UNIVERSITETET I AGDER

Student Motivation in Mathematical Problem-Solving Tasks

Motivating factors of Problem Solving – Intrinsic and Extrinsic Motivation.

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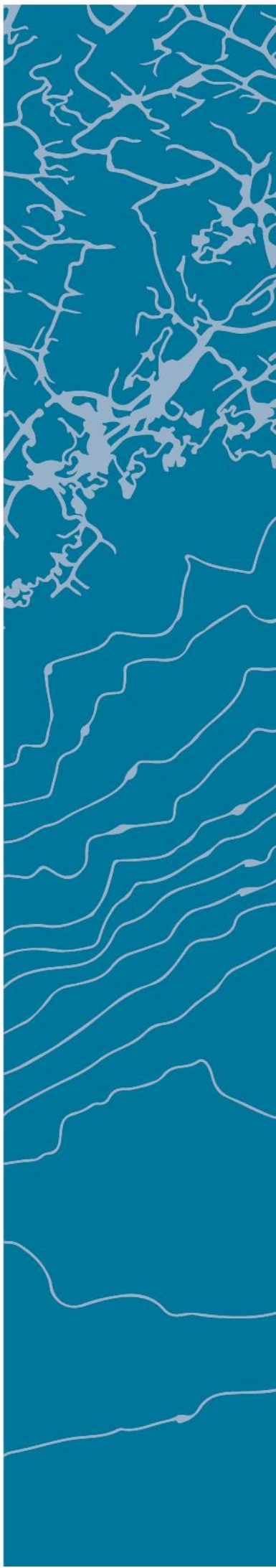

PREFACE

This thesis is submitted for the degree of Masters in Mathematics at University of Agder. The study herein was conducted under the supervision of Professor Cengiz Alacaci and Postdoctoral Research Fellow Yusuf Feyisara Zakariya from the Department of Mathematical Sciences. This work is, to the best of my knowledge, original except where acknowledgements and references are made to previous work.

A two-year master's degree in mathematics is almost now over. This has been an exciting and educational journey for me. Throughout this journey, I have been inspired by various topics in mathematics including problem-solving and research methodology. I chose to do research on the topic of problem-solving, and this master's thesis is a result of my study, which I hope will help me improvise as an educator and can inspire others to further work on problem-solving with mathematics in school. After three years of experience as a teacher at the middle year's program level of an International Baccalaureate school, I have now realized that I have worked far too little with problem-solving tasks with my students, and I am motivated to focus more on this aspect from now on.

Working on my master's thesis has not been just educational, it was also interesting and inspiring. The whole study period was more demanding and strenuous, but I was quite lucky to receive support from all the ends. I would like to thank my supervisors first who were there for me whenever I needed support and help throughout the past academic year regarding the thesis. Starting from the groundwork through the completion of the writing of the thesis, the immense support from my supervisors kept me motivated and inspired throughout the process. You inspired me to do my research on problem-solving, and through my work with this master's thesis, you have given me guidance and concrete feedback, which made me succeed in achieving a good result in my research.

I would like to thank my family for encouraging me to keep going and my coordinator at school, Mr. Marius Sommer Strand, for being so flexible and supporting me throughout my study process. My heartfelt thanks go to my students from grade 9 and 10 for readily accepting to be part of the study. Furthermore, I would like to thank Arendal International School, the wonderful place where I work, for their immense support.

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ABSTRACT

Students from the school are our future. Therefore, it is essential that teachers, who are part of the school, encourage the students to use their full potential. To do this, teachers need to make their students find the schoolwork satisfying and enjoyable and also something useful for their future. One of the important tasks for an educator is to motivate their students to develop the willingness to learn.

This study involves a combination of both quantitative and qualitative approaches that examine what kind of motivating factors can influence the motivation for problem-solving of students based on the rating of the tasks and their ability to solve tasks by them. The study has been conducted in two grade levels at a lower secondary school (International Baccalaureate) in Southern Norway and is based on systematic data collection through Likert type questionnaires, text comments and audio recordings. The empirical material consists of a data collection instrument and post-session interviews.

The result of this study shows that both intrinsic and extrinsic motivation is crucial for problem-solving. Visuals can be one of the most prominent motivation attributes behind problem-solving. In this master's thesis, I have also concluded that the motivating factors for different age groups of students can differ. The results also underline the importance of intrinsic motivation in problem-solving.

Keywords: Mathematical tasks, motivating factors, problem-solving, intrinsic motivation, extrinsic motivation, task design.

SAMMENDRAG

Elever fra skolen er fremtiden vår. Derfor er det vesentlig at lærere, som er en del av skolen, oppmuntrer elevene til å bruke sitt fulle potensial. For å gjøre dette, må lærerne få elevene til å finne skolearbeidet tilfredsstillende og morsomt og også noe nyttig for fremtiden. En av de viktige oppgavene for en lærer er å motivere elevene til å utvikle vilje til å lære.

Denne studien innebærer en kombinasjon av både kvantitative og kvalitative tilnærminger som undersøker hva slags motivasjonsfaktorer som kan påvirke motivasjonen for problemløsning hos elever basert på vurderingen av oppgavene og deres evne til å løse oppgaver av dem. Studien er utført på to klassetrinn ved en ungdomsskole (International Baccalaureate) i Sør-Norge og er basert på systematisk datainnsamling gjennom spørreskjemaer av typen Likert, tekstkommentarer og lydopptak. Det empiriske materialet består av et datainnsamlingsinstrument og intervjuer etter økten.

Resultatet av denne studien viser at både indre og ytre motivasjon er avgjørende for problemløsning. Visuals kan være en av de mest fremtredende motivasjonsegenskapene bak problemløsning. I denne masteroppgaven har jeg også konkludert med at motivasjonsfaktorene for ulike aldersgrupper av elever kan variere. Resultatene understreker også viktigheten av indre motivasjon i problemløsning.

Nøkkelord: Matematiske oppgaver, motivasjonsfaktorer, problemløsning, indre motivasjon, ytre motivasjon, oppgavedesign.

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1. INTRODUCTION

For all of us, math is at the centre of whatever we do. This simple phrase summarises our belief that no matter which background we come from or what ability we have, regardless of our age, math is helpful, and it can also improve our life. Mathematics is a human-centred discipline used to make sense of the world around us in which we use mathematics to communicate, problem solve, measure, and barter (Goldberg, 2014). Mathematics literally means things that can be counted, and that definition can explain the vitality of mathematics in our daily life (Yadav, 2017).

Mathematics is referred to as the queen of science by Carl Friedrich Gauss (Yadav, 2017), where many students have a fear of that queen, which is essential to the growth of many other disciplines. The development of mathematics is the reason behind the development of humankind and its culture. Mathematics is a means to develop reasoning, intelligence and thinking power. Mathematics is physics where experiments are cheap, a philosophy where statements are factual without debate or discussion, computer science without electricity; in other words, computer science is mathematics with electricity (Ziegler & Loos, 2017). As per mathematician Benjamin Peirce, mathematics is a science that draws necessary conclusions. The researcher believes in the fact that either you love math or hate math, but you cannot live without mathematics.

“Nearly all questions and problems in mathematics education, that is, questions and problems concerning human learning and the teaching of mathematics, influence and are influenced by relations between mathematics and some aspects of the real world” (Blum et al., 2007).

Mathematics is the science of order, structure and relation that has evolved from fundamental practices of measuring, counting and describing the shapes of objects, which also deals with logical reasoning and quantitative calculation. The development of mathematics led to an advanced level of idealisation and abstraction of its subject matter. A mathematical problem (Xenofontos & Andrews, 2014) is the one that presents a goal but no immediate solution process (Pólya 1981; Blum and Niss 1991; Nunokawa 2005).

It is a common saying that math is for the brain like gym is for the body. The knowledge that mathematics provides plays a crucial role in understanding the contents of other subjects such as science, social studies, and even art and music. Mathematics helps with thinking ability and wisdom, increasing the speed of intuition and making the child smarter. Overall, mathematics plays a crucial role in a constantly evolving world, where it provides individuals to get an opportunity to get into the world.

The role of mathematics is vital in everyday matters such as accounting, driving, cooking, accounting, financing, engineering, software, and banking, as these functions require a strong mathematical background. Mathematics is the pillar behind the organisation of our everyday lives.

Even though humans can never ignore math, it still remains a subject that students love to hate. As teachers, we always prefer not to teach for only testing purposes, but we try to enable students to see math as the gateway to an enriched life. The fact stated by (Hedrick, E. R., 1917) is true even now where real or alleged educators complain that either the public or themselves tends to show a lack of appreciation of the vital role played by mathematics in the affairs of humanity.

1.1 Significance of the Study

Evidence in the literature suggests a non-trivial relationship between the nature of mathematics tasks and students' motivation to solve the tasks. The purpose of the study is to uncover some characteristics of mathematical tasks that motivate lower secondary school students to solve them. The outcome is expected to help the researcher and other mathematics teachers to understand what factors related to the tasks motivate students for engaging and solving them. This will contribute to improving teaching methods by gaining an understanding of students' perspectives on motivation for problem-solving.

Research Questions

1. What attributes of mathematics tasks are related to students' intrinsic motivation or extrinsic motivation to solve them?

2. Is there a significant difference between two grade levels (Grade 9 and Grade 10) with their perception of motivation for solving the mathematical tasks?

The first question seeks out the answers to what motivational factors can be attributed to a student's choice of selection and whether that motivation comes from internally or externally. Also, the question will try to figure out the top three motivational aspects among all others.

The second question will look into the pattern of liking and disliking a task and selection of a task by students from two different age groups or grade levels, in this case, grade 9 and student. It will try to conclude whether there is a significant difference between the approaches of the students from the two different classes.

Self-determination theory (SDT) of motivation was used to support this research since the focus is on the motivating factors. SDT represents a broad framework for the study of human motivation and personality that defines intrinsic and varied extrinsic sources of motivation.

A total of 14 tasks were used for problem solving in which 37 students participated.

1.2 Mathematics and Problem Solving

In school, the knowledge of mathematics plays a vital role with understanding other subjects such as science, social studies and even music and art since mathematics provides an efficient way to build mental discipline and also encourages logical reasoning and mental rigor.

"Mathematics education is considered crucial not only because of the gatekeeping role that mathematics plays in students' access to educational and economic opportunities, but also because the problem-solving processes and the acquisition of problem-solving strategies equips students for life beyond school" (Cobb, & Hodge, 2002). Problem-solving in learning mathematics is considered important because of the understanding that mathematics is primarily about reasoning, not memorization. Without a problem, there is no mathematics, so mathematicians have always understood that problem-solving is central to their discipline.

The learners themselves can deal with the motivation of problem-solving or it can be triggered by task design. Students develop a deeper understanding of mathematical concepts through problem-solving and then become more engaged and appreciate the usefulness of mathematics (Wu and Zhang 2006).

Problem-solving in mathematics aids the development of the ability to think creatively, critically, and logically, the potential to structure and organize, process information, intellectual challenges that provides enjoyment, the problem solving skills help investigate and understand the world.

1.3 Structure of the Thesis

This thesis consists of six chapters. The second chapter following this introduction presents the theoretical underpinnings of the study. The chapter contains a review of literature and related topics that provide a basis for the whole research study. This includes a brief description of motivation, problem-solving, motivating factors and continues with mathematical problem solving and motivation.

The third chapter presents the methodology used in this study. This includes a presentation of the research strategy, the research design which entails the research method, a description of the research participants, the specific methods used in the data collection, the management of the data and the strategy used for the analysis. This chapter also provides details on the ethical considerations as well as the validity and trustworthiness of the study.

The fourth chapter includes the data analysis and the main findings. This includes the analysis of the data collected through questionnaires and audio interview transcripts. The fifth chapter presents the discussion of the research findings. The discussion involves the connection between the researcher's interpretations and the literature review. The research questions are being addressed in the discussion chapter.

The sixth and final chapter presents the possible implications of the results to mathematic teaching, followed by the limitations of the study, an implication of the study for teaching and also suggestions for further research.

2. THEORETICAL BACKGROUND

Motivation can be simply defined as a reason for behaving or acting in a particular way. Motivation can be discerned as having several meanings. The concept motivation means to move (a derivation of the Latin word "movere." which means to move (Huber, 2006, p. 481). The importance of motivation to support student learning has long been recognised by educational psychologists. Motivation is involvement of a constellation of closely related beliefs, perceptions, values, interests, and actions (Lai, E.R., 2011). The word motivation influences every aspect of our daily lives. Motivation is conceptualised as a strong wish that powers individuals to participate in an activity for the love of satisfaction derived from doing that activity. Psychologists claim that the behaviour is activated by motivation, and it sets an individual in a forward direction toward achieving goals or needs (Theobald, 2006). Motivation is also described as a process that stimulates and initiates the behaviours of humans toward reaching specific goals (Huber, 2006, p. 481). In essence, motivation sets an individual in motion to continue to act until the goal is met (Slavin, 2006). Motivation can also be described as a psychological force that sets a person in action until they are satisfied by certain needs.

2.1 Concept of Motivation

The reasons underlying a particular behaviour can be termed as motivation (Guay et al., 2010). Different approaches to motivation focus on cognitive behaviours (like monitoring and use of strategy), non-cognitive aspects (like perceptions, attitudes and beliefs) or both. Academic motivation can be defined as the joy of learning at school characterised by a mastery orientation, curiosity, persistence, and the learning of challenging, difficult, and novel tasks Gottfried (1990). On a different note, motivation can also mean cognitive engagement, which can be defined as voluntary usage of high-level self-regulated learning strategies like planning, paying attention, connection and monitoring (Turner, 1995).

Although motivation can be viewed from different perspectives, from a teacher’s perspective, it influences learning. Motivation can also be defined as a goal-directed learning in a particular direction. Each person has some needs that drive the individual in a specific direction by a driving force, which represents the physical and mental incentives. With that stimulation force, the person acts to accomplish the needs and reach the accomplishment point (Ozkalp and Kırel, 2005, p. 315).

Over the last two decades, academic entities have been attracted by research on motivation (Sekhar et al., 2013). Motivating factors are the ones that encourage individuals to be committed continually and interested in whatever they do.

When it comes to the learning process, motivation is an important factor where the student has the determination to learn, discover, take advantage of capabilities, develop academic performance, and adjust to the demands of the school context.

The term motivation can be described as the process that initiates, guides, and maintains goal-oriented behaviours, which is also what causes you to act. The behaviours can range from getting a glass of water to quench thirst or to play football to become a professional. The forces that activate the behaviour can be biological, emotional, social, and cognitive. Motivation is the driving force behind human actions.

As teachers, when working with young people, we are always interested in finding what motivates them; in other words, what the child goes through, how they think, feel, and behave as they do. The heart of teaching learners is the motivation of all ages and abilities. When we teachers have a clear understanding of motivation in school, our ability to understand and support this group of students, who at best find learning as a chore and, at worst, they should fight against. Those students who are labelled as demotivated can be referred as those who are incredibly motivated to be not motivated (Ramey, 2013). Through mathematical understanding, learning and growth that comes from motivation give students purpose.

The students' experiences as they go through the educational system affirm or alter their evolving motivational patterns and connections with learning (Lumsden, 1999, p. 15). In creating an environment that supports students learning to keep their autonomy, teachers play a vital role (Schuitema et al., 2016). Energetic and enthusiastic teachers about their subject or task provide positive feelings and importance to what they teach (Schiefele & Schaffner, 2015; Zhang, 2014).

An unmotivated person is the one who feels no inspiration to act, and a motivated person is the one who is energised towards a goal (Ryan, 2020). Motivation not only varies in amounts, but it is of different types. One good example to differentiate the motivation in terms of amount and the different types is a student who is motivated to do the homework so that he will get appreciation or approval from the teacher or parent. On the other hand, a student will be highly motivated to do the same work, but for a different reason, to learn a new set of skills (Ryan, 2020). From the example, there is not much difference concerning the amount of motivation, but one can see a big difference with respect to nature and the focus of the motivation. The likelihood of achieving the goals set for them is met by the students who are motivated to learn, either by themselves or by the teachers.

One of the common concerns that the teachers have is the students' lack of motivation toward mathematics and the difficulty in understanding what motivates the students to embrace mathematics learning.
The two types of motivation that the researcher is interested in this research are intrinsic and extrinsic motivation.

Extrinsic motivation is related an external source where external factors unrelated to tasks being performed motivate the person (Ormrod, 2008), an example being an increase in pay after obtaining a new degree. Monetary compensation is the motivating factor that extrinsically motivates and provides satisfaction for the employees, whereas the actual task is a separate one (Osterloh & Frey, 1999). A student wanting good grades or praise that come from accomplishing a task is a best example of extrinsic motivation. Ormrod states people who are extrinsically motivated are motivated to perform a task as a means to an end, not as an end in itself (Ormrod, 2008).

Intrinsic motivation is where an internal factor acts as the source of the motivation. That internal factor is related to the task being performed, and it comes from within a person (Ormrod, 2008). The persons who are intrinsically motivated tend to engage in activities or tasks for the complete pleasure it provides them, helps them in developing essential skills or for ethical or moral reasons (Ormrod, 2008). A student who obtains a degree for just personal gratification is a good example of intrinsic motivation. Researchers often find the difference between intrinsic motivation and extrinsic motivation, which is motivation governed by reinforcement eventualities. Educators always considered intrinsic motivation to be a most desirable one than extrinsic motivation when it comes to the results of learning (Deci et al., 1999).

2.2 Theoretical Perspectives of Motivation

2.2.1 Attribution Theory

The word "attribution" refers to speculation about the causes behind a behaviour or an event. The term "attribution" can be best explained by the following examples: You hear a loud backfire sound when you drive a car, you likely will deduce that the sound comes from the car; the sound's attribution is the car. Similarly, if the presence of parents at a sporting event makes the child perform better, then the improved performance can be attributed to the attendance of the parents. The publication of Fritz Heider's, The Psychology of Interpersonal Relations (Heider, 1958) led to the origin of Attribution Theory as a field. The causes of everyday events as ascribed by humans, especially other human beings' observed behaviour, can be explained in ways that attribution theory seeks (Creagh, 1985). Attribution answers why question where the domain for motivation is an achievement (Wentzel, 2016). Attributions are made by individuals about themselves as well as other people.

When individuals make attribution, they tend to focus on three important factors, namely Consensus, Consistency and Distinctiveness. The proposal of this theory is that internal and external factors are attributable to an individual's actions.

The effortful student gets a reward from the teachers, whereas the lazy and unmotivated students are not rewarded. As explained by attribution theory, when a teacher sees a student fail due to a lack of effort, the student is deemed responsible, which results in reprimand. On the other hand, when the student fails due to low aptitude or low intelligence, it is deemed that the student is not responsible for that failure and will result in sympathy towards that student or that student will get help (Wentzel, 2016).

One of the significant advantages of attribution theory is that it can be applied to individuals of any age and environment. The benefits of this theory also include its ability to explain the difference in motivation between high and low achievers.

As per attribution theory, individuals gravitate toward making connections between praise and their performance or behaviour. This indicates that discouragement or embarrassment may be brought upon by praise that is contingent on the behaviour or performance (Dweck et al., 1978). Praise can also be a replacement for intrinsic motivators like self-reinforcement (Mumm and Mutlu, 2011).

One of the criticisms that Attribution Theory draws is that it is retrospective. This fact is based on the argument that this theory is helpful in understanding the effects on self-efficacy, formation of future goals, and the perception of values, but the motivation is not directly influenced.

Researchers believe that greater emphasis should be placed on effecting motivation rather than what has caused the motivation. Malle (2011) came up with the fact that this theory did not consider a simple explanation for behaviour by an individual. In other words, the researchers find this theory hard to study because it is challenging to measure an individual's perception of an event. High performers will attempt at responsibilities related to prospering instead of avoiding the responsibilities.

High achievers tend to blame bad luck for their failure rather than accepting that it is their fault. One of the fundamental errors is that this theory underestimates the external factor's influence and favours the influence of internal factors, where the success of the individuals is attributed to their internal factors, and their failures are attributed to external factors. Also, with the learning process, praise in some forms can sometimes damage the process, and other forms of praise will help motivation and learning. Also, the effects of praise cannot be put in simpler terms as its influence involves different elements specific to different individuals (Robins, 2012).

Overall, many different factors should be taken into account before determining the praise's effect. The main idea of this theory is that post event, subconscious causal explanations (attributions) for the results are created by learners. The terms of attributions may vary like locus, stability, and controllability, which influence emotions, which in turn drive motivation in future tasks (Cook, 2016).

2.2.2 Social Cognitive Theory

Social cognitive theory is a theory of human behaviour that emphasises learning from the social environment. The social-cognitive theory emphasises that the primary driver of motivated action is self-efficacy and also clearly defines the evidence that influences future self-efficacy and supports self-regulated learning (Cook, 2016). The goals that can energise and direct motivational outcomes can be predicted by social cognitive theory (Bandura, 1986, 1997). Some of the limitations of Social Cognitive Theory are listed here. One of the drawbacks of this theory is that the motivation research agenda is far from complete for social cognitive theory (Schunk, 2020). In other words, it is a theory that is still evolving. Also, this theory primarily focuses on the learning process, and while doing that, it ignores the biological predispositions that might influence the behaviours, notwithstanding previous expectations and experiences. The theory states that a person will undergo changes when there is a change in environment, which may not always be true.

2.2.3 Expectancy Value Theory

As per the Expectancy-Value theory, the purpose of motivation is the expectation of success and perceived value (Cook, 2016). Expectancy Value Theory proposes that for any given behaviour or action, the motivation for a given behaviour or action is decided by two factors: Expectancy – The probability of how the desired outcome is achieved through action or behaviour. Value – To what extent the desired outcome is valued by the individual (Vroom, 1964). That is why the expectancy theory of motivation is also known as the valence-instrumentality-expectancy theory. As per this theory, the expected outcome for an individual, as a result of hard work and labour, is directly tied to the motivation of that individual. This can be explained in other words, when the individuals have a firm belief that their current actions will result in their desired goal, their motivation level will keep on increasing. If both these factors are aligned properly, then the result will be that a person gets motivated to complete a task.

The expectancy and value constructs initially were defined by theorists such as Lewin (1938) and Tolman (1932). John William Atkinson developed this theory in the 1950s and 1960s, but when Jacquelynne Eccles is the key scholar who was credited as bringing this to the field of education studies.

"The basic premise of the expectancy-value model is that choice of achievement-related tasks, performance, and persistence are most directly predicted by one's expectations for success on those tasks and the extent to which one values the tasks" (Eccles 2007, 2011a, 2011b; Wigfield 1994).

Figure 1 - Expectancy-Value Model

As per this theory, the changes in motivation can be based on three factors: Valence, Expectancy, and Instrumentality. These three factors can be defined as:

Valence is a measure of weight that an individual places on the outcome of something that the individual does. In other words, valency is how bad an individual wants to do something. The motivation gets higher as the valence gets higher. Expectancy can be described as a belief of the individual that performance will get better based on your increased effort. In other words, things such as skills, information, resources and foreseeable future growth affect the expectancy level. The motivation increases as the expectancy also increase. Instrumentality can be described as the belief that the outcome or goal of an individual depends on the level of the individual's level of performance.

The expectancies of individuals for success and the value they have for succeeding determine their motivation to perform different achievement tasks (Wigfield, 1994). The expectancies and values of the children are determined by other beliefs that are achievement related that includes the achievement goal, self-plan and task specific beliefs of the children. Expectancy Value Theory (Vroom, 1964) suggests that for a given behaviour or action, its motivation is determined by the factors, namely expectancy, the probability that the motivation plays a vital role in the outcome achieved through the behaviour or action, and the second factor is value, where how much it is valued by the individual. Expectancies can also be defined as the anticipation of an individual that their performance will lead to success or failure and the value as the attractiveness of the success or failure on a task Atkinson (1957).

As proposed by Eccles et al. (1983), the achievement of children based on their performance, choice of achievement tasks, and persistence are predicted by the children's expectancies for succeeding on the tasks and the subjective value that is associated with those tasks.

Expectancy, instrumentality, and valence are each considered to be necessary but not sufficient conditions for motivation. In other words, an individual must have all three beliefs to be highly motivated (Lambright, 2010). One of the main limitations of this theory is that most individuals believe that there is a remarkable connection between performance and rewards; the expectation theory of motivation appears ideal and ineffective. The difference in expectation may serve as one of the most significant disadvantages of this theory. In other words, the expectations of individuals of the same group cannot be identical, and while some expectations can be met, it is not practical to meet the expectations of all the individuals. One more limitation of this theory is that the concepts of expectancy of success and value occur repeatedly in various other theories (Cook, 2016).

2.2.4 Self-Regulated Learning

Learning and motivation are dependent on each other. As per SRL, students should seek out for knowledge proactively rather than just reacting to situations when an opportunity is provided (Zubair, O. 2017). Self-regulated learning (SRL) refers to a constructive and active process whereby the goals of learning will be set by the learners themselves, and then they "attempt to monitor, regulate, and control their cognition, motivation, and behaviour, guided and constrained by their goals and contextual features of the environment" (Zheng, 2020).

Numerous self-regulatory processes are utilised for learning (Azevedo, 2009). Self-regulation facilitates individuals to function effectively in their personal lives. Also, the knowledge and skills needed to succeed in higher education and the workplace are acquired through self-regulation. Self-regulated learning (SRL) is a conceptual framework that helps understand the cognitive, motivational, and emotional aspects of learning (Sitzmann and Ely, 2011). The process that enables individuals to guide their goal-directed activities, including the transition of cognition, affect and behaviour, is referred to as self-regulation (Karoly, 1993).

Self-regulated learning (SRL), which is one of the critical areas within educational psychology, includes the following aspects of learning: Cognitive, metacognitive, behavioural, motivational, emotional and affective. "The concept of Self-Regulated Learning (SRL) arose in the 1980s as a research problem and, for decades, it has continued to be important for researchers and teachers" (Zimmerman & Schunk, 2011).

Self-regulated learning (SRL) is a cyclical process of the student planning for a task, observing the performance, and reflecting on the outcome (Zimmerman, 2002). The fundamental pillars of SRL are formed by some key characteristics, which are part of numerous models of SRL. “These include self-motivating, possessing and utilising knowledge, personal learning responsibilities, reflective thinking, and evaluating one’s performance” (Zubair, O. 2017). Research has proven that for effective problem-solving, self-regulated learning (SRL) skills are crucial (e.g., Ackerman and Thompson, 2015) (Baars, 2017).

Self-regulated learning demands the learners to set their learning goals, make their learning plans, make a choice of their learning strategies, watch their learning processes, assess their learning outcomes and prevent the development of an intervention (Cheng, 2011).

The relationship between motivation and self-regulated learning from the perspective of goal orientation was explained by Pintrich (Pintrich, 2000). According to Pintrich, goal orientations can be categorised into two types: Performance orientation and mastery orientation. The learner’s learning to use self-set goals or improve themselves can be related to mastery orientation, whereas the learner’s learning to surpass others can be related to performance orientation (Cheng, 2011).

Self-regulation of motivation is divided into two categories: Motivational beliefs, motivational strategies and regulatory strategies. Self-regulated learners can regulate their strategy or behaviour based on their intrinsic feedback, whereas non-self-regulated learners have to deal with new information depending on extrinsic regulation (Boekaerts, 1999). Regarding the disadvantages of self-regulation, not all students can become great self-regulators due to the lack of instructional processes that can regulate self-regulated learning in their lives. Failure and decreased self-efficacy can affect a person's ability and desire to self-regulate (Ormrod, 2012).

2.3 Theoretical Framework – Self-Determination Theory

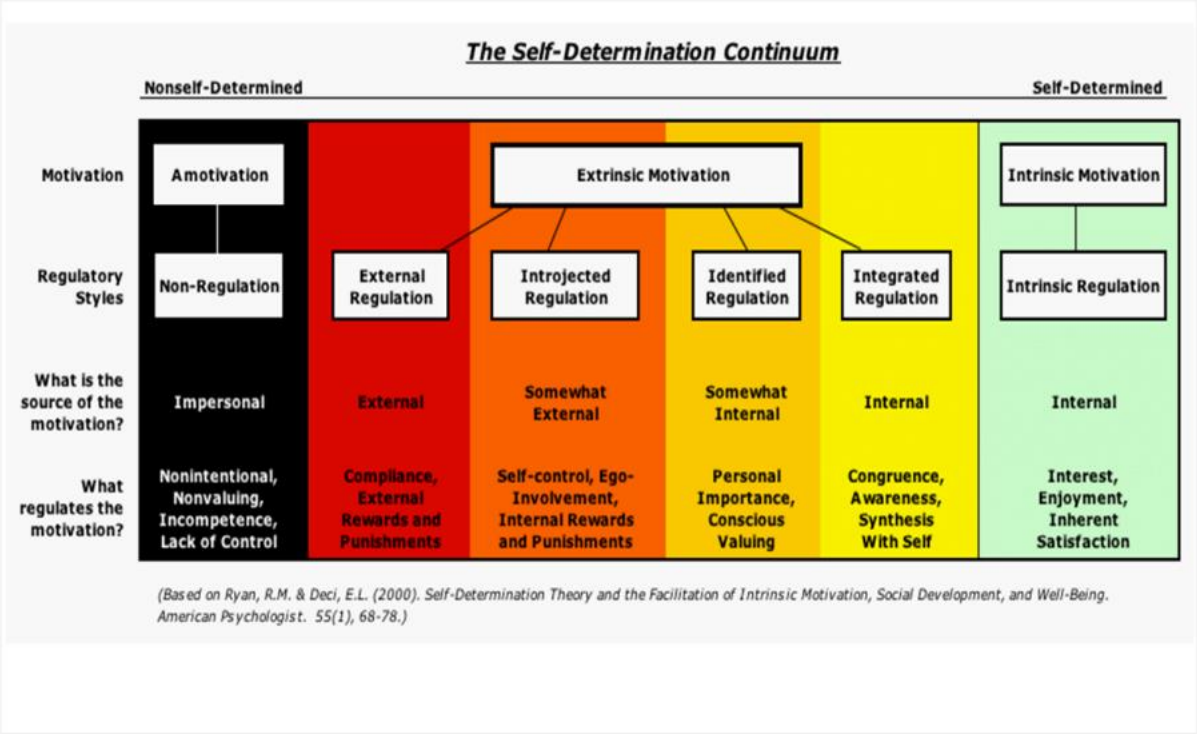
SDT is the theoretical framework adopted for this research. Self-determination Theory (SDT) is a theory that deals with human motivation which examines a wide range of occurrences across gender, culture, age, and socioeconomic status.

Self-determination theory was developed over the last 50 years by Richard M. Ryan and Edward L. Deci (2000a). SDT, as a motivational theory, addresses the energising factors behind people’s behaviour and drives those factors into action and also how the various domains of their lives are regulated by their behaviours.

The explanations of SDT are centred at the psychological level as opposed to sociological or physiological levels. Thus, the regulatory, behavioural, developmental and experimental outcomes are predicted using human perceptions, cognitions, emotions, and needs (e.g., Ryan and Deci, 2000b). Self-Determination Theory (SDT) is an understanding of how students were motivated to learn mathematics on a theoretical basis.

Some of the examples of self-determination are individuals doing regular exercise because they have the health benefits from regular exercise, as does quit smoking, a child`s enjoyment playing with toys, a child completing their tasks because of the child's understanding of the value of responsibility. SDT helps categorise motivation based on two different goals: Intrinsic and extrinsic motivation. The two categories, intrinsic and extrinsic motivation, can be assumed as two distant ends of the spectrum, and the individuals who have been previously extrinsically motivated for the tasks have internalised their motivations now. Traditionally, extrinsic motivation has always been viewed as inferior to intrinsic motivation, but extrinsic motivation is also equally important (Nguyen, 2016).

Figure 2 - Self-Determination Continuum



When it comes to learning, according to Self-Determination Theory, learners have a natural tendency to explore their environments, to grow, learn and develop. This theory mainly investigates the essential and constructive human tendency inching toward growth and delineates to move towards growth, and outlines three vital needs, namely: Autonomy, Competence, and Relatedness, which facilitate that growth; Competence is where the individual gets the satisfaction of doing a good job, Autonomy is the need to have a feeling of having control over the happenings and Relatedness is the need to have interactions with other people and also meaningful relationships.

2.4 SDT's Six Mini-Theories

SDT can be defined as comprising of six mini-theories, which were developed to explain a set of motivationally based phenomena.

2.4.1 Cognitive Evaluation Theory

Cognitive Evaluation Theory was first presented by Edward Deci in 1975. Cognitive Evaluation Theory (CET) was developed based on the observational results about the effects of external motivating factors or consequences such as praise and reward on internal motivation. CET primarily concerns about intrinsic motivation. CET puts external consequences in a meaningful context with the feeling of being competent and autonomy to determine their impact on intrinsic motivation (Thanh, N 2020).

Deci's CET theory was summarised by Boal and Cummings (1981) into three propositions as follows. The first proposition states that when internal factors are substituted by external factors as the motivating factors of their actions, then the intrinsic motivation will get affected. Receiving external praise or award, under certain circumstances, where the action was internally motivated, reduces one's engagement in that activity. The second proposition states that when the feelings of competence and self-determination changes, it will result in a change in intrinsic motivation.

When the competence and the self-determination felt by an individual are less, then the intrinsic motivation also will fall accordingly. Richard M. Ryan (1985) argues that the autonomy should be accompanied with a sense of competence to have a positive effect on intrinsic motivation. The third proposition states that every praise or feedback or reward will deliver information regarding the self-determination and competence of an individual with spontaneous informational and controlling aspects out of which the most remarkable element will determine the outcome correspondingly or else, the intrinsic motivation will decrease.

Cognitive Evaluation Theory (CET) deals with intrinsic motivation, which is based on the satisfaction of behaving for the purpose of its own sake. Prototypes of intrinsic motivation are children's exploration and play, but intrinsic motivation is a lifelong creative wellspring. CET specifically addresses on how elements such as ego-involvements, rewards and interpersonal controls affect intrinsic motivation and interest. Intrinsic motivation is supported by the critical roles played by competence and autonomy, which are essential in education and many other domains, as highlighted by CET.

2.4.2 Organismic Integration Theory (OIT)

Organismic Integration Theory (OIT) talks about the various forms and properties of extrinsic motivation, the forms being their properties, determinants, and consequences. OIT relates how external factors can be internalised and converted to motivators or de-motivators.

According to Organismic Integration Theory (OIT), the extent of autonomy's presence decides the dependence of extrinsic motivation. In other words, extrinsic motivation varies according to the integration and internalisation of the activity's value. "Internalization is how well the value of an activity is felt while integration explains the process of individual transformation from external regulation to their own self-regulated version (Ryan & Deci,2000)." It is aimed at results that are extrinsic to the behaviour itself. As a development, there are many specific forms of instrumentality, which include external regulation, introjection, identification, and integration. Extrinsic motivation consists of subtypes that are seen as falling along a continuous internalisation sequence. As the person becomes more autonomous by enacting the behaviours, the extrinsic motivation will be more internalised. Support for autonomy and relatedness as critical to internalisation is highlighted by OIT.

2.4.3 Causality Orientations Theory (COT)

The individual differences in people's tendencies to adapt to environments and regulate behaviour in various ways are described by COT. Causality orientations theory distinguishes three broad categories of psychological processes related to behaviour and motivation. They are autonomous, control-determined, and impersonal. Choices based on one's needs and integrated goals initiate and regulate autonomous behaviours. Autonomously functioning people hypothesise to seek out to experience and choose their behaviour as self-initiated. The controls in the environment, such as reward structures or by internally controlling essentials, indicate how one "should" or "must" behave, initiate and regulate Control-determined behaviours (Deci & Ryan, 1985). As per the theory proposed by COT, even though people have a difference in the relative strengths of the three orientations, they do possess, to some degree, each of the orientations (Deci and Ryan, 1985, 2017).

2.4.4 Basic Psychological Needs Theory (BPNT)

(BPNT) details the concept of psychological needs that are evolved and their relations to psychological health and well-being. Three basic psychological needs are put forward by BPNT as adaptive human functions: Autonomy, competence, and relatedness (Ryan & Deci, 2000). If these three needs are fulfilled, then the person becomes more functioning, which in turn will lead to the achievement of well-being. BPNT focused only on need satisfaction (Nishimura & Suzuki, 2016). Contexts that support as against to prevent these needs should constantly affect wellness. BPNT deals with cross-developmental and cross-cultural settings for authorisation and clarifications because basic needs are universal aspects of functioning.

The literature indicates that the satisfaction of the BPNs has been associated with greater autonomous motivation, greater self-control, or greater intention to want to learn, which are some of the positive consequences (Haerens, L., 2015).

2.4.5 Goal Contents Theory (GCT)

This theory states that the life goals of individuals will be different, namely intrinsic or extrinsic and how motivation and wellness are impacted by them differently. According to goal contents theory (Vansteenkiste, Niemiec, & Soenens, 2010), some of the goals pursued by individuals are more certainly to promote well-being than other goals (Kasser & Ryan, 1996). As per this theory, the goals for the individuals are viewed as discriminatively affording basic needs satisfaction and are thus discriminatively associated with well-being. Intrinsic goals such as community, personal growth, and close relationships have explicitly been conflicting with extrinsic goals such as financial success, appearance, and popularity/fame, with extrinsic motivation more likely associated with a lower level of wellness and a greater level of ill-being.

2.4.6 Relationships Motivation Theory (RMT)

RMT hypothesises “a basic psychological need for relatedness that mobilises people to pursue relationships, yet not all relationships are of high quality and satisfy the relatedness need” (Deci & Ryan, 2014). Research also shows us that not just relatedness need is satisfied in high-quality relationships, whereas the need for autonomy and competence are also satisfied.

2.5 Intrinsic Motivation and Extrinsic Motivation

This research paper also tries to investigate intrinsic and extrinsic motivation during problem-solving sessions by the lower secondary school students and which motivation type was the most significant driving factor in the problem-solving.

"Synonym
Intrinsic motivation – Interest, enjoyment, inherent satisfaction.
Extrinsic motivation – Instrumental motivation, noninherent motivation." (Legault, 2016).

Engagement in behaviour that is inherently satisfying or enjoyable is referred to as intrinsic motivation (IM). Intrinsically motivated action that is not contingent upon any outcome outside of the behaviour itself is defined as intrinsic motivation. A child doing outdoor play activities just because it is fun and innately satisfying and not for any other reason is an example of intrinsic motivation. Intrinsic motivation can be seen through the following examples where an individual is going for a run because he\she finds it relaxing or energising or trying to break their own personal record. One more example is a person who does painting because the individual feels that painting provides a sense of being calm and happy.

Intrinsic motivation is essential for task persistence, for seeing a project through, and for ensuring the exploration of solutions (Legault, 2016). Performance of behaviour that is fundamentally contingent upon achieving an outcome that is outside of the action itself can be referred to as extrinsic motivation (EM). An example is that a teenager might do household chores at home to receive an allowance. Extrinsic motivation can be seen through the following examples instead of intrinsic motivation. The same example of going for a run, but in this case, the individual is more concerned about his\her increasing the chances of winning a competition and painting is done by the individual to sell that art for the purpose of making money (Legault, 2016). Both intrinsic and extrinsic drives can be experienced by an individual for any given task.

When educators cannot always rely on intrinsic motivation to promote learning, understanding different types of extrinsic motivation and what promotes them becomes crucial. Ryan and Deci (Ryan, 2020) suggested that since many academic tasks are interesting or enjoyed by the students readily, then an important and essential strategy for successful learning and teaching is knowing how to encourage active learning and self-imposed forms of extrinsic motivation.

The comparison between intrinsic and extrinsic motivation discusses about engagement in tasks through the internal drive to engage in tasks for the satisfaction and joy they bring as opposed to extrinsic motivation caters to an individual's need to seek rewards or praise (Hoffman, 2015). For any given task, both intrinsic and extrinsic drives are experienced by an individual. Intrinsic motivation can be associated with meaningful learning (Mayer, 2008). However, as the learning progresses, extrinsic motivation can develop into intrinsic motivation.

The core of Self-Determination theory is formed by intrinsic motivation. Intrinsic interest is part of the Eccles-Wigfield 'value' construct (EVT). In SDT, intrinsic or extrinsic motivation can give rise to values such as curiosity for intrinsic goals and utility and social values for extrinsic motivation (Cook, 2016).

The research on intrinsic motivation (IM) began with the investigation of an interesting task, how extrinsic rewards affect intrinsic motivation. The initial research studies figured out the fact that when an individual engaging freely out of interest in activity was offered an external reward (money or grades or points), the intrinsic motivation of that individual toward that activity subsequently declines (Deci 1971) (Lepper et al. 1973) (Legault, 2016).

Even though these findings were controversial, subsequent critical review affirmed that when extrinsic rewards are expected and tangible, they indeed diminish intrinsic motivation for an activity (Deci et al. 1999).

The main reason for this diminishing effect is because of the tendency of extrinsic rewards to shift an individual's motives for performing the behaviour from internal factors such as satisfaction, fun, and interest to external factors such as grades, rewards, and points, thus eventually changing the locus of causality for action and the source of the motivation (Legault, 2016).

Even though intrinsic motivation is considered the best form of motivation and is associated with different benefits that include persistence, enjoyment and psychological well-being, sometimes extrinsic motivators are thought to be helpful in promoting the behaviour's actions such as recycling, doing homework, obeying traffic laws, that are not intrinsically interesting (Deci and Ryan 2008).

Mounting evidence suggests, however, that despite the initial ease and allure of extrinsic motivators, they carry a substantive cost to learning and the development of autonomous, self-sustaining behaviour (Kohn 1999). Ultimately, incentives and rewards are given to motivate people to decrease the development and persistence of genuine interest and self-generated motivation (Legault, 2016).

When activities lack internal motivating qualities, the motivation will be significantly less to engage in those activities – unless external rewards are available, in other words, unless with the existence of external motivation. Extrinsic motivation is not always the same since some forms of extrinsic motivation are more self-advocated and self-concordant than others. Extrinsic motivation is a broad group of motivations as opposed to being a one-dimensional construct that ranges from an autonomous extent, that is, stemming from an internal perceived locus of causality.

Rather than being a one-dimensional construct, extrinsic motivation is a broad class of motivations that range in the extent to which they are autonomous, that is, the extent to which they stem from an internal perceived locus of causality and sense of personal volition.

After all, an activity is internally regulated as opposed to externally controlled, even when it is not fun or enjoyable. In other words, it is not intrinsically motivated (Legault, 2016).

2.6 Problem-Solving

Problem-solving believes that reasoning is the crucial factor in learning mathematics and not memorisation. Kilpatrick (2009) suggested that the focus of mathematics in school should be problem-solving, and the skills learnt in school should not extend beyond calculation. Lam (2009) pointed out that there has been pressure for problem-solving to be the central focus of the mathematics curriculum at the school level since the 1980s.

2.6.1 The Conceptualisation of Problem-Solving in Mathematics Education

Problem-solving with mathematics establishes the area of mathematics instruction, and there is always a need for research on various instructional approaches to support student learning in this area (Klang, 2021). "Problem-solving is an important cognitive process, be it in everyday life, at work or at school. Problem-solving is the process in which people put effort into closing the gap between an initial or current state (also called givens) and the goal state (Mayer, 1992; Jonassen, 2011; Schunk, 2014)." Problem-solving in this research study demands the pupil to look for and develop a solution method for a given problem that they are facing for the first time.

According to Fauskanger and Bjuland (2018), the means of achieving deep learning is done through problem-solving. Motivation "pertains to a person's basic decisions as to whether or not to accept responsibility for a task and to pursue a given goal" (Reiser & Dempsey, 2012).

The process of constructing and applying mental representations of problems to find solutions to those problems encountered in almost every context is called problem-solving (Jonassen, 2012).

Problem-solving is a mathematical process. Also, from a general perspective, the act of defining, determining the cause and identifying, selecting alternatives and implementing a solution is called problem-solving. According to Mayer (1992), cognitive processing aimed at goal achievement when no particular method is obvious to the person solving the problem is defined as problem-solving.

Mathematics, of all school subjects, is the only one that deals with the "problem-solving" concept and with school learning, it is the fundamental component that provides a substantial formative effect on students. In mathematics, the term "problem solving" indicates tasks that provide intellectual and analysing challenges that will enhance the understanding and development of mathematics by students.

The development of students' problem-solving skills is the main goal achieved through teaching problem-solving in the classroom. Also, the teaching should help and enhance them to come up with various ways of thinking and build the students' confidence when it comes to dealing with unfamiliar situations (Cai and Nie, 2007). Being a central area of mathematics instruction, mathematical problem-solving constitutes an integral part of preparing students to function in modern society (Gravemeijer et al., 2017).

A problem-solving activity provides an opportunity for the student to face a challenge that the student will try to overcome by making use of a combination of the knowledge that the student possesses in a well-defined context and in an efficient manner. For any scientific research, problem-solving is an initiation. This is usually done by analysing or learning to analyse a given situation, looking into various effective strategies, generalisations and so on (Căprioară, 2015).

A mathematical problem, whether it is a pure mathematical problem or one with a practical application, the successful completion of solving it is subjective to the positive way of thinking of the problem solver and the firm intention of the solver to reach the end.

Problem-solving tasks are of different kinds ranging from well-structured transformation problems with a clearly defined goal and solution procedure to not clearly defined problems that do not have a clear goal or solution procedure (Jonassen, 2011).

2.6.2 Characteristics of A Selected Task

The Professional Standards for Teaching Mathematics (NCTM, 1991) stated that "it is the responsibility of teachers to select and develop worthwhile tasks and materials that create opportunities for students to develop mathematical understandings, competence, interests and dispositions." A single problem or a set of problems focused on a student's attention on a mathematical idea is defined as a mathematical task (Stein et al., 1996). The task, as a learning tool, is the instrument of cognitive processes to gain knowledge (Khairunnisa, 2018).

The task is an intermediate used in the mathematics teaching-learning activities so that students gain experience and understanding of mathematics (Khairunnisa, 2018). Students will continue with the problem solving even when it is difficult, only when they feel that the task is both interesting and engaging and interests them throughout. Also, the task should demand the students to come up with various possible approaches and representations. Tasks that build on the understanding of concepts by students, that is interesting to students and looks familiar to them with a good mathematical significance are considered as a valuable mathematical task.

A task should be a challenging one and should promote critical mathematical ideas through conceptual understanding. It should also provide the teachers with opportunities to develop mathematical knowledge essential for teaching (Feldman, 2016).

2.6.3 Mathematical Tasks with Motivation

Traditionally, throughout literature, the issues that connect mathematics and motivation have been reported (Nguyen, 2016). Wæge and Nosrati (2018) point out that in mathematics, motivation can be the sole decisive factor for students to choose which activities they choose to participate in and the amount of time and energy they want to spend on them.

If the math problems or activities do not provide enough motivation, the students will end up with little or no motivation for that said activity; the activity may be either a discussion or a task.
Motivated students, on the other hand, get engaged with the math task or activity, and the students get a feeling of joy, and they lose track of time and place and themselves.

2.7 Task Design

The data collection instrument is designed in such a way it involves problem-solving tasks of 14 different mathematical tasks. The mathematical tasks are created by looking into curricular content that will suit for grade 9 and grade 10 students. The tasks were designed to reflect various states of hypothesized motivating factors. These factors are described below:

1. Visual Elements (Functional and Non-Functional)

To reflect mathematical information, visual representation involving creating and forming models is used (van Garderen & Montague, 2003). Visuals in a task can help explain the task or question, which are called functional visuals and sometimes, they will be just present without being beneficial to actually explain the task, which is non-functional visuals.

2. Context (Applied, Illustrative, Modelling)

Mathematical context problems can be defined as tasks in which the task situation can be really experienced by the student. The context of a task can be abstract (no connection to reality), illustrative (with names and units but no apparent purpose), applied (names, units and a purpose in real life to solve the task) or modelling. Modelling in mathematics can be a mathematical representation of a quantitative relationship in reality Vos, P. (2020).

3. Mathematical Power

Mathematical power is about the curricular content or mathematical concept embedded in the task, in addition to nurturing process skills of problem solving. So, for example, a task with high mathematical power may require an important mathematical concept for solution (e.g., percentage or proportional reasoning) and it can also support good classroom discussion and provide opportunity for pupil reflection.

4. Response Structure (Constructed and Extended)

Constructed response for a task can be defined as a response from the student where the student is required to generate a response rather than selecting a response for the problem-solving. Constructed response tasks demand the students to come up with the correct answer rather than choosing the correct answer from the given set of solutions. Constructed responses are often open-ended questions.

Extended responses, which require essential critical thinking skills, task demand the students to give more detailed answers with the explanation. "Extended response" tasks are often open-ended questions.

The students have to spend considerably more time and thought to provide their responses, where oftentimes the students have to give their responses in a more in-depth way as possible. Sometimes, it is not sufficient for the students to give an answer but explain the answer by showing how they arrived at that answer. The best thing about setting up a task with the extended response is that guessing is almost completely eliminated. These types of tasks enable students to use their prior knowledge and encourages them to make connections and draw conclusions. Any student who masters this skill has a better chance of being academically successful.

Extended responses have their own disadvantages where it is not easy for teachers to set up such tasks and grades. Each student may come up with completely different responses for the task, and the teacher has to go through the work of each student entirely and also the teacher should make an accurate rubric that will help grade such tasks. From a student's perspective, these tasks are time-consuming compared to the multiple-choice questions, where the students spend a lot of time organising the information and constructing a plan before they can actually proceed.

A good example from the task questionnaire that I used for my research is Task 3 where it demands the student to organise the information and construct a plan to come to a conclusion where they can compare the walking and swimming and then use their knowledge of Pythagoras to solve the task.

5. Surprise factor (Yes and no)

The surprise element in mathematics can act as a motivating factor, which the teachers or educators should not overlook or underrate. One of the key themes or characteristics of mathematical beauty is surprise or unexpectedness, for example, when the answer seems to be counter-intuitive and mathematical solution gives a deeper insight into a quantitative relationship.

6. Complexity (Low, Medium, High)

Complexity is usually construed as something not desirable, opposite to simplicity. For example, a convoluted task set up, too much text to read, etc. The opposite is simplicity or efficiency in conveying the mathematical context embedded in the task both in wording or in task set up, a desirable task feature. (The task is not necessarily easy or ordinary).

7. Cognitive demand (Low, Medium, High)

The cognitive demand of a task can be defined as the cognitive processes that the students had to undergo to accomplish that task (Doyle, 1988).

Low cognitive demand tasks are those tasks which require students to memorize and reproduce facts or just repeat routine procedures with no connections being made to the underlying mathematical ideas. High cognitive demand tasks are those that demand the students to make connections to the underlying mathematical concepts. The tasks that fall into the category of procedures with connections focus on meaning, require effort, and involve a procedure and it requires a higher level of cognitive demand to successfully complete the task. Procedures without connection have no connection to the concepts or meaning that underlie the procedure being used and it requires limited cognitive demand for successful completion of the task. Doing math is the need for students to impose their own structure and procedure and tasks in this category also demand high cognitive demand (Stein & Smith 1998).

As an example, task 4 from the task questionnaire demands the student's ability to think and calculate the volume of a shape created by an A4 sheet, which in turn requires the student to inquire about the dimensions of an A4 sheet and calculate the radius of the cylinder formed by the A4 sheet, it serves as a high cognitive demand task.

2.8 Motivating Factors Used in This Study

The questionnaire asked the students to rate a set of tasks from the perspective of motivation and engagement. Some of the attributes that are of interest in this study: 1. Visual elements. 2. Context, 3. Mathematical power,4. Response structure, 5. Surprise factor. 6. Complexity, and 7. Cognitive demand, among possibly others. We plan on using approximately 14 tasks in such a way that the selected attributes above will systematically be reflected in them.

3. METHODOLOGY

Since I am the only person involved in this research, all the data collection was done by one researcher. The purpose of this research was getting a complete and detailed description, also to classify features, count them. We used a combined approach of both quantitative and qualitative methods in research design. We also conducted interviews with selected students.

As mentioned, the study is a mixed method of qualitative and quantitative one where the students from grades 9 and 10 took part in a problem-solving session with mathematics and the students were asked about factors that motivate them to choose a problem to solve from among a given set. My role as a researcher will be explained in this section and will be discussed throughout this study. I will try to explain why I choose a mixed method approach for my research. Moreover, I will discuss the data collection and will try to discuss the weakness and strengths of the overall data collected. Also, in the latter part of the chapter, I will also discuss how the data analysis was performed.

3.1 Research Design

The study followed a mixed methods research design that involves a combination of quantitative (i.e., use of a questionnaire) and qualitative (i.e., focused interviews) approaches to data collection and analysis. The data collection tools include one quantitative tool and two qualitative tools, the quantitative tool being Likert type questionnaire and the qualitative tools being comments given by students and audio interviews. This combined approach is utilized because the researcher believed that the ratings from Likert scale in combination with the supportive comments given by the participants will help the researcher to get a more accurate picture of the motivating factors being studied in this research and the contribution of intrinsic and extrinsic motivating factors toward the problem-solving tasks session.

The quantitative part of the research is one of the key parts of this research. A quantitative research method deals with quantifying and analyses the variables in order to get results. The process involves the usage and analysis of quantified data using specific analytical techniques to provide answers for questions like who, how much, what, where, when, how many, and how (Apuke, 2017). According to (Creswell 2003; Williams, 2011), quantitative research involves inquiry strategies such as surveys and experiments to collect data on predetermined instruments, which yield statistical data. For the purposes of this research, a Likert's type survey questionnaire was used to rate tasks for how students view them as motivating.

The primary means of qualitative data collection is through comments by students for rating given by them for each of the 14 tasks. Even though it is a common practice to ask for additional comments with a Likert scale survey, the responses received as additional comments are not often analysed beyond surface-level analysis or used by researchers as data (Rich et al., 2013). A rich source of data suitable for content, thematic and narrative analysis is offered by free text responses. In this case, the researcher chose to utilize this type of data as a source of the primary qualitative data because the researcher strongly believed that the free-text comments provide the details that may provide an important context for participant response and reveal issues that pure quantitative surveys fail to do so (York et al., 2011).

The secondary means of qualitative data collection was done through interviews. In qualitative research designs, interviews form the backbone of primary data collection. One of the advantages of interviews is that there is a direct contact between the interviewer and the interviewees while minimizing the non-response rates. “Interview can be simply described as a form of consultation where the researcher seeks to know more of an issue as opinionated by the individual being asked” (Adhabi, 2017). It is the responsibility of the interviewer to develop necessary skills to successfully carry an interview (Langkos, 2014). A structured interview was carried out as part of this study with 10 selected students, which will serve as a qualitative data collection technique. The interview was not conducted for all the participants for the problem-solving session whereas only a handpicked students took part in the interview, which will be described in detail in the latter part of this section.

The researcher made sure that the nature of questions asked are very short, and the students are expected to respond in a similar fashion, with short and straightforward answers.

3.2 Participants

Based on his own discretion and after discussions with the supervisors, the initial thought was to conduct the problem-solving session with students from one grade, either grade 8 or grade 9 (age level 13 to 14). It was eventually decided that grade 9 will be the more suitable grade level to be the informants for this research. The main reason was that the mathematical tasks selected for problem solving to test the various attributes of motivation were more suitable for grade 9 level. In other words, setting up mathematical tasks at grade 9 level gave the researcher more flexibility to include the various attributes of motivational factors.

On the other hand, the researcher felt that there may be some limitations with the inclusion of the motivational factors if he needs to set up mathematical tasks below the grade 9 level. Once the tasks were designed and on the date for data collection, only 16 students participated for the data collection and out of the total 21 students that were originally supposed to participate in the problem-solving session. The remaining 5 students were not able to participate due to various reasons. The researcher ended up with 16 sets of data. The researcher, based on discussion with the supervisors, felt that the tasks designed were suitable for the grade 10s too. Also, it will give an opportunity for the researcher to get a rich data. Since the researcher is a mathematics teacher/support teacher for the grade 10 too, it was more convenient for the researcher to organize the problem-solving session with the grade 10 students.

The mathematical tasks include topics from grade 8 curriculum, which the grade 9 would have learned the previous year and curriculum from the first semester of grade 9, which makes it a combination of grade 9's current curriculum and the previous year's curriculum. The same justification will hold good for Grade 10s as they will be doing mathematical tasks from their previous year's learning (grade 9) in addition to some mathematical topics from grade 8.

All in all, a total of 37 students (age level 14 to 16) from an International Baccalaureate School in Southern Norway were the participants for the research. The number of students who participated from grade 9 were 16 and 21 students from grade 10 participated in the research. Students from both the genders participated in the research. The participants from Grade 9 had a ratio of 9 girls and 7 boys whereas in grade 10, there were 12 girls and 9 boys.

The second reason for selecting these two grade levels for the research is also it was convenient for the researcher to conduct the data collection with these two grade levels as the researcher is the mathematics teacher/support teacher for the selected grade 9 and 10 students. The researcher has worked with both the grade level students for three years now in the Middle Years Program of the International Baccalaureate curriculum. Based on the fact that the researcher works with high-achieving students from these grade levels as part of mathematics club once every week after school and also, the researcher's responsibilities as a teacher include that of providing support to individual students with mathematics in a classroom setting, the researcher has a strong knowledge regarding the performance levels of the individual students in both the grade levels, which helped the researcher to categorize the students into three categories: High achieving, average and under achieving students. This categorization was put into use during the selection of students for audio interviews.

3.3 Research Instrument

The main survey instrument used in this research was a mathematical task questionnaire, which served as the primary source of data on a given participant. The term survey instrument refers to a tool or form used to gather data that was utilized in survey research. The instrument was designed in such a way that each questionnaire contains mathematical tasks, a section where the participants will give their rating and a short explanation supporting their choice of rating. The researcher was aware of the fact that survey instruments constructed poorly will not yield the needed insights that a researcher was looking for, which can help in making more confident decisions, so he was keen to use these best practices to maximum advantage to make sure that the researcher does not waste the investment of time, money and people.

The Likert scale section was framed in a direct, unbiased, and simple language. The term “task” in this research context refers to working on ideas with pencil or pen and a paper. The instrument was designed to include 14 mathematical tasks that exemplify task attributes hypothesized to be related to student motivation to solve them.

The sources for the mathematical tasks were mathematics textbooks that the researcher uses for teaching middle years program of International Baccalaureate curriculum, tasks provided by the supervisors and the tasks from subjects from the researcher’s master studies. All the tasks were modified such that all the mathematical tasks contains either one or more of the previously chosen motivation factors. The seven motivation factors selected were visual elements (functional or non-functional), mathematical context (abstract, illustrative, applied and modelling), mathematical power (procedures with connections, doing math), response structure (structured and extended), surprise factor (yes or no), complexity (high or low), cognitive demand (easy, medium and hard). These factors have been discussed previously in the literature section. The tasks taken from the textbooks are mostly inquiry-based questions and mostly open-ended questions, so those tasks underwent some changes such that it will be more suitable for grade 9 and 10.

The survey instrument had the section where the participants will give ratings for each of the 14 tasks on a Likert scale ranging from 1 to 5, where 1 denotes least motivating task and 5 denotes most motivating task. There is also an added section to the Likert scale, which is a text box where the students will give a short explanation/comment, which can be a supportive statement for the choice of their rating for that task or any comments that they want to share regarding that particular task.

3.4 Designed Tasks

TASK 1 Reflection: Just by reading this task, do you feel motivated to solve it?

Please circle one of the five options below, 1 for the least motivation, 5 for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

.

A total of 14 mathematical tasks were designed for data collection. The tasks were designed from grade 8 and grade 9 level curriculum, and the curriculum is based on International Baccalaureate. The fundamental principles that are used in designing the tasks are that the tasks should possess one or more elements that serve as a motivating factor for the pupils to rate and solve two of the 14 mathematical tasks. A total of seven motivating factors were selected.

TASK NUMBER 1: UNIT MAKES DIFFERENCE

In 1983, an Air Canada flight ran out of fuel halfway through its journey due to a mix-up between pounds and kilograms. The plane needed 22300 kg of fuel for the journey. There were 7682 litres of fuel already in the tanks.

a. One litre of jet fuel has a mass of 0.803 kg. Calculate how much fuel should have been loaded. Give your answer in litres.
b. Instead of 0.803 kg per litre, a conversion of 1.77 was used. (One litre of jet fuel has a mass of 1.77 pounds). Calculate how much fuel was actually loaded. Give your answer in litres.
c. Find how many litres short of fuel the plane was.

Source:

This task tests the student's knowledge of conversion of units between pounds and kilograms. The background for this task is 1983 Air Canada Flight 143 where a refuelling error was one of the main reasons that led to the emergency landing of the flight. The visual in this task is a non-functional one, which does not help in explaining the task. The context of the task is a real-life application of mathematics. With regards to mathematical power, this task can be termed as procedures with connections since it represents a problem situation. Since it is a straightforward conversion task, it is unlikely that the students will end up with a surprise answer. The cognitive demand can be rated as medium and the complexity was high as there were considerable text used to explain the context, even though the mathematics of the task is about a conversion between units.

TASK NUMBER 2: THE MAGIC SQUARES

Show that each square is a magic square by showing that the rows, columns and the diagonals all have the same sum.

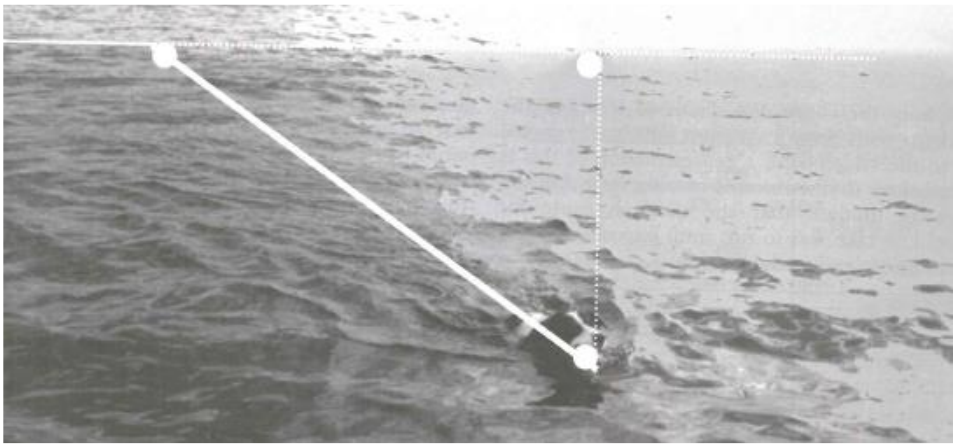
2x-2y	-x+3y	2x-y
x + y	x	x-y
y	3x-3y	2y

3y-2x	-x-5y	6x+2y
9x-y	x	y-7x
-4x-2y	3x+5y	4x-3y

This is an algebraic task. No visuals are included except the tables. It demands the students to do algebraic simplification.

TASK NUMBER 3: APACHE THE BORDER COLLIE

Apache the border Collie

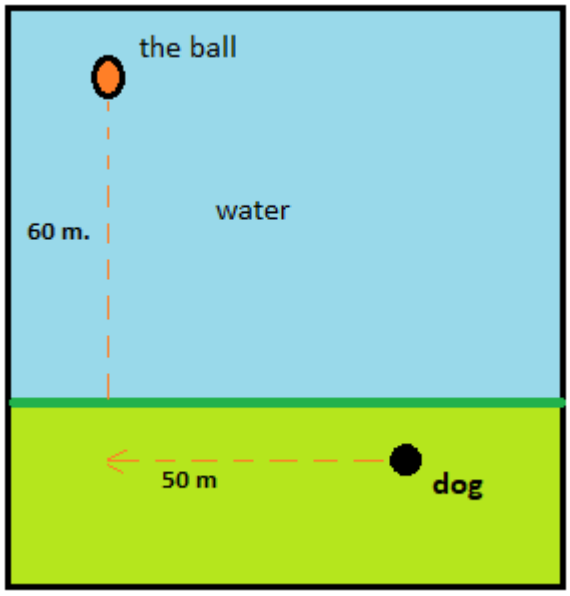


In 2001, Ian Forbes from Edinburgh wrote, in the journal *MicroMath*:

I have a 2-year-old dog, a Border collie named Apache and after a year of avoiding deep water she recently met three Labradors at the local lake. These dogs love to swim and I named them the "submarine brigade" because of their ability to dive straight in and swim after the ball. After meeting them, Apache quickly took to swimming, but being a dog with 'brains,' she discovered that she could beat the rest by running along the bank and then diving in.

The situation is like this: The Labradors jump immediately in the water and swim straight to the ball. Apache runs for about 50 m along the bank and then jumps to swim to the ball. Why would Apache run 50 m and then have the shortest distance for swimming? Is Apache really smart?

Please note that one meter of swimming takes four meters of running in time.)



Please explain your solution.

Source: Professor John Monegan.

The task was modified by adding a functional visual and also adding the fact that one meter of swimming equals four meters of running in attempt to make the task more of a closed ended one.

TASK NUMBER 4: A4 PUZZLE

Take two sheets of A4 size paper. Roll one into a short cylinder and the other into a tall cylinder. Does one hold more than the other?

Please explain your answer and show your work.

Source: *https://figurethis.nctm.org/index.html*

The tasks presented a problem with a surprise answer for most students. It is our experience that most students think that they two cylinders should hold the same volume as the papers were the same size. A4 sheets were kept ready to provide for participants if they chose to solve this task.

TASK NUMBER 5: PERCENTAGES

Find the unknowns: X, Y, Z.

S.No	Name of the item	Marked Price	Selling Price	Discount
i)	Book	225 kr	X	8%
ii)	LED TV	Y	11970 kr	5%
iii)	Digital clock	750 kr	615 kr	Z

Show your work here.

i.

ii.

iii.

This was a percentage question again with no visuals. This task tests the topic that the participants learned at grade 8 level.

TASK NUMBER 6: LOGICAL REASONING

Your friend says she passes a field every day on the way to school, and each day, without exception, she sees **a farmer wearing a straw hat feeding a carrot to a brown horse**. Look at the following general statements and rank them in order from most likely to be true to least likely to be true.

- *The horse never eats anything but carrots.*
- *The farmer feeds the horse only on school days.*
- *The farmer is the only person who feeds the house.*
- *Your friend never walks to school.*
- *The farmer always wears a hat.*
- *The horse is not a racing horse.*
- *Your friend travels to school at the same time every day.*

Source: MYP Mathematics 4 & 5 Standard: A concept-based approach

This task tests the logical reasoning of the participants with no numbers and no calculations included.

TASK NUMBER 7: DIVISIBLE BY 7

Is **3843** evenly divisible by 7? To see if a number is evenly divisible by 7, remove the units digit of the number, double the removed digit and subtract the doubled amount from the remaining number. If the result is evenly divisible by 7, then the original number is also divisible by 7. The method may need to be repeated several times. 

3843 remove the units digit, 3, leaving 384:

384
-6 subtract the doubled number 3
____
378 remove the units digit, 8, leaving 37:
____

37
-16 subtract the doubled number 8
_____
21 This is a multiple of 7, so 3843 is evenly divisible by 7.
_____

This is a specific example that works with the method described.
Use the above method to check whether 3374 is evenly divisible by 7

Source: MYP Mathematics 4 & 5 Standard: A concept-based approach

This task has an illustrative context where the process of solving is illustrated with an example. The visual is non-functional.

TASK NUMBER 8: ORANGE JUICE VOLUME

Stuart has a 330 mL bottle of orange juice. He thinks he can pour it all into his glass, which is a cylinder with diameter 7 cm and height 8 cm. Stuart's friend Patrick thinks the glass will overflow. Answer the following questions.

a. Will Stuart's glass overflow?

b. If the glass was full, what volume of fluid would it contain.

Show your work here.

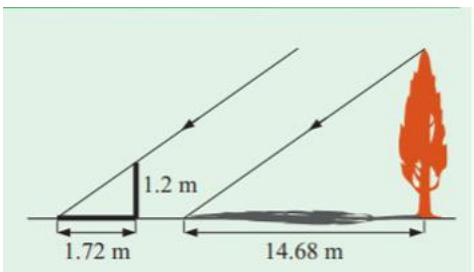
This task requires a simple application of a formula and the formula was given to the students.

TASK 9: SOH CAH TOA

Dean needs to accurately find the height of a tree in his garden. Local Council regulations prohibit the growth of garden trees beyond 20 m. They argue that in storm conditions falling branches and uprooted large trees are dangers to houses and lives. As Dean cannot climb the tree, he decides to use shadows to help solve the problem. On a windless sunny day, he stands a 1.2 m stick vertically on the ground. The length of the stick's shadow is 1.72 m and at the same time, the tree's shadow measures 14.68 m.

Using the diagram to estimate:

- The height of the tree
- The angle of elevation of the sun (the angle that the sun's rays make with the horizontal ground



A functional picture has been provided for the participants and the explanation was also provided to the students since most of them requested for it.

TASK NUMBER 10: HEARTBEAT

The average person's heart beats 70 times per minute. It can be shown that the average person's heart beats 2.57 billion times in a lifetime.

a. According to this information, how long is the average life span?
b. What assumptions have to be made to solve this problem? How do they affect your answer to part **a?**

Show your work and explain.

No visuals for this task and it involve lot of numbers and calculation.

TASK NUMBER 11: PALEONTOLOGY

Archaeologists use a coordinate grid system when excavating a site. This allows them to easily record the location of artefacts at a site, which simplifies future excavations. If the coordinates (in cm) of the top and bottom of the arm bone of this dinosaur skeleton are (6.2, 22.3) and (9.1, 11.8), find the length of the arm bone, rounded to the nearest tenth of a centimetre. (Assume that the arm bone is perfectly straight).

This task demands the student to use the distance formula. The picture is non-functional and it has real life connection.

TASK 12: GREAT BLUE HOLE TASK

When faced with the problem of trying to breathe underwater, ocean explorer, Jacques Cousteau, designed an underwater breathing apparatus called the Aqualung. It was the precursor of today's scuba gear and allowed Cousteau to explore places that had never been seen before. In 1972, he explored the Great Blue Hole, a cylindrical formation in Belize which began forming over 70 million years ago. The great Blue Hole has a depth of roughly 125 m. If there is 9132700 m^3 of water in the Great Blue Hole, find its radius. Round your answer to the nearest tenth. (Volume of cylinder = $\pi r^2 h$).

This is again about volume of cylinder task with formula given. This task has too much backstory in text and a non-functional visual.

TASK NUMBER 13: CURRENCY CONVERSION TASK

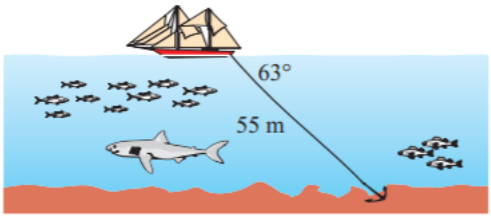
Claudia lives in Canada. She is planning a holiday to Norway. She exchanges 2000 CAD into Norwegian kroners at a rate of 1 CAD = 6.99 NOK.

1. Calculate how many Norwegian Kroners she receives.
2. Before she even leaves Canada, Claudia becomes ill and has to cancel her holiday. She sells the Norwegian Kroners back to the bank at a rate of 1 NOK = 0.12 CAD. Calculate how many Canadian Dollars she receives.
3. Determine how much money the bank makes from the two transactions.
4. Calculate Claudia's loss as percentage of her original 2000 CAD.

This task deals with currency conversion and percentages.

TASK 14: WHERE THE ANCHOR LIES

A boat has an anchor rope length of 55 m. The boat drifts with the ocean current so that the rope makes an angle of 63 degrees with the surface of the water. Find the depth of the water at the position where the anchor lies at the bottom.



This is a simpler trigonometry task with functional visuals.

3.4.1 Motivation Attributes of Tasks

Table 1 - Distribution of Attributes of Motivation Across the Selected 14 Tasks

S. No	Visual elements (Non)visual (Non)Functional	Context Abstract Illustrn Appl Modeling	Mathematical power Procedures with connections Doing maths		Response structure (Extended) constructed response	Surprise factor Yes/No	Complexity High or Low	Cognitive demand Easy Medium Hard
1	Visual (Non-functional)	Applied	Procedures with connections			No	Low	Medium
2	Visual (functional)	Abstract	Procedures without connections		Constructed response	No	Low	Medium
3	Visual (functional)	Applied	Doing math		Extended	No	High	Medium
4	Visual (functional)	Illustration	Doing math		Extended	Yes	Low	High
5	No Visual	Illustrative	Procedures with connections		Extended	No	Low	Medium
6	No Visual	Illustrative	Procedures with connections		Constructed	No	High	High
7	Visual (Non-functional)	Illustrative	Doing maths		Constructed	No	Low	High
8	Visual (functional)	Applied	Procedures with connections		Constructed	Yes	Low	Medium
9	Visual (functional)	Applied	Procedures with connections		Extended	No	Medium	Hard
10	Non-visual	Applied	Procedures with connections		Extended	No	High	Medium
11	Visual (functional)	Applied	Procedures with connections		Constructed	No	Low	Medium
12	Visual (Non-functional)	Applied	Procedures with connections		Constructed	No	Low	Medium

13	Non-visual	Applied	Procedures with connections		Constructed	No	Low	Medium
14	Visual (functional)	Applied	Procedures with connections		Constructed	No	Low	Medium

3.5. Procedures of Data Collection

Video observations and experiences in the classroom provided me some insight into how the teacher introduced problem solving for the pupils. The data collection took place over two lessons in two consecutive days. First day, grade 9 took part in the session and the next day, grade 10 students participated in the data collection session. The researcher followed the same protocol for both the days. The researcher explained the instructions to the participants.

Each of the participants were given a survey instrument and a pencil or pen or eraser as needed was also provided. A calculator was provided to each participant as well. The participants were asked not to write their names in the survey instrument. Instead, the researcher marked the task sheet with numbers starting from 1 to 16 for grade 9 and numbered grade 10 students from 1 to 21. The researcher made use of the last names of the students from their attendance list to assign the numbers in that order. Only the researcher has the knowledge of which task sheet belongs to which student and it was not documented anywhere, in an attempt to make the data as anonymous as possible.

It was explained to the students that the task instrument contains 14 tasks and the students are expected to rate each of the tasks on a scale of 1 to 5 based on how motivated they are after looking at and reading through the tasks. The participants are also expected to give a brief explanation or a comment that can either be a supportive explanation for their choice of rating or a comment about that box in the text box given below the Likert scale.

After rating all the 14 tasks, the students were asked to choose and solve 2 tasks out of the 14 tasks. These two tasks can be either the ones that are rated high by them or any other two tasks of their choice out of the 14. Students were also informed that if they are interested in solving more than two tasks and if the time permits, they are welcome to do so. Participants were informed that a total of one hour will be spent on this problem-solving session. It was recommended to the students that they can spend 30 minutes to rate and comment all the 14 tasks and spend 30 minutes for solving the two selected tasks, but the participants can use their own judgement to plan the time.

The students requested for some formulas like volume of a cylinder and trigonometric formulas, which were provided to them, since they claimed that they forgot those formulas. The task instrument contained two blank pages at the end, which the students will utilize for solving the two tasks. At the end of one hour, the researcher requested to the students to stop whatever they are doing. The researcher collected survey instruments from all the students.

A total of 12 students, six from each grade were selected for audio interview process. Students were asked the question of whether they want to stick to their original rating for the tasks after they have solved the two problems that they chose. Their statements were recorded and translated.

3.6 Procedures of Data Analysis

The data from the questionnaire contained both closed-ended and open-ended items. The closed-ended items contributed towards the quantitative data. The ratings for Likert scale questions were transferred to an Excel sheet. Data extraction is the process of capturing important features of studies in structured and standardised manner (Schmidt et al., 2021). The researcher had to spend a considerable amount of time duplicating the text comments into a word document and duplicate the results of Likert scale data into a Microsoft excel sheet. A total of 518 comments were gathered from the surveys.

3.6.1 Quantitative Data

The rating given by each student for each task was documented in the Excel sheet. The ratings given by grade 9 students and grade 10 students were differentiated using different colours to differentiate the groups.

3.6.2 Qualitative Data

The qualitative data in this research comes in the form of open-ended items in a questionnaire. The first step of the coding process is to identify the essence of the text and code it accordingly. One- or two-word ideas that cogently and succinctly explain what is happening in the data are called codes. In other words, it is a mechanism that allows you extract a well-developed theory from raw data to a well-developed theory (Holton, 2010). A code can also be used to establish ~~is~~ how the researcher conceptualize the data (Glaser, 1992) (Chametzky, 2016). A colour code system is utilized to select, separate, and sort data to initiate an analytic accounting of the data.

The coding was distinguished as positively approaching comments toward the task and negatively approaching comments. The positive comments and negative comments were sub-categorized. A broad category was defined and comments falling into that category were documented in that section. Each task was given two, three or four colour codes depending on the variety in comments. The number of comments falling under each colour code were counted and it was calculated as a percentage.

An example of colour coding analysis of student comments from grade 9 and 10 were given in table below.

Table 2 - Sample of Colour Coding of Comments

TASK 1	Grade 9 comments	Grade 10 comments
	1. The question had too much back story 2. The question seems achievable, but there is a lot of text for the question. This is not a bad thing though. 3. Conversion and many numbers is hard, but the image made me chose 2. 4. I chose 4 because I understand the task clearly and I am motivated to find out the answers. 5. The first question (a) confused me, but b and c were ok. The picture helped even though it didn't have any info. 6. Too many terms like pounds, distance, liters, calculate kilos. Makes it stressful. It does make it interesting. 7. Its relatively easy since you are given the fuel in pounds plus its real life. 8. There is a a, b and c, also because it just looks long. 9. I find it difficult to calculate these kind of word problems. 10. I feel that this task was pretty motivating because it gives you a lot of information to work with, has multiple answers and has a visual. 11. I feel like it is in the middle of motivation scale because it can feel like it is a bit hard. 12. I don't know how to transfer Kg to L or L to Kg. 13. Takes into account something I am curious about. 14. I chose 2 because I know that I am very bad with different weight units. Therefore, I knew it would be difficult for me to answer this question. 15. Too much text. 16. I gave it a 4 because it is a multiple choice question with visuals 17. There are a lot of numbers and a lot of info, which makes it less motivational, but it also seems interesting which is why I gave it a 3.	1. There are a lot of numbers and a lot of info, which makes it less motivational, but it also seems interesting which is why I gave it a 3. 2. Too much text. 3. There were a lot of questions and it seems a long calculation process. 4. I am not really a fan of weight questions etc. I find them a bit confusing. 5. Some things were a bit confusing and hard to understand, but it looked fun and interesting. 6. It's a confusing unit to me. 7. It is not that easy, but it is not that hard either. 8. The text is too long. The photo looks too confusing. 9. It's a lot of writing and its abc task. 10. There are a lot of numbers, but the picture makes it more motivating and fun. 11. Theme is good, too much text. 12. The text is too long, that is why it is not motivating. 13. Its not a bad question, but I don't feel an urge to do it. It was a bit confusing and I had to read it multiple times. 14. Something that I would see in a normal test, its good. Good explanation. 15. This can be solved, but I am not so motivating because of too much details, numbers and text. 16. I don't know how to calculate this. 17. I wouldn't mind doing the task if it was given to me, but I don't like the amount of conversion you have to do in order to do the task, because you have to be really focused. 18. Not challenging, takes time. 19. I feel its too much text for only one big question. 20. This task is a bit basic and easy to solve. It is familiar. And picture engages. 21. Seems interesting, but a lot of information.

BLUE CLASSIFICATION: TASK COMPLEXITY: too much text, confusing story, too many things to do, a lot of numbers, much information, takes time (and not for an interesting purpose at the end, anyway) .. [n= 20, 20/37 => 54%], Negative

GREEN CLASSIFICATION: THE VISUAL IS ENGAGING: image made me choose, picture helps, engages, motivates, [n=6, 6/37=16 %] Positive

BROWN CLASSIFICATION: I FIND IT DIFFICULT: confusing, difficult to compute, hard, conversion of units hard, [n=9, 9/37 = 24 %] Negative

PURPLE CLASSIFICATION: INTERESTING CONTEXT: interesting, curious, fun, theme is good [n=6, 16 %] Positive

OVERALL RATING: 2.59

3.6.3 Ethical Issues

As I did my research on young students, I had to consider that I may need to attend a few ethical issues. The main concern regarding ethics when doing social research is the creation of a trusting relationship between the researcher and the subjects who are researched. The researcher made sure that a communication between the researcher and the researched was established and that was carefully planned and managed and made sure the benefits are maximised and the risks are minimised.

In the first place, before proceeding to get the consent from the participants, the researcher approached the school administration where he works and requested permission to spend one or more mathematics lessons towards the problem-solving session and data collection. The school readily agreed and gave permission to carry out the research.

It is a mandatory requirement that all empirical surveys where the processing of personal data is involved should be reported to the Data Inspectorate (Jacobsen, 2015). Therefore, the project was sent to Norwegian Centre for Research Data (NSD). Details regarding the purpose of the research, the participants of the research, how the data collected will be stored and processed and how long the data will be stored were informed to NSD.

Also, how the participant details will be kept anonymous and how they will not be recognized in the thesis was also informed to NSD. What rights the participants have with the research was also informed to the NSD. The initial thought was to get informed consent from the parents of the students since the participants are not adults, but NSD recommended that participants aged 15 or more can sign the informed consent themselves and those who are not yet aged 15, will have to get consent from their parents. Also, NSD came up with some queries regarding the duration of the storage of data and the location of the storage.

After appropriate clarifications were provided to NSD stating that the data will be stored internal to the data controller and the personal data will be stored two years from the date of submission for research purposes, NSD gave their approval for the research. The researcher provided the consent forms to all the students and the students who are 15 or above signed the documents themselves and the students who are not 15 yet got the signed consent from their parents. The researcher then proceeded with the data collection.

4. DATA ANALYSIS

Accurate and appropriately analysis of research findings forms the essential component of ensuring data integrity. Inaccurate or improper analysis of the data will misinterpret statistical analyses, misdirect casual readers, and may negatively influence the public perception of research (Shepard, 2002).

Two types of data analysis were done for this research. The first one, a quantitative analysis of collected data via a Likert type questionnaire, was done. This analysis focuses on the ratings of the task by the participants.

Likert-type scales are frequently used in education and education research. In this study, the primary interest of the researcher is not to incorporate the viewpoint of the participants as it is, but to document the captured feelings and their logical opinion about the issues surrounding the study, which is one of the main reasons behind the selection of Likert-type scale. The researcher believed that the results of the data from the Likert scale will provide a quantitative data of the ratings by the participants.

The second type of analysis was the qualitative analysis of the data collected in the form of text comments and audio interviews.

4.1 Analysis of Likert Scale Questionnaire

Each participant gave a rating for each of the 14 tasks on a scale of 1 to 5. The average rating of each of the tasks was calculated.

The scales 1 to 5 indicate, 1 is not at all motivated, 2 is less motivated, 3 is medium-level motivation, 4 is good motivation, and 5 is highly motivated. Even though the total number of participants is 21, there are some tasks which have some missing ratings. This is because the participant either mistakenly or by choice did not rate the task, so the number of ratings received for all the tasks is not always equal to the number of participants.

Table 3 - Quantitative Data Analysis

	N	Mean	Std. Dev.	Grade	N	Mean	Std. Dev.	M.D.	t-value	p-value
Task 1	37	2.595	.956	9	16	2.750	1.065	.274	.837	.410
				10	21	2.476	.873			
Task 2	34	2.735	1.310	9	14	2.429	1.284	-.521	-1.153	.258
				10	20	2.950	1.317			
Task 3	37	**3.541**	1.145	9	16	**3.750**	1.291	.369	.940	.355
				10	21	**3.381**	1.024			
Task 4	37	**3.270**	1.194	9	16	**3.063**	1.237	-.366	-.915	.367
				10	21	**3.429**	1.165			
Task 5	34	2.794	1.409	9	14	1.929	1.072	-1.471	-3.586	.001
				10	20	**3.400**	1.314			
Task 6	36	**3.944**	1.094	9	16	**4.125**	.957	.325	.905	.372
				10	20	**3.800**	1.196			
Task 7	36	**3.139**	1.515	9	16	**3.125**	1.586	-.025	-.048	.962
				10	20	**3.150**	1.496			
Task 8	37	**3.486**	1.346	9	16	**3.500**	1.414	.024	.052	.959
				10	21	**3.476**	1.327			
Task 9	35	**3.057**	1.110	9	16	2.938	1.063	-.220	-.584	.563
				10	19	**3.158**	1.167			
Task 10	36	**3.306**	1.215	9	16	**3.375**	1.204	.125	.304	.763
				10	20	**3.250**	1.251			
Task 11	32	**3.031**	1.177	9	15	**3.067**	1.223	.067	.157	.876
				10	17	**3.000**	1.173			
Task 12	33	2.909	1.234	9	15	2.867	1.187	-.078	-.179	.859
				10	18	2.944	1.305			
Task 13	33	2.939	1.298	9	15	2.933	1.100	-.011	-.025	.980
				10	18	2.944	1.474			
Task 14	32	**3.719**	1.224	9	14	**3.786**	1.188	.119	.271	.788
				10	18	**3.667**	1.283			

4.2 Analysis of Ratings of Individual Tasks

Task 1:

All students who participated gave a rating for the first task, so 37 responses were recorded. It is interesting to note that out of the 37 responses; not even one was registered as a “5”, which is the highest possible rating, implying the highest motivation. The highest rating received for this task is 4, and a total of seven responses were received, five from grade 10 students and two from grade 9. Being the high motivational ratings, this accounts for 19% of the total responses. The medium level rating of 3 has been recorded 13 times, the highest for any task.

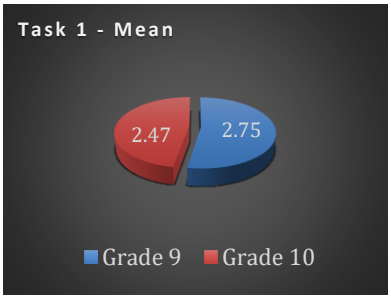
On the other hand, the lowest rating received for this task is 1, and it has been registered five times. The other indicator of lower motivation of "2" has been reported twelve times. The combination of ratings "1" and "2" accounts for 17 ratings or 46% of the ratings. The lower ratings have the upper hand for this task, standing at 46% against the 19%.

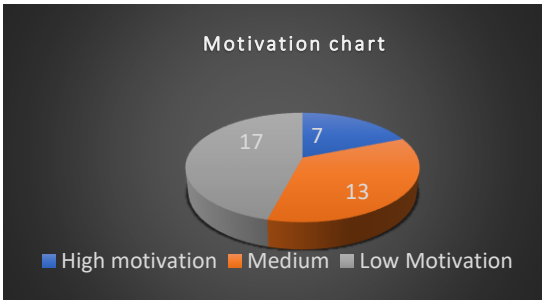
The mean value of the ratings received from grade 9 students for this task is 2.750, and that of grade 10 students is 2.476. A p-value was calculated for the ratings received for all tasks. The p-value indicates a statistically significant difference in the pattern of ratings by students from both classes.

Any value less than 0.005 is considered significant since it implies that there is a notable variation in the trend of a rating between the two classes. However, one can easily see from the mean values that there is no significant difference between the ratings, which again was confirmed by the p-value of 0.410.

The tasks are numbered from 1 to 14 based on the combined mean value of the ratings received. This task takes the last spot of number 14. Regarding the choice for problem-solving, no student chose to solve this problem. Overall, this task ended up as the least favourite of all the tasks.

Figure 3 - Task 1 – Graphical Representation of Rating and Motivation





Task 2:

The second task received 34 responses from the participants, out of which 14 were from grade 9 students and 20 were from grade 10 students. Two reactions from grade 9 and one response from grade 10 were missing.

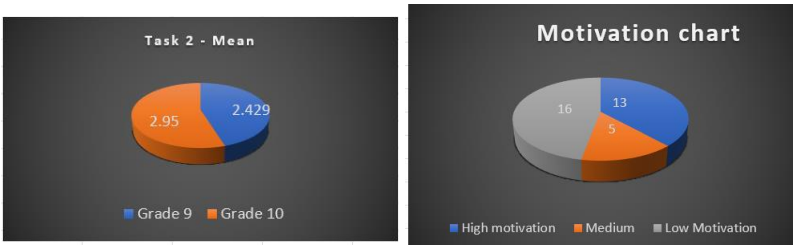
The highest rating of 5, which implies high motivation, was given by two students for this task, one from grade 9 and one from grade 10. Also, a rating of 4, which lies on the highest side of the rating, was given by 2 grade 9 students. Interestingly, 9 grade 10 students rated it as a 4. As a result, 13 out of 34 ratings, which is about 38% of the ratings, lie on the higher side of the motivation scale.

Concerning the lower ratings for tasks or indicators for lower motivation levels, eight ratings of 1 were received for this task, equally shared between two grade levels (4 each).

When it comes to receiving the highest number of ratings of "1", this task shares the second place with task number 7 (eight ratings of 1). This task also received a rating of 2 from eight participants. Overall, 16 ratings, a combination of ratings 1 and 2 on the Likert scale, point towards lower motivating factors for this task. This constitutes about 47% of the responses from the participant population as against 38% positive approach towards the study, with 15% of the ratings remaining at the medium level.

The overall mean rating for this task stands at 2.735, where the mean of grade 9 ratings is 2.43, and the mean of grade 10 ratings is 2.95. Even though the difference in the mean value between the two grade levels is higher than in the previous task, a p-value of 0.258 is a clear indicator that there is no statistically significant difference in the pattern in ratings given by both the grade level students. In its entirety, only one student from grade 10 chose to solve this problem. When it comes to ranking based on the motivation scale, this task holds the second last place of 13 out of the 14 tasks.

Figure 4 - Task 2 – Graphical Representation of Rating and Motivation



Task 3:

A total of 37 responses were recorded for this task. All 21 students from grades 10 and 16 from grade recorded their answers for this task. The highest rating received for this task is 5, and 9 students out of 37 rated this as 5, 6 from grade 9 and 3 from grade 10. In other words, a quarter of the whole participant population rated this task as the highest motivating one. If we also consider the rating of 4, which is also an indicator of high motivation, a total of 11 ratings of 4 were received, four from grade 9 and 7 from grade 10. The combined high motivating indicators based on the ratings of 4 and 5 account for 20 responses out of 37, indicating being a highly motivating task among more than 50% of the participants.

The lowest rating received for this task is 1, and only one student rated it as a 1 and the number of responses that rated the task as a 2 is seven. The combined low motivation ratings stand at 8 out of 37, much less than the high motivation ratings. Nine students rated it as a 3.

The mean of the ratings from grade 9 is listed at 3.75, and the mean of ratings from grade 10 is 3.38. The p-value of these values stands at 0.355, which is not statistically significant. In other words, there is no significant difference in the pattern of ratings between students from the two grades.

This task was solved eight times; 5 students from grade 9 chose to solve this task, and three students from grade 10. Two students from grade 10 decided to solve this task, but they could not solve it entirely, but there was an attempt at solving this. This task ranks at #3 in the overall listing of the tasks based on the rating scale.

Figure 5 - Task 3 – Graphical Representation of Rating and Motivation

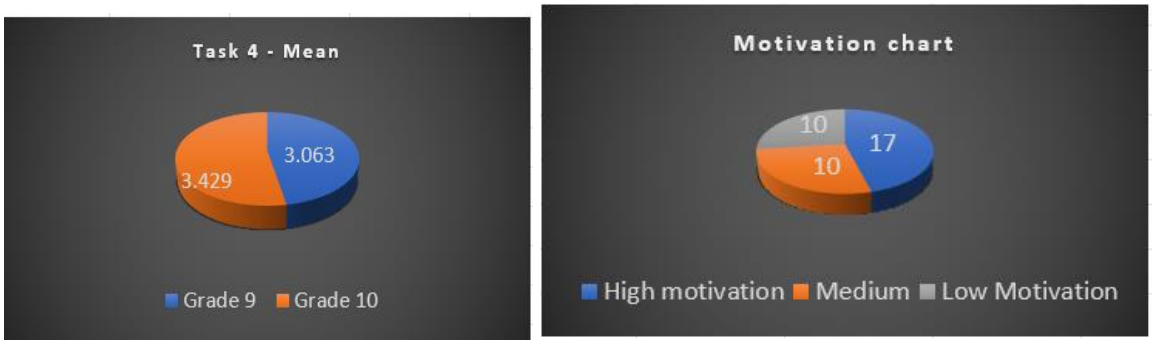
Task 4

All the participants responded with a rating for this task, accounting for 37 responses. Six students gave the highest rating of 5 for this task. Two students from grade 9 and four students from grade 10 rated this task as 5. Therefore, the highest rating for this task was given by only 16% of the participants. A rating of 4, which falls on the higher side of the rating scale, was given by 11 students, four from grade 9 and seven from grade 10. The combination of ratings of 4 and 5 was numbered at 17, which constitutes 46% of the total ratings by the population.

The lowest rating received for this task is 1, and three participants recorded it. The next level indicator for low motivation, which is a 2, has been recorded by 7 participants. The combination of low-level motivation indicators accounts for ten responses, which constitutes an approximate 27%, which is very low compared to the higher-level ratings. The number of medium level ratings is 10. The mean value of ratings by grade 9 is 3.063, and for grade 10, the value is 3.429, and the combined average is calculated at 3.270. The p-value of 0.367 again indicates that there is no statistically significant difference in the trend of a rating between the two classes of students involved. When the tasks are ranked in the ascending order based on the ratings received, this task takes the 6th spot.

Regarding solving the task, four participants attempted to solve the task, out of which two students completed the task and two students made an attempt, but they could not solve the task.

Figure 6 - Task 4 – Graphical Representation of Rating and Motivation



Task 5

This task received 34 responses, which is three less than the total participants. Two students from grade 9 and one student from grade 10 did not give a rating for this task. The highest motivating indicator, a rating of 5, was provided by four students.

All these four students were from grade 10. No student from grade 9 rated this task as a 5. A total of eight ratings of 4 were received for this task, out of which seven were from grade 10, and only one was from grade 9. In total, only one student from grade 9 rated this task on the higher side as opposed to 11 ratings of either 4 or 5 from grade 10. With respect to lower motivation indicators, ten students rated this task as 1, which is the highest of any other task and 7 of those ten were from grade 19. There are precise data indicating that this is one of the least favourite tasks as a whole, especially for grade 9. If we also look at the other indicator of lower motivation, which is a rating of 2, three students rated it as a 2, two from grade 9 and one from grade 10.

Out of the 14 responses received from grade 9, nine were on the lower side of motivation, and four responses indicated a medium level of motivation. The mean value of the ratings given by grade 9 students is 1.929, which is the lowest value of all the mean values calculated. The mean value of the ratings assigned by grade 10 students is 3.4, clearly on the higher side. The combined mean value of this task is 2.794. One can easily see a massive difference in the pattern of the rating given by the students from both grades. The p-value calculated as 0.001, which is lower than 0.005, also clearly indicates that there is a statistically significant difference between the mean values.

The values indicate that grade 10 students felt more motivated about this task, whereas it ended up as one of the least favourites of grade 9. On the ranking scale based on the combined ratings of grade 9 and 10 students, this task stands at 12th place.

Even though it was rated as least motivated by many students, a few higher ratings by grade 10 students prevented this task from being the least favourite of all the tasks. When it comes to problem-solving, seven students chose to solve this problem, out of which six students successfully solved it. Again, all the students who chose to solve this task belong to grade 10 and solving a task seven times is significantly higher than some of the other tasks.

Figure 7 - Task 5 – Graphical Representation of Rating and Motivation

Task 6

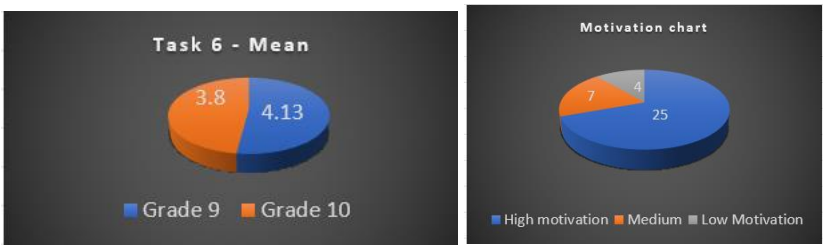
A total of 36 participants registered their responses for this task. One response from a grade 10 student is missing for this task. The highest level of rating received for this task is 5, and 14 students rated this task as 5, thus making this task with the most number of "5s". The 14 responses were equally shared between the students from both grades, with seven answers from each class. In addition to the most significant number of 5s received, this task received eleven ratings of 5, six from grade 10 and 5 from grade 9. The combined ratings of 4 and 5 stand at a tremendous number of 25.

These responses constitute approximately 70% of the ratings received. Only one student from grade 10 gave the lowest level rating for this task, which is a 1. Regarding the other lower motivating ratings, a total of three ratings of 2 were received. The indicator of low motivation has a total number of four ratings, which accounts for just 11% of the total responses. The medium level ratings stand at 7 in number. The mean value of the ratings for the class of grade 9 is 4.125, which is the highest mean value calculated from the data collected. The mean value of the ratings for the class of grade 10 is 3.800; the second-highest value was recorded for the mean values. The p-value of 0.372, which is less than 0.005, indicates no statistically significant deviation in the ratings given by students from both classes.

The combined average stands at 3.944, giving this task the highest rating value. Such high values made this task the top most rated among the 14 tasks, ranking at #1.

When it comes to solving this task, 15 students solved this problem, eight from grade 9 and seven from grade 10. This makes it the second-highest regarding the number of times a task was solved.

Figure 8 - Task 6 – Graphical Representation of Rating and Motivation



Task 7

This task received 36 responses, with a rating from one grade 10 student missing. The highest rating received for this task is a 5, with a total number of 5s being received nine times. Four students from grade 9 rated it as 5, and five students from grade 10 rated gave the same rating, which accounts for 25% of the total responses recorded. In addition, eight responses with a rating of 4 were recorded. A combination of the ratings “5” and “4” with a total of 17 constitute 47%.

In other words, less than half of the participant population gave this task a favourable rating. The lowest rating received for this task is 1, and it has been recorded eight times, four from grade 9 students and four from grade 10 students. The other lower-level motivation indicator of 2 has been registered five times. The combined ratings of 1 and 2 have occurred 13 times to account for 36% of the total responses. The medium level rating of 3 has been recorded six times. The mean value of the ratings by grade 9 students is 3.125, and the mean value of grade 10 students’ ratings is 3.150. The combined average of these two classes is 3.139, which lies just above the medium level rating. The p-value, which is 0.962, also indicates that there is no statistically significant data between the ratings of grade 9 and 10 students. Also, the p-value is one of the highest in the data collected, which resembles that the deviation between the ratings by the students of two grade levels is very minimal.

When rated based on the values from the mean scale, this task occupies the 7th spot, which is the midway in the rank scale. Surprisingly, this task is the top choice of the students for solving, contradicting the not-so-high rating received by this task. This task was solved successfully by 17 students, which is the highest number recorded in the section of solved problems. Interestingly, the students chose to solve this task, whereas their ratings suggest otherwise.

Figure 9 - Task 7 – Graphical Representation of Rating and Motivation

Task 8

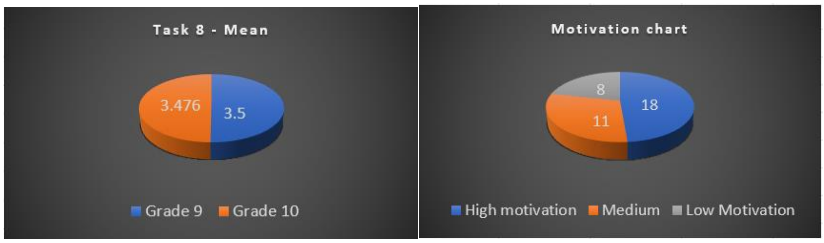
All the participants responded with a rating for this task, a total of 37. The highest rating of 5 for this task has been received 12 times.

Grade 9 rated it as 5 for five times, and grade 10 rated it seven times. This highest rating constitutes 32% of the total responses. In addition to this, six responses with a rating of 4 were received for this task. The combined number stands at 18. In other words, the high motivating indicators account for close to 50% of the total responses. The lowest rating received for this task is one, and it has been received four times, which is just 10% of the total ratings received as opposed to 32% of the highest ratings. A total of four responses were received as “2”, so the ratings indicating lower motivation occurred only eight times.

A medium-level rating of 3 was rated 11 times, which is comparatively higher than many other tasks. The mean value of the ratings of this task for grade 9 is 3.500, and the mean value for grade 10 ratings is 3.476. The combined mean value of both classes is 3.486. The difference between the two mean values is very lean and the p-value of 0.959, which is way higher than 0.005, also reassures the fact that the rating pattern by students from both the classes is almost the same.

On a ranking scale of the tasks from 1 to 14, based on the ratings received, this task holds 4th place, which is a clear indication that this task was one of the favourite tasks for the students. This task was solved by eight students in total, five from grade 9 and three from grade 10. It is interesting to note that this task takes the 4th spot in both the scenarios, based on ratings and also based on the number of times it was solved.

Figure 10 - Task 8 – Graphical Representation of Rating and Motivation



Task 9

The total number of responses received for this task is 35. Two reactions from grade 10 students were missing for this task. The highest rating of 5 was given by only two students, one from grade 10 and one from grade 9. The other indicator of high motivation, a rating of 4, was provided by 12 students, mostly from grade 10 (eight ratings). The highest motivating factors account for 40% of the responses. The lowest rating of 1 was received four times for this task, one from grade 9 and three from grade 10. A total of 6 responses of "2" were recorded. The lower-level motivation factors account for 27% of the total responses. The medium level rating of "3" has been given by 11 students, which is one of the highest numbers compared with many other tasks.

The mean value of the ratings of grade 9 is 2.938, which is lower than that of the medium level rating. The grade 10 mean value is 3.158, a little over the midway rating. The combined average value of the ratings is 3.057. The p-value of 0.563 indicates that there is no statistically significant difference between the rating patterns of grade 9 and 10 students. This task takes the 8th spot in the ranking of tasks.

No students chose to solve this task. Even though the rating values were on the higher side, this was one of the least favourite tasks when it comes to the choice of solving. The other task that was never a choice for solving is task #1.

Figure 11 - Task 9 – Graphical Representation of Rating and Motivation

Task 10

A total number of 36 responses were recorded for this task. One task from grade 10 is missing. The highest rating received for this task is 5, and it was received six times, four from grade 10 and two from grade 9. The other high rating of 4 was given 12 times, seven from grade 9 and five from grade 10. The high ratings account for 18 responses out of 36, accounting for precisely 50% of the responses. The lowest rating received for this task is 1, which has been recorded three times.

The other lowest rating of "2" was recorded seven times. The total number of lowest motivation indicators were registered ten times, about 27% of the total registered responses. A medium-level rating of 3 was recorded eight times. The mean value of the ratings for grade 9 students is 3.375 and for grade 10 students is 3.250. The combined average weight for this task is 3.306. With a p-value of 0.763, there is no significant difference in the rating of tasks by students from both classes. On the ranking scale, this task takes the 5th spot. As a choice for problem-solving, only three students chose this problem for solving, which is somewhat contradicting based on the ratings it received.

Figure 12 - Task 10 – Graphical Representation of Rating and Motivation

Task 11

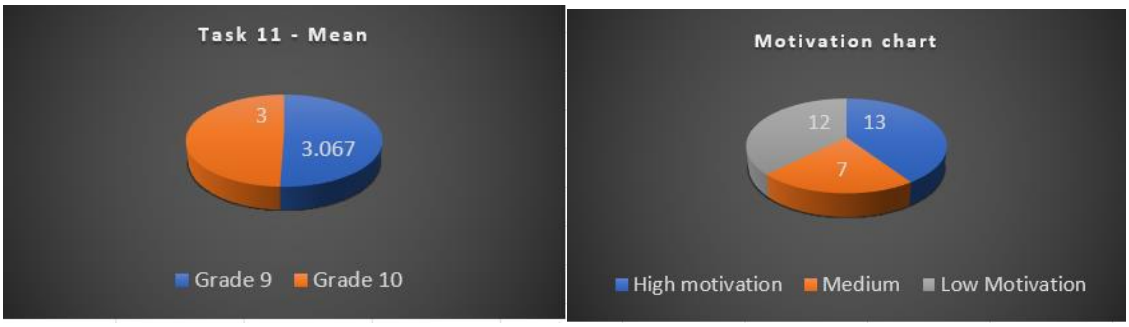
Only 32 responses were recorded for this task; five were missing for this task, four from grade 10 and one from grade 9. The highest rating of "5" was received three times for this task, two from grade 9 and one from grade 10. A rating of "4" was registered ten times, four from grade 9 and six from grade 10.

The higher-level rating was registered 13 times, accounting for 41% of the responses. The lower-level rating of 1 was registered three times, and the other lower motivation indicator of 2 was recorded nine times. When combined, twelve responses correspond to low-level motivators, which account for 41% of the responses. Seven responses were recorded as "3", an indicator of medium level motivation.

The mean value of the grade 9 ratings is 3.067, and the mean value of grade 10 ratings is 3.000. The combined average for both values is 3.031. The p-value of 0.876 indicates a very slight difference between the ratings given by the students from both grades.

On the ranking scale based on ratings, this task falls in 9th place. Only one student from grade 9 chose to solve this problem, and no student from grade 10 chose this problem to solve, indicating this is one of the least favourite tasks for students.

Figure 13 - Task 11 – Graphical Representation of Rating and Motivation



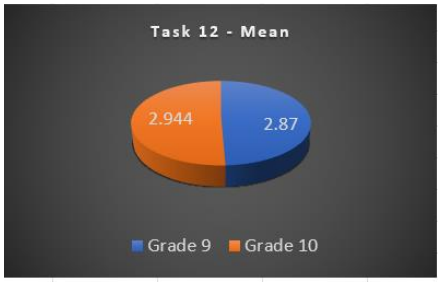
Task 12

The total number of responses received for this task is 33; one response from grade 9 and three replies from grade 10 was missing. The highest motivating rating of 5 has been registered four times, one from grade 9 and three from grade 10. The other higher motivation rating of 4 has been registered six times.

When combined, these ratings account for a total of 10 responses, which constitutes 30% of the total responses registered. The lowest rating for this task is 1, and it has been recorded five times. The other lowest rating of 2 has been registered seven times. Altogether, the ratings of 1 and 2 add up to 12, approximately 36%, which is slightly higher than that of higher motivation ratings.

The medium level rating of "3" has been recorded 11 times. This is the third task on the list, which has received this many numbers of "3" ratings. The mean value of the ratings by grade 9 students is 2.867, and that of grade 10 students is 2.944, both less than the medium level ratings and ending up with an average of 2.909. A p-value of 0.859 shows the narrow difference between the rating style of the students from the two grades. When it comes to the ranking, this task stands at the 11th position and falls into the category of least favoured task. When it comes to problem-solving, only three students chose to solve this problem which falls into the least preferred choice in this category too.

Figure 14 - Task 12 – Graphical Representation of Rating and Motivation



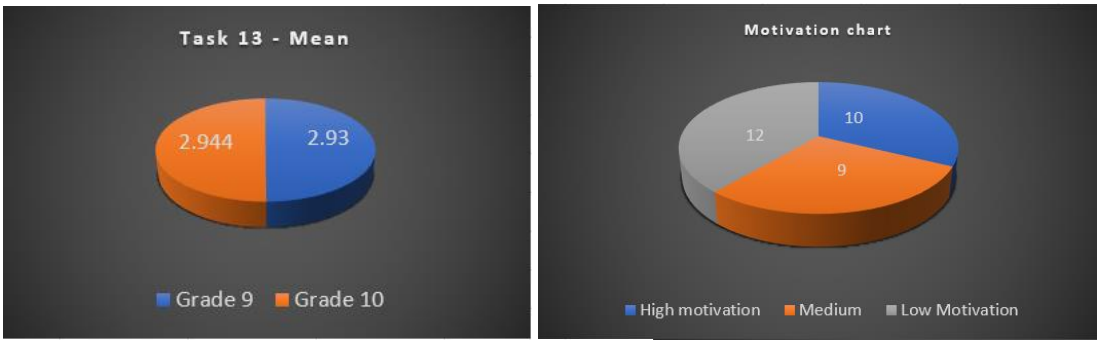
Task 13

The total number of responses received for this task is 33, with one missing response from grade 9 and three absent responses from grade 10. The highest rating of 5 has been obtained five times, out of which only one is from grade 9 students, and four are from grade 10 students. The other highest motivating rating of "4" has been recorded in five instances. Combined, they account for ten ratings or 30% of the responses. The lowest rating received for this task is 1, and it has been registered five times, and the other lowest rating of "2" has been registered seven times, and most of them (5) are from grade 10. The combination of ratings 1 and 2 accounts for 12 responses or 36% of the responses.

The lower level ratings lie ahead of, the higher ratings by a small but significant margin. The number of medium-level ratings (3) is nine, which is comparatively higher than many other tasks. The mean value of the ratings given by grade 9 students is 2.933, and that of grade 10 students is 2.944; the difference between the two values is very insignificant.

This p-value for this task is 0.980, the highest value from the table, which again implies the almost non-existent difference between the ratings by the students of the two classes. The combined mean value is 2.939. When it comes to the ranking of the tasks from 1 to 14, it occupies the 10th spot, which suggests this is one of the least favourite tasks. When it comes to problem-solving, this task was solved by only two students. Only four other tasks were solved less number of times than this task.

Figure 15 - Task 13 – Graphical Representation of Rating and Motivation



Task 14

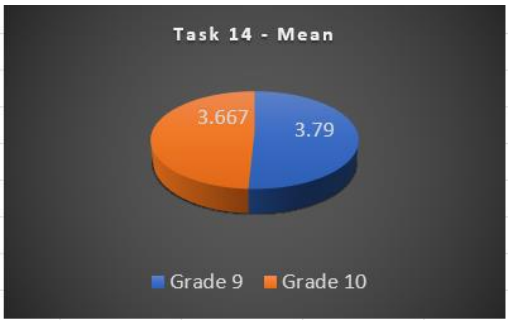
The number of responses received for this task is 32. Two students from grade 9 and three from grade 10 did not rate their ratings for this task. The highest rating of 5 has been received ten times, four from grade and six from grade 10.

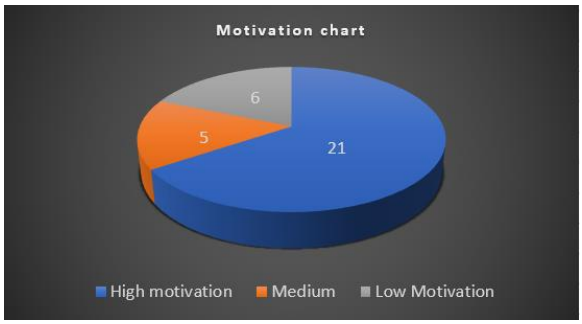
The other high rating of 4 has been recorded 11 times, which is comparatively higher than many other tasks. This rating, combined with the rating of "5", has occurred 21 times. This constitutes 66% of the ratings. On the other hand, the lowest rating received for this task is 1, and it has been registered just by two students, one from each of the classes. The other lower level rating of 2 has also been registered four times, which is comparatively very low. When combined, the lower level rating occurred just six times or 16% of the responses.

Such ratings imply that this is one of the favourite tasks for the students. The medium level rating of "3" has been rated five times. The mean value of the ratings given by the grade 9 students is 3.786, and that of the grade 10 students is 3.667. The p-value of 0.778 indicates that there is no statistically significant difference between the ratings received from both classes. The combined mean value is 3.179, giving this task one of the top spots in the ranking list.

This task stands at number 2 in the overall ranking of all the tasks. A total of seven students solved this problem, and this number stands the fifth place. Overall, this task remains one of the toppers when it comes to the rating and also on the higher side based on the number of students who chose to solve it.

Figure 16 - Task 14 – Graphical Representation of Rating and Motivation





4.3 Qualitative Analysis

The qualitative data was collected through the text comments provided by the students either as a supportive statement for their rating or personal comments regarding the task. Also, a minor part of the qualitative data comes from follow up interviews.

The challenge for qualitative researchers is to present a coordinated data representation that can be huge and confusing and needs to make sense of different perspectives or complex issues. This researcher tried to decode the data received in the form of text, made use of grounded theory to colour code the text and extract a quantifiable data. Each colour coded statements were counted, and their percentage were calculated using the total number of responses received. The addition of percentages was more than 100 sometimes because some comments had more than one idea in it and hence coded twice for each theme.

4.3.1 Colour Coding Analysis of Individual Tasks

Task 1

The themes of student comments were identified by colour coding as shown in table 4 above. Comments were coded with blue colour that indicates the task complexity, which is a negative perspective about this task. Too much text, confusing story, a lot of things to do, a lot of numbers and time-taking are the aspects indicated using blue colour. Some of the comments from grade 9 students imply that this question has too much back story and a lot of text. There are too many terms indicative of units of measurement like pounds, litres, and kilos, which makes things stressful. The question is divided into three subcategories to make it look like the task is so long. The grade 10 students' comments also lie in the same line implying that this task has a lot of information and lots of text, making it less motivational. The long question structure makes it a "long calculation process."

One student commented that "it is not a bad question, but I don't feel an urge to do it. I had to read it multiple times." This comment can be considered a classic example that this task failed to intrinsically motivate the participant student. The blue colour code summarizes the comments from students from both classes that this task has a lot of text, too much back story, a lengthy question structure and many units and conversions. The blue coded comments account for 54% of the responses received from both the grades. The green colour was used to code some of the positive aspects, which denotes that the visual is engaging. Comments from grade 9 students indicate that even though the task looks complex, the image gave them a higher rating. One more student stated that "the picture even though it didn't have any information." One more student liked this task since it is a multiple-choice question with visuals. Green coloured statements from grade 10 students suggest that the picture makes the task more motivating and fun, and also the picture engages. The number of green coded text is not a lot and only accounts for 16% of the comments.

The subsequent colour coding is brown, which indicates the perspective of finding it complicated or difficult by the students. Keywords of "confusing, difficult to compute, conversion of units hard" were taken into count when using this colour for coding. The statements that support this colour coding states that the students have difficulty doing the conversion of units, and it involves a lot of calculation. Most of the comments under this category say it is complicated and confusing, but a specific reason was not stated, still accounting for 24% of the comments.

The last colour used for this task is purple representing a positive trend in the approach of those students who found this task exciting because it is fun and interesting, making them curious. The selected theme of the task is also good. Grade 9 students commented that this task deals with the theme they like and is a real-life application.

Some grade 10 students found this task fun and interesting, but they did not give a specific reason. In other words, there were some factors that made the students intrinsically motivated to solve this task.

The purple colour scored around 16%. The opposing perspectives constitute more than 75%, making this task a least favourite one based on the comments provided by the students. No student solved this task, so there was no possibility of looking at the post-session interview comments.

Overall, majority of student comments expressed negative view of this task from motivation perspective, namely the task being complicated and confusing. There were also positive comments about the task containing a good visual and the context being interesting.

Table 4 - Task 1 – Colour coding of comments

TASK 1	Grade 9 comments	Grade 10 comments
	1. The question had too much back story. 2. The question seems achievable, but there is a lot of text for the question. This is not a bad thing though. 3. Conversion and many numbers is hard, but the image made me chose 2. 4. I chose 4 because I understand the task clearly and I am motivated to find out the answers. 5. The first question (a) confused me, but b and c were ok. The picture helped even though it didn't have any info. 6. Too many terms like pounds, distance, liters, calculate kilos. Makes it stressful. It does make it interesting. 7. Its relatively easy since you are given the fuel in pounds plus its real life. 8. There is a a, b and c, also because it just looks long. 9. I find it difficult to calculate these kind of word problems. 10. I feel that this task was pretty motivating because it gives you a lot of information to work with, has multiple answers and has a visual. 11. I feel like it is in the middle of motivation scale because it can feel like it is a bit hard. 12. I don't know how to transfer Kg to L or L to Kg. 13. Takes into account something I am curious about. 14. I chose 2 because I know that I am very bad with different weight units. Therefore, I knew it would be difficult for me to answer this question. 15. Too much text. 16. I gave it a 4 because it is a multiple choice question with visuals.	1. There are a lot of numbers and a lot of info, which makes it less motivational, but it also seems interesting which is why I gave it a 3. 2. Too much text 3. There were a lot of questions and it seems a long calculation process. 4. I am not really a fan of weight questions etc. I find them a bit confusing. 5. Some things were a bit confusing and hard to understand, but it looked fun and interesting. 6. It's a confusing unit to me. 7. It is not that easy, but it is not that hard either. 8. The text is too long. The photo looks too confusing. 9. It's a lot of writing and its abc task. 10. There are a lot of numbers, but the picture makes it more motivating and fun. 11. Theme is good, too much text. 12. The text is too long, that is why it is not motivating. 13. Its not a bad question, but I don't feel an urge to do it. It was a bit confusing and I had to read it multiple times. 14. Something that I would see in a normal test, its good. Good explanation. 15. This can be solved, but I am not so motivating because of too much details, numbers and text. 16. I don't know how to calculate this. 17. I wouldn't mind doing the task if it was given to me, but I don't like the amount of conversion you have to do in order to do the task, because you have to be really focused. 18. Not challenging, takes time. 19. I feel its too much text for only one big question. 20. This task is a bit basic and easy to solve. It is familiar. And picture engages. 21. Seems interesting, but a lot of information.

BLUE CLASSIFICATION: TASK COMPLEXITY: too much text, confusing story, too many things to do, a lot of numbers, much information, takes time (and not for an interesting purpose at the end, anyway) .. [n= 20, 20/37 => 54%], Negative

GREEN CLASSIFICATION: THE VISUAL IS ENGAGING: image made me choose, picture helps, engages, motivates, [n=6, 6/37=16 %] Positive

BROWN CLASSIFICATION: I FIND IT DIFFICULT: confusing, difficult to compute, hard, conversion of units hard, [n=9, 9/37 = 24 %] Negative

PURPLE CLASSIFICATION: INTERESTING CONTEXT: interesting, curious, fun, theme is good [n=6, 16 %] Positive

OVERALL RATING: 2.59

Task 2:

The researcher started to use blue colour for this task for coding, which denotes the fact that the task is confusing. The keywords that fall into this category are hard to understand, complicated, too many numbers and insufficient explanation. Most of the comments from grade 9 look blue. “It was hard to understand, and maybe an extra sentence” was the first comment, clearly expressing the fact that it failed to intrinsically motivate.

One plain comment is that of “I don’t like algebra”, “I just don’t like it” suggesting “algebra” is not a favourite topic among students at this age level. One student gave a low rating stating the task demands to “show,” in other words, “prove.” The task looks too tiring for a student. Some students stated that they needed more explanation or there was not sufficient explanation so that they could easily understand. “It looks confusing with all those boxes and numbers including symbols and letters” implies that the task structure did not go well with one of the students. These comments that criticize the task account for 51% of the text comments. Because of the minimal positive comments toward the task, only one colour (green) is used for marking those comments.

As opposed to some of the blue coloured comments stating that the question cannot be easily understood, some students stated that the task looks easy and it can be easily understood. Many of the comments stated that the task should have provided more explanation and information, but one of the students claimed that “the explanation was clear” and also “the diagram is clear.” These comments denote that the structure of the task was well received by some of the students. The “not sufficient explanation” aspect was looked at from a different perspective by some students who stated that “not too much text makes it less confusing.”

The last section of coding was done with brown colour, which indicates a slightly positive approach to the task, highlighting the comments that sounded “interesting.” Statements include “looked like an interesting puzzle and kind of fun.” A considerable number of comments repeatedly state, “it is interesting, it sounded interesting, fairly fun and interesting, interesting wording, making it engaging magic square.” These comments can be viewed as clear indicators of intrinsic motivation. Even with such comments, the number of comments opposing the task outnumber the comments that favour the task. The positive comments account for approximately 30% of the comments as opposed to 51% of negative comments. The comments received indicate that this is one of the least favourite tasks among the students.

The overall rating for this task is 2.74, which is a low rating, and the majority of the comments support that rating. As part of post-session interview, the only student who solved this task mentioned that the student does not want to change the initial rating given to the task because “because I understood their concept while reading. They were also clear about what you need to answer.”

Overall, majority of student comments expressed negative view of this task from motivation perspective, namely the task being hard to understand, confusing, and lacks some information. There were also positive comments about the task being entertaining and fun.

Table 5 - Task 2 – Colour coding of comments

TASK 2	Grade 9 comments	Grade 10 comments
	1. It is in between 2 and 3, but leaning more towards 3. I feel like it could be organized better and maybe an extra sentence. It was hard to understand at first, but makes sense when looking at it better. 2. I don't understand it and I don't like algebra. 3. I have problems with understanding the task and therefore I don't feel motivated. 4. I don't get it, dislike it. 5. Just tiring to look at and seems more complex, than I think it would have looked like with more visuals. 6. It looks a little long, but still looks better than the last one. 7. It looks very complicated and seems difficult to complete because we have to "show." 8. Too many numbers, too much to work with. Think many people would find this hard to read and interpret. Generally too tiring. 9. It looks easy and not too hard and it can be easily understood. 10. It looks confusing and does not make sense to me. 11. The question gives little context and information and I don't understand it. 12. I chose 5 because it looked like an interesting puzzle that would get me thinking. Also, it seemed kind of fun to solve. 13. I like that it doesn't have so much text. 14. It is fine, but there is nothing that is very exciting about it.	1. Many numbers and variables, but explanation was clear and short making it motivational. 2. It was a bit complicated to read, but diagram is very clear. 3. I have never worked with this before. 4. It is different than other questions. I am used to so it is interesting, it sounded interesting, but it also seems a bit repetitive, so it is not a 5. 5. I could see the logic in the task and it seemed fairly fun and interesting. 6. Don't really understand the task. 7. I don't understand this task. 8. It looks confusing with all those boxes and numbers including symbols and letters. 9. I have never done this before, I don't get it. 10. All the numbers make it look hard and complicated, but the colours help a bit. 11. Need more explanation. 12. It looks very confusing and there is not enough explanation. 13. Good question, not too much text, which makes it less confusing. 14. Easy to understand, clear, nice light colours. 15. Not much text, easy to understand, good pictures. 16. I don't feel motivated when solving algebra. 17. I don't like questions where you have to prove given information. 18. Challenging enough, too much to read. 19. Needs to be explained a bit better and more detail. 20. Interesting wording, making it engaging "magic square" Little text which makes it easy and understandable. 21. This seems interesting because it makes me want to verify the statement.

BLUE CLASSIFICATION: IT IS CONFUSING: hard to understand, I don't get it, it is complicated, too many numbers to understand, needs more explanation [n=9+9 =18, 18/35 => 51%], Negative

GREEN CLASSIFICATION: IT IS NOT CONFUSING: looks easy, diagram-explanation is clear, easy to understand [n= 1+6 =7, 20 %] Positive

BROWN CLASSIFICATION: IT IS INTERESTING: interesting, engaging, fun [n= 1+4 =5, 14 %] Positive

OVERALL RATING: 2.74

Task 3:

The comments received for this task demanded five types of colour coding. The first one is a blue colour classification grouping the comments about the long text. The very first comment from a grade 9 student is "too much unuseful information and too little about the question." The statements that mean too much text or long occur ten times, suggesting that the vast majority of the participants felt that there was too much text for this task. Some students also commented that the task looks long and has a lot to remember. Comments like "boring, too much storyline" indicate that the students felt too tiring to understand the task by reading the whole story. The green classification mostly talks about the role of visuals in this task. Grade 9 students stated that the numbers are easy and the task looks fun. They also commented that the task has text that gives more information with good visuals.

Comments like "The diagram is clear," "the diagram helped a lot, I liked the diagram" clearly indicate the visuals being helpful. Grade 10 students also gave favourable comments regarding the visuals, such as "It included a diagram with colours and good informative writing," "good picture," "the picture is very clear," "explanation good, picture good, note good." This task is one such task that received a more significant number of favourable reviews about the visuals. It should be worth mentioning that this task contains two visuals.

The yellow colour coding indicated the story told in this task, and it was fun. The number of comments belonging to this category is comparatively low but is interesting. One of the students mentioned that the story was motivating. The most interesting observations from this category are "It has animals and animals are motivating for some people," "Dogs. You gotta love dogs with brains and logic." At least five people mentioned this task contains one of the following factors: "Question is fun and interesting, fun topic, likeable topic," explicit references that these students found some factors that pretty much intrinsically motivated them. The next colour chosen is brown to highlight the comments of those students who found the task very difficult and had a negative view of the visuals.

"For me though, I would prefer to do questions with a straightforward answer," indicating an apparent absence of intrinsic factors that can motivate the student. Some students complained about the visuals, "the photos look like they don't make the task make no sense," "the diagram at the end was a bit confusing because of the space between the line A and B," "Don't look the first image," "not picture of visualizing." The purple classification tries to group the comments of those students who felt that the task is easy and can be easily solved, a clearly extrinsically motivated perspective where the main focus is on completing the task rather than seeing what is enjoyable.

Some of those comments are “The task seems easy, and therefore I am more motivated to do it,” “super simple and can easily be explained and understood,” “I chose 5 because it looked like an easy question to solve with little requirement for thinking too much,” “seems easy to answer,” “it is easy to understand.” In line with the positive comments, nine students solved this task because this task was both intrinsically and extrinsically motivating to a majority of the students and the rating of 3.54 also clearly suggests this task being one of the favourite ones.

Overall, majority of student comments expressed negative view of this task from motivation perspective, namely the task containing too much text and the visuals not helping. There were also positive comments about the task with an interesting story and helpful visuals.

Table 6 - Task 3 – Colour coding of comments

TASK 3 Grade 9 comments	Grade 10 comments
1. Too much unuseful information and too little about the question. 2. The question seems interesting and also is different. For me though, I would prefer to do questions with a straightforward answer. 3. Too much text, but naming the dog makes me want to do it. 4. The task seems easy and therefore I am more motivated to do it. 5. I didn't understand if 4 m of running is equal to 1 m of swimming or the other way around 6. Too much backstory, which begins to make it nerve-racking. 7. Super simple and can easily be explained and understood. 8. Looks so long and boring, too much storyline. 9. There is a lot of text, but it seems like an easier task. 10. Fun topic, easy numbers, looks more fun. 11. It has animals and animals are motivating for some people. You can understand this easily too. 12. Looks easy and interesting. 13. The question is well explained and the topic is very likeable. 14. I chose 5 because it looked like an easy question to solve with little requirement for thinking too much. 15. A lot text and a lot to remember, but the story kept me motivated. 16. I gave it a 4 because it is more of a fun question. It has a text that gives us information that we have to find, and it has visuals.	1. Too much explanation/context, makes it less motivational. 2. A lot of text, diagram is clear. 3. The task was not that interesting. 4. The text was confusing, however, the diagram helped a lot, I liked the diagram. I also like the Pythagorean theorem. 5. Dogs. You gotta love dogs with brains and logic. 6. Well explained, seems easy to answer. 7. It is easy to understand. 8. The text overcomplicates the task and the photos look like they don't make the task make no sense. The task question is even more confusing than the photos make it. 9. I like its Pythagoras, but I don't remember now to do it and I don't like math. 10. I felt that this was okay to solve because it included a diagram with colours and good informative writing. 11. Too much unnecessary text. Not enough explanation. Good pictures. 12. The text is very long, but the picture is very clear. 13. I understood that I needed to use Pythagoras, but there was a lot of text and the diagram at the end was a bit confusing because of the space between the line A and B. 14. Don't look the first image, too much text, a bit boring. 15. Explanation good, picture good, note good. 16. I don't remember this. 17. I thought the story was amusing. 18. Motivated, but don't remember how to do it. 19. Too much text, not picture of visualizing. 20. Well-structured task but lacking slight motivation to solve it at the moment.

BLUE CLASSIFICATION: **LONG TEXT**: Too much text, confusing story, much information, takes time [n= 16, 16/36 => 44%], Negative

GREEN CLASSIFICATION: GOOD VISUALS: Picture engages, helps, motivates, text explains better [n= 10, 10/36 = 28 %] Positive

YELLOW CLASSIFICATION: **INTERESTING CONTEXT**: story is interesting and fun [n= 8, 8/36 =36, 22%] Positive

BROWN CLASSIFICATION: I FIND IT DIFFICULT: Hard to understand, visuals not helping, [n= 7, 7/36=19 %] Negative

PURPLE CLASSIFICATION: **I FIND IT EASY**: Easy to understand, theme is interesting [n= 7, 7/36 =36, 19%]

Task 4

The comment section for this task opens with "the question made no sense" by a grade 9 student. Blue colour was used to code such tasks where the students commented that the task is confusing. "Didn't understand" and "confusing" also add to that category. Some comments criticised the picture "but confusing picture, why is there that picture." Also, the comments indicated that the task has very little information and numbers, thus making it confusing. The blue comments account for only 16% of the total responses.

Green colour coding was used to sum up the comments that states the task is fun. "This is fun because it is an activity task. Instead of just writing, we get to do actually do something," "It is an active exercise that seems fun," "I like solving practical questions," indicating students love to do math tasks that involves some activity rather than just solving it with pen and paper. This "activity" factor did not go well with some of the students who stated, "I can't be bothered to gather other materials to answer the question." The rest of the green colour comments on aspects like easy to understand, good explanation, understanding, looks fun.

The next category is that of "time consuming" denoted by brown colour coding. "If this was in a test, I would do it but as a class task, I would skip because its too "much work"" this comment was viewed as one of the most important comments from the whole research. This comment clearly indicates that the internal motivating factor is almost non-existent and problem solving is done only for grades and marks, which are external factors. "This one isn't very interesting, but it is very simple, meaning I would be more motivated to do the easier or more simple ones with less calculations and complications," again this comment indicates the dominance of extrinsic motivating factors over the intrinsic ones. The other brown colour comments also talks about the facts such as "it would be a waste of time, hard to prove, or it seems or it actually requires a lot of calculations."

Next category is regarding the visuals, which is coded in yellow. Six students praised the visuals, saying "colourful picture, good picture, nice image, good picture, picture helps explain the question."

The last category for this task is purple colouring, which implies that the task is easy to understand. The purple colour indicates the task being simple and it can be easily done. "I am not very motivated because the task is too easy," "easy problem," "simple to understand," these comments suggest a good part of the participants found this task to be too simple. Also, a couple of students mentioned that the text is short and the explanation is also short, which is a positive aspect. Overall, this task was categorized into five different colour coding as the variety of comments were more.

Overall, the positive comments accounted for 70% of the comments and the opposing comments constitute 30% of the comments. Four people solved this task. The number of times this task was solved does not justify either the positive comments it carried or the rating of 3.27 it received. The researcher's understanding is that even though many students were intrinsically motivated by looking at the task, they chose not to solve it.

Overall, majority of student comments expressed positive view of this task being practical and straightforward. There were also some negative comments about the task stating that it is time consuming and involves too much calculations.

Table 7 - Task 4 – Colour coding of comments

TASK 4 Grade 9 comments	Grade 10 comments
1. The question made no sense. 2. The question is simple and there is a correct answer. When things are done correctly, my answer is in between 4 and 5. 3. The physical aspect seems fun, but the three lines of the text seems boring. 4. Difficult task, didn't understand. 5. I think it is boring. 6. A lot of doing makes it easier to focus and think about volume. If this was in a test, I would do it but as a class task, I would skip because its too "much work." 7. Can be easily done. 8. It takes too long to do, but it is fun because it is engaging. 9. It is confusing and I don't know how to use math to solve the problem 10. This one isnt very interesting, but it is very simple, meaning I would be more motivated to do the easier or more simple ones with less calculations and complications. 11. This is something you have or do not have to write for and you can more a little bit. 12. Sounds simple, but also hard to prove. 13. The question is relevant, however, it requires or seems to require a lot of calculations. 14. I chose 1 because it looked really difficult to answer and feels like it would probably be a waste of time because I thought that I could solve it within 15 minutes without giving up. I don't think the mathematics would be that hard, I just don't remember the formula for the volume of the cylinders. If I had my mind refreshed and was told the formula again, I think I could probably solve it. 15. This is fun because it is an activity task. Instead of just writing, we get to do actually do something. 16. It is an active exercise that seems fun.	1. Good and concrete explanation given. 2. Clear instruction, I just don't remember how to do it. 3. I can't be bothered to gather other materials to answer the question. 4. I don't really have that much feeling towards it, like it does not seem that motivating, but not that motivated. 5. I am not very motivated because the task is too easy. 6. Easy problem, but confusing picture, why is there that picture. 7. It is simple to understand. 8. It starts off fine until it starts with the A4 paper. The question does not hold more than the other, makes it very confusing. 9. I wasn't here when the people in my class had this and my teacher refused to teach it cause he said "you've had about this in your old school" 10. Motivating and looks fun because of the colourful picture that has been included. 11. Boring picture. Enough explanation. 12. Short text. 13. Easy to understand, good picture. 14. Nice image, good explanation, maybe have a bit more detail. 15. Understandable, good picture, short explanation. 16. I like solving practical questions. 17. The picture helps explain the question, but it make it less motivating when you have to explain your answer with words. 18. This was alright, should have said what the measurements of an A4 is. 19. Personally, I don't like doing volume and I don't remember how. 20. Too little information, numbers? Makes it confusing. 21. Seems difficult, but I am motivated to figure it out.

GREEN CLASSIFICATION: IT IS FUN: practical, understandable, motivating and fun, [n= 10, 10/37 = 27 %] Positive

PURPLE CLASSIFICATION: **LOW COMPLEXITY**: Easy to understand, straightforward [n= 10, 10/37 = 27%] Positive

BLUE CLASSIFICATION: **IT IS CONFUSING**: difficulty understanding, [n= 6, 9/37 => 16%], Negative

BROWN CLASSIFICATION: TIME CONSUMING: Time consuming, lots of calculations, prefer less time-consuming tasks [n= 5, 5/37=14 %] Negative

YELLOW CLASSIFICATION: NICE PICTURE: Picture is helpful. [n= 6, 6/37=16%] Positive

OVERALL RATING: 3.27

Task 5:

This task was classified into just three colours: Blue, green and purple. The blue colour covers the aspects of the comments that implies that the task is confusing. The structure of the question did not go well with one of the students in grade 9 “The question is kind of hard to understand due to the way it is organized.” At least five more students from grade 9 stated that the task is either hard to understand, complicated. Some more comments from grade 9 also stated that the task is confusing, looks messy. Just two comments were from grade 10 were coded blue where the students mentioned that the task is confusing and it needs more explanation.

Green colour coding gives supportive statements about the task and it resembles the easiness and clarity of the task. “I understand it, but it seems too easy,” “, something you know very well,” “It makes me think, but still too easy,” these comments clearly indicate that the students felt that the task is too easy and it is not really challenging for them. Some of the comments mention this task as a percentage task. The green coloured comments from grade 10 are “Well explained,” “It is easy, because it has linear equation,” “Love these types of equations, easy to understand, easy to solve, good explanation and short explanation,” “Good structure of table.” These comments clearly indicate that grade 10 students had a very positive approach towards this task. Some students felt that this task can be solved as a linear equation as opposed to grade 9’s approach of percentage question. Some other interesting comments from grade 10 are “Money stuff, this is great,” “This is motivating because it includes real life situations with money.”

The other colour used for this task is purple, which deals with comments where the students found the topic of percentage difficult. For example, “I have forgot how to work out percentage questions, I don’t like percentages that much, I am not sure how to do this.” There was one comment “it is challenging to remember percentages because we don’t use it much,” which indicates the usage of integration of previously learned topics into the current curriculum. The positive comments account for 32% and the opposing comments for this task account for 53%. The overall rating for this task is 2.79. As you can see from the comments from both the grades, grade 9 voiced a strong opinion against this task whereas the grade 10 students took a positive stand with this task.

Overall, majority of student comments expressed a negative view of this task because they forgot the process of calculating percentages. There were also some positive comments about the task stating that it had a clear explanation.

Table 8 - Task 5 – Colour coding of comments

TASK 5 Grade 9 comments	Grade 10 comments
1. The question is kind of hard to understand due to the way it is organized. The space is also limited to do working out. 2. I don't understand it. 3. Understood half of the task, but lost motivation at iii. 4. I didn't understand the context. 5. Loads of numbers and filling out. 6. Feels like the question is easy. 7. I understand it, but it seems too easy. 8. A little bit boring, but percentages is something we learned a while ago and it is motivational to do things that are in the core of your knowledge, something you know very well. 9. It is too complicated, and it is hard to understand. You have to think way more and you don't just want to start the last. 10. Confusing. 11. The question is very messy and confusing. It as well doesn't tell me what I need to do. 12. By the initial look of the task, it seemed confusing. 13. Hard to understand what I am supposed to do. 14. This one is very plain and confusing.	1. Looks confusing. 2. Clear instruction, I want to do it, but forgot how. 3. I have forgot how to work out percentage questions. 4. I don't like percentages that much. I could do it, it is not just that fun in my opinion. 5. It makes me think, but still too easy. 6. Well explained. 7. It is easy, because it has linear equation. 8. It looks over complicated. 9. I never had percentages, my teacher don't believe me. 10. This is motivating because it includes real life situations with money, which I find interesting. 11. Need more explanation, more fun with picture. 12. It looks clear 13. I understood it right away. 14. Love these types of equations, easy to understand, easy to solve, good explanation and short explanation. 15. I am not sure how to do this. 16. I like the type of question, but sometimes, it is challenging to remember percentages (how to work with them) because we don't use it much. 17. Money stuff, this is great. 18. Difficult, but fun to do. 19. Good structure of table. 20. Confuses me a bit. Not very motivated to solve it.

BLUE CLASSIFICATION: **IT IS CONFUSING**: Difficulty understanding, confusing, [n= 13, 13/34 => 38%], Negative

GREEN CLASSIFICATION: IT IS EASY AND CLEAR: Easily understandable, not complicated, clear explanation [n= 11, 11/34 = 32 %] Positive

PURPLE CLASSIFICATION: PERCENTAGES DIFFICULT: I do not remember how to do this, percentages difficult [n= 5, 5/34 => 15%], Negative

OVERALL RATING: 2.79

Task 6:

This task demanded colour coding using four colours. This section of green colour covers the comments of those students who found the task easy. “At first, it seemed tiring to do, but when looking closely at the questions and bullet points, it does not seem so hard and looks easy to do” is the first comment from a grade 9 student, and most of the subsequent comments agree with this point.

These comments are highly supportive of the task. The students commented that the task is simplistic and formatted in a good way to have sound reasoning, looks simple and easy with a good explanation, and the instruction was explicit. A significant portion of the comments was supportive of this task only because it does not contain real math or numbers; some of those are, “it’s not really related to math, no math is related, there aren’t numbers involved, this question requires no mathematics to be completed since there are no calculations needed, it looks simpler, this is very easy as it only needs common sense to do it, it didn’t include a lot of math.” This green colour classification accounts for 64% of the total comments received.

The subsequent coding is also that of positive or supportive statements toward the task using brown colour. It covers the students who found this task as fun and not boring. “Farmer and horses are fun” and “I am fond of logical tasks” give evidence of the presence of intrinsic motivating factors in this task. At least five students mentioned that this task was fun. The combination of green and brown colour constitutes 83% of the total comments, which is the highest of any other task. The aspect of the task being tedious was coloured using the purple colour. “It’s also boring because there are no numbers,” and “A bit boring because it doesn’t require as much thinking as some of the other questions,” such comments look at the aspect of the absence of numbers from a different perspective.

Blue colour classification talks about too much text on the task. Five people commented that this task had too much text. The blue and purple colours account for only approximately 20% of the comments. With the massive number of supportive comments and the highest rating of 3.94, this task is the clear winner and sits at the top of the list. The values also translated to the number of times it was solved, 15, the second-highest in the list.

Overall, majority of student comments expressed a highly positive view of this task because it deals with logical reasoning, being fun and deals with animals. There were also some negative comments about the task stating that it had too much text.

Table 9 - Task 6 – Colour coding of comments

TASK 6 Grade 9 comments	Grade 10 comments
1. The question was an opinion question, so there were no correct answer, so it felt comforting because there is not the stress that the question was wrong. 2. At first, it seemed tiring to do, but when looking closely at the questions and bullet points, it does not seem so hard and looks easy to do. 3. Too many options, but the farmer and horse are fun. 4. I feel motivated because I understand the task and it includes items from criteria D (real life application of International Baccalaureate) . 5. All of them are unlikely 6. Simplistic and so formatted in a way to have good reasoning. 7. You can easily cross out the illogical answers. 8. Looks fun because its not really related to math, but its also boring because there are no numbers. 9. I feel motivated to do this task because it seems easy and no math is related 10. Motivational because there aren't numbers involved, it looks simple and is easy. 11. Again, has animals and it is easy to understand. 12. Easy to answer. 13. This question requires no mathematics to be completed, but it is easily understood. 14. Looks simple and easy. A bit boring because it doesn't require as much thinking as some of the other questions. 15. Very easy and also good explanation. 16. It seems easy and fun.	1. Since there are no calculations needed, it looks simpler. Good amount of info, but a lot of text. 2. The instruction was very clear. 3. It seems too easy and has a lot of text. 4. There are too few numbers like doing math with numbers, this seems easy and not that fun. 5. I am very fond of logic tasks, so I therefore want to solve this task. 6. Easy, but needs a bit more of information to be able to answer. 7. This is very easy as it only needs common sense to do it. 8. It was a simple but also hard question. 9. This is probably the only think I can do. 10. This motivated me because it didn't include a lot of math and wasn't boring. It was fun to solve this. 11. Explained good, too easy, good theme. 12. Too much text 13. I felt very encouraged to find which one was the most true for some reason. 14. It is okay, took sometime to solve, personally I think there is too much text. 15. I like logical reasoning. 16. I like questions that use a formula to acquire an answer more. 17. This one is fun. 18. This was a 50/50. 19. Too much text, little number, too many details. 20. This seems to be rather easy, so I would be motivated to try solve it.

GREEN CLASSIFICATION: I CAN DO IT, IT IS EASY: No numbers, fun, logic only [n= 23, 23/36 = 64 %] Positive

BROWN CLASSIFICATION: IT IS FUN: the task is fun, animal story is fun, not boring, I like logical tasks [n= 7, 7/36 = 19 %] Positive

PURPLE CLASSIFICATION: IT IS BORING: it is boring, [n= 2, 2/36 => 6%], Negative

BLUE CLASSIFICATION: **TOO MUCH TEXT**: Too much text, [n= 5, 5/36 => 14%], Negative

OVERALL RATING: 3.94

Task 7:

The coding started with green colour that deals with the illustrative nature of the task. Most of the comments were appreciative of the illustrative nature of the task, in other words, an example being worked out for them. Some of those comments are “The question was motivating due to it having an example, so I would know what to do,” “Along with a written explanation, there is also an example, and it seems to be easy and a good brain activity,” “It shows u how to do it to make it clearer for us,” “Like that there are examples of how to solve it,” “Method included,” “I looked at the example on how to solve, it looked easy to follow,” “the numerical explanation below helped me understand it, which made me more motivating.” One interesting statement is “without the visual presentation, I would have no clue” because the picture in no way gave a clue of how to solve the task. Students gave comprehensive statements that a worked-out example helped a lot in solving this task. The students felt this task was easy to solve, but that did not make them find the intrinsic motivating factors.

The blue colour classification was used to categorize the comments that talk about the task being complicated and lengthy. Those comments indicate that the task had too many different numbers, steps in addition to the given text do not go together, many steps and a lot to write, the method itself is very long, a long calculation. These comments account for about 35% of the total comments received.

The last category is the purple classification of those who found the task fun and interesting. Some students found this task a fun and interesting one since it creates a curiosity factor about whether this method will work or not, and they thought that the process would be fun. Overall, the supportive statements account for 60%, and the negative comments account for 35%. Even though it does not top the list in terms of rating and a significantly higher number of supportive statements, this task sits at the top of the list regarding the number of times it was solved.

Overall, majority of student comments expressed a positive view of this task because it was interesting and had surprises and also the illustration. There were also some negative comments about the task stating that it had too much text and many steps involved.

Table 10 - Task 7 – Colour coding of comments

TASK 7 Grade 9 comments	Grade 10 comments
1. The question was motivating due to it having an example, so I would know what to do. 2. Along with a written explanation, there is also an example and it seems to be easy and a good brain activity. 3. The formula is dumb, but the rest is motivating. 4. It shows u how to do it to make it clearer for us. 5. Too many different numbers. 6. Steps with a lot of text don't go together. Looks harder than it has to. 7. Makes sense, but without the visual presentation, I would have no clue. 8. Looks long and looks stupid. 9. Many steps and a lot of writing. 10. Many steps, looks fun to work out the problem. 11. Seems easy and easy to understand. Like that there are examples of how to solve it. 12. Just use calculator. 13. The question is well phrased and includes an example. I also find it interesting how something works that way. 14. Looks like fun and not too hard to solve. 15. This gives the explanation on how to do it very clear. 16. It would be easier to just divide it by 7 and see if the result was a whole number.	1. Method included, makes it motivational. 2. Too much text. 3. I looked at the example on how to solve, it looked easy to follow. 4. This method does seem interesting to use, but it seems like a long method. 5. I am told how to do it, therefore I am motivated to try it myself. 6. Explains you how to do it. 7. This is very easy task as the method is already given. 8. The equation and fractions make it a little bit complicated and confusing. 9. Numbers in it. 10. This was fun and motivating because it came with an instruction on how you did it. 11. Picture not relevant, weirdly explained. Easy. 12. It looks hard, so you will think hard. 13. I was very confused when reading it, but it was a little fascinating and interesting. 14. Don't understand, no need to have this question. 15. Don't like this kind of task. Much text, number, overall a bit task. 16. It's a long calculation. 17. I was not motivated when I read the text, but the numerical explanation below helped me understand it, which made me more motivating. 18. I don't know. This could be fun. 19. Don't know how to do it. 20. It gives a method and it is engaging because it makes you wonder if it always works. 21. This one just confuses me and I am not very motivated to attempt and solve it.

GREEN CLASSIFICATION: EXAMPLE HELPS: Sample calculation given, interesting [n= 15, 15/37 = 41%] Positive

BLUE CLASSIFICATION: **IT IS COMPLICATED AND LONG**: Too much text, many steps involved, confusing, [n= 13, 13/37 => 35%], Negative

PURPLE CLASSIFICATION: FUN: Interesting, surprises. [n= 7, 7/37 = 19%] Positive

OVERALL RATING: 3.14

Task 8:

The first comment, which was not colour coded, is the striking one for this task, “Question I know how to do, but the question was not going to help me with anything in the real world.” Then the classification was started using green, indicating those students’ comments who felt that this task was straightforward and easy.

The positive aspects mentioned in this task include it does not include random numbers, not too much text, the formula is already given, and the information is clear, short and simple, the organization was good with not too many numbers and explanations, straightforward, clear overview of the task, easy to dissect the question. Such comments account for 43% of the total responses, close to the halfway mark.

The classification then moved on using blue colour, indicating the responses of students who mentioned that they either forgot how to calculate the volume. Some of the comments in their direct form are “Its simple when you know how to do it, but I have forgotten,” “I don’t remember how to measure the volume of the cylinders,” “I wanted to do the task, but forgot how to,” “I am not good at volume man,” “I haven’t learned volume yet and cylinder, but I understand the task. With some more knowledge, I could solve.” These comments indicate that the only issue with this task is that these students either forgot the method of calculating volume or had some challenges (even when the formula is given) with calculating volumes, accounting for 27% of the total responses.

Finally, the brown colour was used to code the comments that deal with the characteristics of the visuals. Seven students commented that the visuals are good, it has good colours, the picture looks fun, and they liked the picture. One more interesting comment that was not coloured is, “I would enjoy the question because it tells me what I need to do and the purpose for it, as well as not being too intimidating of a question.” Overall the positive comments stand tall against the negative comments by 60% to 30%. Eight students solved this task, the fourth on the list of being solved. Some of the comments indicate the presence of intrinsic motivation factors.

Overall, majority of student comments expressed a very positive view of this task because of its straightforward nature and helpful visuals. There were also some negative comments about the task stating the difficulty with the formula and involved calculations.

Table 11 - Task 8 – Colour coding of comments

TASK 8 Grade 9 comments	Grade 10 comments
1. Question I know how to do, but the question was not going to help me with anything in the real world. 2. The question is simple and does not include a lot of random numbers. 3. There is a picture, named characters and not too much text. 4. I didn't understand how to get the answers for the task. 5. Because the formula is already given and the information is fairly clear. 6. Right away understood it and its about something close to me, making it feel more "natural." *I really liked it. 7. Easy, real life applicable. 8. Short and simple, I forgot the formula so that why I am not doing it. 9. Its simple when you know how to do it, but I have forgotten. 10. Task that is fun math, working with centimeter etc. I like visuals and multiple answers, question steps (a,b,c). 11. It was a bit hard to understand. 12. I don't know how to solve. 13. I would enjoy the question because it tells me what I need to do and the purpose for it, as well as not being too intimidating of a question. 14. Looks like a tricky question that would definitely get me thinking, however, I don't remember how to measure the volume of the cylinders. 15. Pretty good organized, but boring. 16. It looks easy and simple, it is also a multiple choice question, which is fun.	1. Not too many numbers and explanation. 2. Very clear text, easy to understand, I wanted to do the task, but forgot how to. 3. I don't remember how to do it. 4. I like the picture, but the task itself is straight forward. I am quite neutral towards it. It is easy to understand and which I think is good. 5. I am not good at volume man. 6. Explained well, has a picture to follow. 7. It is easy if you know the formula. 8. The question is a little bit complicated and confusing. 9. I don't remember this. 10. This wasn't very motivating because it included a real-life situation that seemed a bit unrealistic. 11. Good picture, easy explanation. 12. Short text, fun picture. 13. You immediately know what you have to do in order to solve the question. 14. Nice colours. 15. I haven't learned volume yet and cylinder, but I understand the task. With some more knowledge, I could solve. 16. No reasoning. 17. I think the question is a little bit silly, as it isn't realistic that two people would think about this when pouring themselves a glass of orange juice. 18. A bit boring, maybe. 19. Don't have time to do. 20. Gives clear overview of tasks, easy to dissect the question. Like the picture. 21. I don't really know how to solve this but I would try.

GREEN CLASSIFICATION: I FOUND IT SIMPLE: Straightforward method, easy, picture helps, engages, motivates, [n= 16, 16/37 = 43 %] Positive

BLUE CLASSIFICATION: **I DO NOT KNOW/REMEMBER THE MATH** (but formula was given): Don't remember the formula, how to calculate, [n= 10, 10/37 => 27%], Negative

BROWN CLASSIFICATION: I LIKE THE PICTURE: like the picture, colour, good picture, [n= 8, 8/37 = 22 %] positive

OVERALL RATING: 3.49

Task 9:

The first comment that was not coded by any colour states, “The image demoted me because it makes the picture look harder than it actually is,” an opposing comment about it. Due to the variety of the words, five colour coding was required for this task. First, blue colour classification was utilized to categorize the comments that signify that the task has too much text. Students from both grades commented that there was a lot of text in the first paragraph, the task was confusing, too much writing, making it dull, the text was too long and confusing. These comments account for 26% of the total responses. The percentage of all the colour classifications was approximately equally distributed for this task.

The next category was done using the brown colour that covers the comments of those students who hated the topic. Some of those comments are “I forgot the formula for SOH CAH TOA,” “I have done this and hated it,” “I just didn’t remember how to solve,” “Pythagoras is kinda gross,” which clearly indicate the hatred towards trigonometry by this set of students and these account for just 17% of the total responses.

The subsequent classification was done using green colour to describe the engaging visuals. The comments in this section include the diagram is exemplary, the concept is good, good picture and the last one “I would give it a try, because the picture fits with the text, so I can relate it to the question while I read it.”

The purple colour classification is a supporting one about the task that deals with the aspect of “recently learned.” “Super confident, I could do it, and it’s a recent subject,” “The question appeals to me because of the mystery and because it is well-phrased. It is also not intimidating,” “I liked this unit, making it motivational.” Most of these comments are from grade 9; it is understandable since grade 9 learned this unit recently. One comment seen as a crucial one by the researcher is, “Looks like a fun task, and I would honestly love to solve it; however, I am lazy and can’t be bothered to do so because this isn’t a graded test.” This student obviously can be motivated only through external motivating factors.

The last one is that of yellow classification, dealing with “finding it easy.” Five students felt that the task was easy, and the reason for that was straightforward and familiar. The three types of positive statements constitute 42% and approximately the same percentage of comments opposing the task. Even with a decent number of comments supporting this task and a rating of 3.06, this task was not solved even once.

Overall, student comments expressed a balanced view for this task where the positive and negative views are almost the same.

Table 12 - Task 9 – Colour coding of comments

TASK 9 Grade 9 comments	Grade 10 comments
1. The image demoted me because it makes the picture look harder than it actually is. 2. The question or task is easy and straight forward, but there is a lot of text in the first paragraph. 3. Way too much text, but the diagram is good. 4. The task was confusing. 5. I forgot the formula for SOH CAH TOA 6. Understood what to do, but comparisons make it feel unusual. 7. Super confident, I could do it and it's a recent subject. 8. I have done this and hated it. 9. We have learned about this recently, but I think the answers is phrased weirdly. I would like to have a clearer diagram. 10. Not a fan of shapes, triangles, etcs, but still an easy task where we know how to solve. 11. I felt like he should have measured it another way and by shadows, but maybe by his height. 12. Sounds interesting, but confusing. 13. The question appeals to me because of the mystery and because it is well phrased. It is also not intimidating. 14. Looks like a fun task and I would honestly love to solve it, however, I am lazy and can't be bothered to do so, because this isn't a graded test. 15. Too much writing, boring. 16. I like the concept and diagrams are good.	1. Looks interesting. I liked this unit, making it motivational. 2. Clear instruction. I just didn't remember how to solve. 3. I can't remember the formula. 4. This I believe is trigonometry and I like that unit and thought it was fun. I like that you have to think a little bit before figuring out what to do, but it is not so confusing that you wont be able to figure out what to do. 5. It is familiar, therefore I would do it because its old news. 6. Easy kind of problem gives enough information. 7. This is easy, but time consuming. 8. The text is too long and confusing. 9. Pythagoras is kind a gross. 10. This wasn't motivating because it included a diagram that made it look hard. 11. Good picture, too much text. 12. The text is long and the picture is not clear, it looks hard. 13. If I remembered trigonometry, I would be very motivated to do it. 14. Too much text. 15. Didn't understand. 16. I would give it a try, because the picture fits with the text, so I can relate it to the question while I read it. 17. A bit much maybe. 18. Like the diagram, easy to follow. 19. This seems okay, I am somewhat motivated.

BLUE CLASSIFICATION: **IT HAS TOO MUCH TEXT**: Long text, too many words, hard to understand [n=9, 9/35 => 26%], Negative

BROWN CLASSIFICATION: I FIND IT DIFFICULT, I DO NOT REMEMBER THE MATH: Hate the topic, forgot how to solve [n= 6, 6/35= 17 %] Negative

GREEN CLASSIFICATION: THE VISUAL IS ENGAGING: Image made me choose, picture helps, engages, motivates [n= 5, 5/35 = 14 %] Positive

PURPLE CLASSIFICATION: **I FIND IT INTERESTING**: Recent learning helpful, interesting, easy to do [n= 5, 14 %] Positive

YELLOW CLASSIFICATION: I FIND IT EASY: it is easy, simple, straight forward familiar [n= 5, 14 %] Positive

OVERALL RATING: 3.06

Task 10:

There was not much variety of comments for this task, so this was only categorized with three colours. The blue colour was used to indicate the statements of the students who felt the task was very difficult. A grade 9 student commented that the task looked easy to start with but became very hard when attempted to solve. The following comment is that the task requires a lot of background information. The number of calculations involved did not go well with one student. “Looks by the initial thought in my mind that it was way too difficult for me to put my efforts into and attempt of solving it,” indicating that the student needs some external motivation to justify putting so much effort into it. At least three students replied that they did not know how to do it. A student also commented that the high numbers are also one of the low motivating factors. Such comments accounted for 28% of the responses.

The subsequent colour used to classify the comments was purple for those students who found the task enjoyable. Examples of those comments are “It is not a boring question and seems interesting,” “I feel motivated because it’s a real-life scenario,” “another real-life applicable question I think I could do,” “it’s about life and death,” “It feels like it is not just math, but also science.” The other aspects that the students found interesting in this task were the questions were open and exciting, seemed quite fun and fast, assumptions, story/prompt were interesting - this negative trend in commenting accounts for 28% of the comments.

The last classification is that of green colour, which is also a positive trend, indicating that the task is simple and straightforward. The students mentioned this task as easy and straightforward because it is straight to the point, and the instruction is evident. The positive aspects account for approximately 55% of the comments, while the colour coding for negative trends accounts for 28% of the responses. Many of the comments were clear indicators of intrinsic motivation. Even with the high number of supportive comments and a high motivation rating of 3.31, only three students chose to solve it.

Overall, majority of student comments expressed a positive view of this task because it had simple and clear instruction. There were also some negative comments about the task stating it involved a lot of calculation and hard to understand.

Table 13 - Task 10 – Colour coding of comments

TASK 10 Grade 9 comments	Grade 10 comments
1. The question look simple, but when you do, it becomes hard. 2. It is not a boring question and seems interesting, but also requires a lot of background information. 3. It is simple and straight to the point. 4. I feel motivated because it's a real life scenario. 5. I don't have the time, I am sorry. 6. Feels close to **me (like task 8),** but when I read it, I already know that there is a lot of calculations and ruins it for me. 7. Another real-life applicable question I think I could do. 8. Its about life and death. 9. It is simple and there is clear instruction. 10. More of a theoretical answer, have to think about "assumption", etc. Question is open and interesting. 11. It feels like it is not just math, but also science. It also looks easy to solve. 12. I don't know how to solve it. 13. The question is phrased okay and the question is relatively easy. 14. Looks by the initial thought in my mind that it was way too difficult for me to put my efforts into and attempt of solving it. 15. This task is okay. Its not too confusing, it is well organized and the question is pretty simple. 16. This one seems quite fun and fast, which is good.	1. Clear instructions, just I don't remember how to do it. 2. Clear instruction. 3. I don't how to do to it. 4. The task sounds interesting, but I am stuck on how to solve it and the way I thought is long and not appealing. 5. Logic using past knowledge to solve a problem. Assumptions, all good and motivating things. 6. Need to make assumptions, answer might not be correct. 7. This is easy if you have a calculator. 8. The question is a bit confusing. 9. I don't like word questions. 10. This was motivating as you get numbers and you are supposed to figure out something important. 11. Easy explained, good theme, not too much text. 12. Short text, but no picture, which makes it boring. 13. I love these types of questions. 14. No image. 15. I feel not to solve this task, too high numbers. 16. Too long. 17. I don't really like questions that involve time, but the story/prompt is interesting. 18. Cant say this is fun. 19. Good set up of words, good connection between tasks. 20. This interests me and I am motivated to try solve it.

PURPLE CLASSIFICATION: **I FIND IT INTERESTING**: Fun, interesting [n= 12, 12/36 = 33%] Positive

BLUE CLASSIFICATION: **I FIND IT DIFFICULT**: Lot of calculations, hard to understand [n=10, 10/36 => 28%], Negative

GREEN CLASSIFICATION: IT IS SIMPLE AND STRAIGHTFORWARD: Simple, clear instruction [n= 8, 8/36 = 22 %] Positive

OVERALL RATING: 3.31

Task 11:

This task demanded classification with five colours. The green colour was used to start to code the comments that talk about the visual aspects of the task and the simplicity of the task. The key factors that come under this category are the task is simple and easy, super easy, it can be solved quickly, and the question is straightforward. Some repeated comments state that the tasks are very easy, easy to answer and so on. These comments account for 28% of the tasks.

Subsequently, yellow colour classification was done, covering the students' remarks who felt the task was confusing. Some of the comments belonging to this classification are “I feel it could be worded differently,” “question is confusing,” “it’s an easy question formulated in a hard way,” “Too complicated, I am very tired,” “confused why there are two different numbers,” “Don’t really understand.” These comments account for 25%, which suggests that the structure of the question should have been constructed in a more straightforward way.

The following colour coding was done with purple, and it was that of comments indicating the task is interesting. “Dinosaurs are cool, and so is the picture,” “interesting because we can use the math and think about it in a real-life setting,” these are the critical comments that indicate that the students got intrinsically motivated by the real-life connection and dinosaurs.

The blue classification deals with the aspect of a task containing long text. Comments by the students from this section repeatedly say that the task has too much text. The reasons behind that were given in plain text here “As I read the question, so much information gets thrown at me. Got confused immediately and makes want to go over it, especially in test situations, this will be more stressful,” “question provides lot of complicated words and is somewhat clustered in information,” “If I got this in a math lesson and I was tired, I would not attempt it,” “small paragraphs would be better.” These comments give a lot of insight to the researcher about the content and structure of the text used in a task.

The last category was done in brown colour, where students found this task very dull. This set of students felt that the task did not look fun, was very dull and unattractive, and also coordinate geometry was not one of their favourite topics. The positive comments constitute 44%, and the negative comments also account for 44%. Only one student chose to solve this comment. During the post-session interview with one of the students who solved this task, the student stated, “My motivation for the task has not changed since I found the task easy to complete.”

Overall, majority of student comments expressed a negative view of this task because it was boring with lot of text and complicated words. There were also some positive comments about the task stating it had engaging pictures and the real-life scenario involved.

Table 14 - Task 11 – Colour coding of comments

TASK 11	Grade 9 comments	Grade 10 comments
	1. The task is simple and easy to do, but I feel it could be worded differently. 2. Too much text and question is confusing, but dinosaurs are cool and so is the picture. 3. The task is simple and makes me motivated. 4. Because I knew the formula and we just learned about it 5. As I read the question, so much information gets thrown at me. Got confused immediately and makes want to go over it, especially in test situations, this will be more stressful. 6. Super easy because it's an easy question formulated in a hard way. 7. I don't like archaeology. 8. We have learned this recently and I feel that I can solve it easily using the distance diagram. 9. Coordinates which we have learned about, interesting because we can use the math and think about it in a real life setting. 10. We can easily find it, you have to think a bit, but that's okay. 11. Confusing. 12. The question provides lot of complicated words and is somewhat clustered in information. 13. Looks interesting and hard. Doesn't really look fun to solve though. 14. Too much text. If I got this in a math lesson and I was tired, I would not attempt it. 15. It seems boring and the task isn't very attractive, but plus for picture.	1. Clear question 2. Too complicated, I am very tired. 3. I don't know how to do it. 4. For this task, you would have to draw and I think it is fun. It is also a bit easy, some tasks are funner when they are challenging, but not too challenging and this one is a bit too easy. 5. Uninteresting task. 6. Easy to answer, but confused why there are two different numbers. 7. This is easy if you know the distance formula. 8. The question is a little bit confusing. 9. Its like science and math and I don't like either. 10. This is motivating to me as it includes coordinates, and I like working with coordinates. 11. Don't really understand, fun task. Fun theme. Good picture. 12. Text too long, small paragraphs would be better. 13. I was a bit confused when there was decimals in the coordinates, but when I looked at them closer, I understood it. 14. I like this question because the story makes sense (it is actually something that happens in real life, it is realistic) and because it gives you additional facts that you might not have known before. 15. Did you try to make this motivating. 16. Good structure of text, good picture. Not fond of coordinate geometry. 17. I am not very motivated to solve this problem.

GREEN CLASSIFICATION: IT IS EASY: Good picture, helps, engages, motivates, simple, easy to understand [n= 9, 9/32 => 28%] Positive

YELLOW CLASSIFICATION: **THE TASK IS CONFUSING**: too complicated, confusing, should have been worded better [n= 8, 8/32 => 25%], Negative

PURPLE CLASSIFICATION: THE CONTEXT IS INTERESTING: real life task, it is fun, it is interesting [n= 5, 5/32 => 16%], Positive

BLUE CLASSIFICATION: **IT HAS A LONG TEXT**: Lot of text, complicated words [n= 5, 5/32 => 16%], Negative

BROWN CLASSIFICATION: IT IS BORING: Not interested, boring, not fun [n= 4, 4/32=13%] Negative

OVERALL RATING: 3.03

Task 12

Again, the classification starts with the blue colour. The first comment is that the text is squashed. A good number of students mentioned that the text was too long, and some of them felt it was "unnecessary stuff." Some of them thought that there is a presence of unnecessary backstory, and even if the story starts from "The Great Blue Hole," it still would be meaningful. Repeatedly, it was mentioned by the students as a "lot of text, long text, unnecessary text, unnecessary information." These comments, which indicate a negative view of the task, account for 42% of the responses.

The other two colour coding was done in purple and green colours. They signify supportive statements towards the task. They cover the aspects of "interesting context" and "visuals." The comments about the visuals are "image was nice, cool picture, a bit motivating, makes the task more motivating, helps visualize the question a lot." Some of the purple comments imply that the task sounds mysterious, exploration, interesting topic, and clear numbers and formula. The remarks in the purple section indicate apparent motivating factors, the examples being mysterious and exploration themes. Even though the reasons were not mentioned, some students stated that this task was interesting and fun.

The supportive comments for the task account for 60% and the opposing comments account for about 40% of the responses. The rating received is 2.91, which is not so high, contradicting the number of positive statements. The task was solved only three times.

Overall, majority of student comments expressed a positive view of this task because of its theme and interesting picture. There were also some negative comments about the task because it had confusing story and big numbers.

Table 15 - Task 12 – Colour coding of comments

TASK 12 Grade 9 comments	Grade 10 comments
1. The text felt a bit squashed, but the image was nice. I wouldn't willingly want to solve this because of the numbers (9132700) and the effort it would require. 2. Again, too much text, but cool picture. 3. Didn't understand the task. 4. I understood it at once 5. A lot of unnecessary stuff for me, but as I read through the question I know I just have to reverse solve it. 6. Again, pretty simple I think because you can just reverse operate. I forget formulae. 7. Sounds interesting and mysterious. 8. Too much text 9. Interesting because of the exploration, but too complicated. 10. It is a lot of text, the picture is cool and might be a bit motivating. 11. Complicated. 12. The question speaks of a relevant and interesting topic while being well phrased. 13. Looks fun and difficult. I can see that I am given the formula for the volume of the cylinder on this one. However, I still don't feel the bother to solve it with its formula. I might be more motivated to solve some of the earlier ones. 14. Fun and interesting information. Too much text. 15. The question does not sound entertaining plus picture.	1. Don't need the whole backstory. If it started from "The great Blue Hole…" would be better. 2. Too detailed back story, a lot of unnecessary information. Too much text, was too confusing to do. 3. There is a lot of writing, I didn't really understand it. 4. The picture makes the task more intriguing. 5. Gives me everything I need to understand it myself. Story is motivating, interests me and makes me want to do the task. 6. Have to convert high numbers. 7. This is time consuming. 8. There is a little bit too much text. 9. I don't need the backstory. 10. It was motivating when looking at the photo but then all the numbers made it look a bit complicated. 11. Good picture, like story, good explanation. 12. Long text. 13. Although there was a lot of text, it had my attention and the picture helps visualize the question a lot. 14. I forgot how you do this. 15. I liked it because the story was interesting and because you are given the formula. 16. A bit understanding this one. 17. A lot of unnecessary text, but it is engaging and includes clear numbers and formula. Good to include picture. 18. Although this seems interesting, it confuses me a bit.

BLUE CLASSIFICATION: **IT HAS TOO MUCH TEXT**: Too much text, confusing story, big numbers [n= 14, 14/33 = 42%] Negative

PURPLE CLASSIFICATION: **IT HAS INTERESTING CONTEXT**: Interesting, easy to understand, theme is good, motivates [n=11, 11/33 = 33%] Positive

GREEN CLASSIFICATION: THE VISUAL IS ENGAGING: Interesting picture, [n=9, 9/33 = 27%] Positive

OVERALL RATING: 2.91

Task 13:

One student found the mistake in the question, “There is an error in the question, so it is confusing because it says 1 CAD = 6.99 CAD.”

Only two colours were used to code the comments for this task since the content is not of much variety. Colour coding began with the blue colour, collecting the negative statements. The first comment is about a student’s precautionary measure: “there could be an accidental mistake when multiplying so many times.” The term CAD seemed to confuse the students. The students felt that the task has too many steps, the text is too long, the calculation process seems long, time-consuming, and lots of numbers.

The green colour coding of the task mentions the simplicity of the task. One of the students liked how the question was being built up slowly. Being in a real-life situation also intrinsically motivated some of the students. Four consecutive comments from the grade were that the task was simple, the information was clear, and the calculations were simple. Also, the task is structured as small four tasks with little text, which was helpful for one of the students. “This motivates me because I love everything that has to do with economy and conversion” this comment comes from a grade 10 student, and all of the comments mentioning “money” and “economy” come from the grade 10 students. The setup of the task seems good, and it also has a good explanation were some of the supportive statements for this task. The split-up of positive comments versus negative comments for this task stands at 48% to 33%.

Even though most of the words support this task, the rating lies below the medium level rating of 3. Only two students chose to solve this task, one of which, during the post-session interview, stated confirmation of wanting to stick to the original choice of rating because “the problems I chose to solve were interesting and fun to do. I like the step-by-step calculations, etc.”

Overall, student comments expressed a balanced view of this task with almost equal percentages of positive and negative comments.

Table 16 - Task 13 – Colour coding of comments

TASK 13 Grade 9 comments	Grade 10 comments
1. The task is short and each question is being built up slowly, which I like. I although feel there could be an accidental mistake when multiplying so many times. 2. I don't like currency conversion. 3. It is a real life situation, but it is too long. 4. I got confused by CAD 5. Numbers are just not "fun." 6. Simple calculations. 7. Seems simple. 8. Clear information, seems simple. 9. Easy calculations, decimals are fun, good to have a specific problem. 10. It is four small tasks in one end, little text. 11. Not interested. 12. There are a lot of steps but they appear to be simple. 13. Looks too boring. 14. Too long. 15. More entertaining questions and there is more of them.	1. Too much text, seems like a lot to do. 2. Clear instruction. 3. It seems a long calculation process. 4. This task is confusing. 5. Easy to calculate, so fairly motivating. 6. Have to convert a lot of numbers. 7. This is easy, but slightly time consuming. 8. It made sense at the start, but then it got a bit over complicated at the end. 9. Words 10. This motivates me because I love everything that has to do with economy and conversion. 11. Like theme, enough explanation. 12. Long text, lots of numbers. 13. Easy to understand. 14. I don't really know why 15. There is an error in the question, so it is confusing because it says 1 CAD = 6.99 CAD. 16. Nah, I don't know. 17. Good setup of task, don't like currency conversion tasks. 18. This question seems logical and I am motivated to try and solve it.

GREEN CLASSIFICATION: IT IS EASY AND SIMPLE: Simple instruction, easy to calculate, interesting [n= 16, 16/33 = 48%] Positive

BLUE CLASSIFICATION: **IT IS TOO LONG**: Too much numbers, too much text, time consuming [n= 11, 11/33 => 33%], Negative

OVERALL RATING: 2.94

Task 14:

Four colours were used to classify the comments received for this task, out of which three colours were chosen to highlight the supportive classifications for the task, and only one colour coding opposes the task. The coding was started with green colour, which is a set of positive comments that talk about the task being easy, and it was recently learned. The first comment stated that the text and image make it easy to understand, and the subsequent comments from grade 9 students state again that the task can be easily understood because of its structure, and SOH CAH TAO is something they know. Again, some repeated comments from the students stated that the task looks logical, easy, etc.

The subsequent colour used is purple to mark the usefulness of the visuals. The relevant image makes the task a bit easier," "good visuals," "Since its visual, I can picture it more," "I think the diagram makes it easier to solve," "Clear diagram that helps visualise task" are some of the comments in direct quotes that suggest that the visual of this task plays a key role in understanding the task.

The third classification was done using the brown colour. Students' comments about the task being interesting are covered in this section. A couple of students found this question to be fun, and it is interesting. The statement, "I love the ocean and boat driving, and this seems important to me", is considered important because the visual of something the student likes motivates the student. There was a previous instance from task 3 where the student commented about the visuals of the dog being motivating. The above mentioned three colour coding account for approximately 90% of the responses (green 45%, purple 33%, brown 18%).

The last colour used was blue to discuss the comments about the task is boring. At least three students commented that they found the task very dull. One student mentioned that the topic of trigonometry is not a favourite one. The negative comments account for only approximately 12%. The enormous supportive comments plus the rating of 3.72 make this task the second favourite for the students. A good number of students (seven) also solved this equation.

Overall, majority of student comments expressed a highly positive view of this task because of the visuals and the fact that the topic was recently learned. There were also some negative comments about the task because it was boring.

Table 17- Task 14 – Colour coding of comments

TASK 14 Grade 9 comments	Grade 10 comments
1. The task, image and text is easy to understand. The relevant image makes the task a bit easier and the text is short and simple. 2. Just don't like it. 3. I understand the task clearly and its easy. 4. It is linked to previous lessons. 5. Its something of interest and I know what to do with SOH CAH TAO, but there are others I just prefer. 6. Easy questions and good visuals. Oops, I am rusty. 7. I dont like trigonometry. 8. Diagram is not clear and I would rather have a question mark on the diagram for what we need to find. 9. Easy to do, fun question. 10. It is a little text and the picture gives. 11. Not interested. 12. The question is structured and easily understood. 13. Doesn't seem that difficult and it may be fun to solve, but I would rather want to solve some of the earlier ones. 14. Good amount of text, pretty organized. 15. Easy and simple question, it also has an image.	1. Clear info, not too much information. Since its visual, I can picture it more, making it more motivational. 2. Very clear instruction 3. I enjoy working with trigonometry. 4. It seems interesting and I think the diagram makes it easier to solve. Again, I like trigonometry. 5. The shark looks like it is on drugs, so I am not motivated, put glasses on him and a book in his fin. 6. Gives you a diagram explaining it. 7. Only one of the sides are given, making it time consuming. 8. The question is simple, so it makes sense. 9. I don't know how to do this. 10. This motivates me because I love the ocean and boat driving and this seems important to me. The picture makes it a bit unrealistic, but its fine. 11. Good picture, enough explanation. 12. Looks fun, short text, clear picture. 13. The picture is good and helps understand the question. 14. I don't remember the formula. 15. I think the story is kind of boring, but the task is easy enough to do. 16. Maybe this could be motivating. 17. Easy task to understand and I like Trigonometry. Clear diagram that helps visualise task. 18. This question seems logical and not very hard to solve.

GREEN CLASSIFICATION: IT IS EASY: easy to understand, recently learned topic, [n= 15, 15/33 = 45 %] Positive

PURPLE CLASSIFICATION: VISUAL HELPS: picture helps [n= 11, 11/33 = 33 %] Positive

BROWN CLASSIFICATION: IT IS INTERESTING: Looks interesting, theme is good, [n= 6, 6/33 = 18 %] Positive

BLUE CLASSIFICATION: **NOT INTERESTED, IT IS BORING:** Don't like it, boring, [n= 4, 4/33 => 12%], Negative

OVERALL RATING: 3.72

5. RESULTS

In this study, I explored what attributes of mathematical tasks motivate students, either intrinsically or extrinsically, to solve them. I did this exploration by applying the Self-Determination Theory as a framework to understand students' motivation. The data collection instrument was formed to analyse the seven motivating factors we selected as part of the research. Based on the rating and the number of times it was solved, the top three tasks or the favourite tasks for the students were listed, and the motivating factors to those tasks were discussed. Similarly, the low rating or least favourite tasks were also recorded, and their attributes were discussed. Also, discussion and analysis were carried out about the intrinsic and extrinsic motivation as the encouraging force behind selecting tasks. Also, how grade 9 and grade 10 students rated-commented and solved the tasks was discussed. We started with listing the high rated tasks.

One observation during this study is that the tasks that received high ratings were not the one that was solved the most number of times. When the participants started looking at the task, and as they read through, they began to like or dislike the tasks. Some factors in the task motivated the students to give it a high rating. The participant provided the task with a rating when they read the task. Depending on some of the features that the participant sees as enjoyable or not enjoyable – motivating or demotivating, they chose a rating. We think that the internal or intrinsic motivating factors influence students to go for a rating as an initiating process because they find something exciting and satisfying in itself to do so.

5.1 Top Rated Tasks

Top-rated task – Logical reasoning (task 6)

The top-rated task is the "Task 6 - Logical Reasoning" task based on the mean rating received of 3.944. Most of the students registered a high rating for this task, and the supportive statements for their ratings mainly depend on the fact that this task has no numbers and no calculation is required. The factors attached to the task while designing it were: No visuals, illustrative context, extended response, high complexity, and high cognitive demand. Interestingly, this task is the top-rated one but does not top the list of choices for solving. Being solved 15 times, on par with the task that was solved the most number of times (17), this task stands at number 2.

The logical reasoning aspect acted as the critical intrinsic motivating factor for this task, and the absence of numbers and calculations made problem-solving less tedious. For some of the students, the same aspect of the lack of numbers and calculations made it less attractive since it requires a different kind of thinking.

Even after rating it high, they chose to solve some other tasks that had numbers and with complicated calculations. Some of the comments indicated the presence of “farmer and horse or animals” made them choose this task. Also, students found this task comforting since there was no one particular correct answer that they should look into. The post-session interview with those students who solved this task also ensured that they wanted to adhere to their choice of rating and the choice of solving. Some even wanted to give a higher rating because it was more exciting and satisfying for them when they solved it than they had previously thought.

Second top-rated task

“Task 14 - Where the anchor lies” task was rated with an average score of 3.72 on the motivation scale. This represents the second-highest rating within the group of tasks. The rating meant that the students’ found the task motivating.

When students’ comments were analysed and classified, the most frequently given positive comment was that the task was easy. Forty-five percent of the students’ comments pertained to this feature. One-third of the comments indicated that the visual diagram of the task was helpful and motivating (33%). Also, eighteen percent of the comments were about the context of the task being interesting. The text is short and precise in combination with visuals was seen as a motivating factor for this task. This comment, “I love the ocean and boat driving, and this seems important to me,” is similar to the one found on the previous task where the student mentioned above liking horses.

This signifies that the visuals or context that are part of the participant’s hobbies or aspects of daily life play an important role in intrinsically motivating the students. When constructing this task, we kept the following motivating factors in mind: Visuals, applied context, low complexity and medium cognitive demand. One can also see that all the intrinsic motivation connected to this task has not transpired to make this task one of the most solved tasks. This task sits at the fifth position along with task 5, being solved only by seven students. Students who took part in the post-session interview, who also chose to solve this task, decided to stay with their initial rating. The grade 10 students’ love for trigonometry chapter also helped this task make it to the top three.

Third top-rated task

"Task 3 - Apache the border collie" task was rated to have an average score of 3.54 on the motivation scale by the students. This was the third highest rating within the group of tasks. The rating meant that students found the task to be motivating.

The most frequently given student comment about the task was interestingly not positive; 44% of the comments indicated that the text of the problem was long, or the story was confusing, it was taking too much time to read. On the positive side, some students indicated that the visual diagram was excellent and helpful (28%), the context and the story were interesting (22%), and the task was easy overall (19%).

However, a similar percentage of comments indicated otherwise that it was difficult (19%). Comments also mentioned the presence of two visuals making the task more motivating. One of the supportive aspects of this task was the usage of Pythagoras, which is a recently learned topic for grade 9 and also for grade 10. The trend of the animals being part of the supportive comments, either by visuals or text, making the task motivating for students continued for this task too. This task was initially formed to contain the following motivational attributes: Functional visual, constructed response structure, low complexity and medium cognitive demand. Most of the students mentioned intrinsic motivation factors, which influenced them to give a higher rating for this task.

5.2 Least Rated Tasks

The first least rated task

"Task 1 – Unit Makes Difference" was the least favourite task among all the other tasks. The rating received for this task was 2.59, the lowest of all tasks, making it the least favourite task. The critical factors underlined by the students that made the task the least motivating one were too many numbers and the conversion of units. The visual aspect was liked by most of the students. Students do not like the fact that they had to read and understand a lot to solve this task. Also, the terms that denote the units were not well received by the students. The motivation attributes associated with this task are functional visual, with an applied mathematics context, an extended response structure, and high complexity with medium cognitive demand. Students found significantly fewer intrinsic motivating factors. The participants voiced against the task structure since it demands an extended response.

The second least rated task

"Task 2 – The Magic Squares" is the second least rated task, and it occupied the 13th position in the rating table. The rating received for this task was 2.74, which is close to the average rating of the least-rated task. Based on the students' comments, they rated Task 2 low because it is an algebraic task. Also, the absence of visuals and abstract context were also cited as reasons for the low rating.

On the positive side, students indicated that this task is easy to understand (28%), whereas most of the students (51%) commented that more information is needed to process the task, and they do not like algebra. Only one student chose to solve this task, which again confirms that students did not find this task motivating, either intrinsically or extrinsically.

The factors attributed to this task are abstract context, with low complexity and medium cognitive demand. The low rating is supported by the fact that only one student chose to solve this task. In this case, there is a clear connection between the liking of the task and the liking of solving a task.

The third least rated task

"Task 5 – Percentages" is the third least rated task in the overall rating list, taking the 12th position. The rating received for this task is 2.79, which is just 0.05 higher than the second least rated task and 0.2 more than the overall least rated task. In other words, all the least rated tasks lie within an interval of 0.2 (2.59 to 2.79) mean value. This task is the only task that had a significant difference in the rating pattern between grade 9 and grade 10 students where grade 9 rated it low and grade 10 gave a higher rating. Most of the negative comments (63%) stated that the task was challenging and confusing.

There was also mention of the topic of percentages learned a while ago, so the students could not recollect and said they forgot. These comments were mostly from grade 9 students. On the other hand, the grade 10 students liked this task because of the real-life situation involving money. The attributes included in this task are applied mathematics context, with low complexity and medium cognitive demand. Students from grade 9 were neither intrinsically nor extrinsically motivated to solve this task or rate it. In contrast, grade 10 students' decision to place it high and solve the task came from the intrinsic motivation because of the satisfaction they found in the money factor. Even when compensated by ratings by grade 10, this task still became one of the least favourite tasks.

5.3 Solved Tasks

Most solved task:

The task that was solved by the highest number of students is “Task 7: Divisible By 7.” The most surprising fact from the whole research data is that this most solved task is not a part of the top three rated tasks; it falls in the seventh place based on the rating. This data clearly indicates that it is not always true that the most liked task will be the most solved. It is an illustrative task where the process has been explained using an example, and the students enjoyed the surprising factor of whether this process will always work. There are not so many intrinsic motivating factors behind the fact that many students (17) chose to solve this task. The illustration with a clear example made their job very easy, making them select this task as explained by their comments. Among those who solved this task, a couple of them decided it because of the surprising factor that comes with it and wondered whether the process applied in this task would work at all times. One exciting aspect observed in this task is that students liked the picture used.

Still, that picture was not helpful to understanding the task other than to indicate the number 7 using seven sculptures, which is the vital number used in this task. This is one more example of visuals being a critical factor that motivates the students, whether it is functional (beneficial) or non-functional.

The second most solved task

The second most solved task is “Task 6: Logical Reasoning,” the highest rated task (3.94). Not surprisingly, this task was solved by 15 students, the second highest.

The third most solved task

The third most rated task, “Task 3 - Apache the Border Collie,” is the third most solved task.

Apart from the top solved task, the other two top solved tasks were also the same top-rated tasks. This data indicates a clear connection between extrinsic motivation and intrinsic motivation when it comes to problem-solving (the choice of rating and solving). In most cases, students have some internal motivational factors from the tasks they feel are enjoyable and satisfiable. Still, the driving force behind solving that task may not be the same factors. Some external motivation factors can also force the students to ignore the chosen tasks and go for some other tasks that will be externally rewarding.

In general, there is no significant difference between the rating style of students from both grades 9 and 10. The only instance where there was a significant difference found in the pattern of ratings was in Task 5. Grade 10 students, even though they struggled with the calculations and problem solving, they were motivated to solve Task 5 more than grade 9 because it deals with money or the real-life economics. This is a difference induced by an intrinsic motivating factor.

5.4 Post-Session Interviews

As part of the post session interviews, some students from various achievement levels were selected and asked, "*After solving these tasks, would you like to change your initial rating of motivation for the solved tasks?"* Most of the students replied that they wanted to adhere to their initial ratings. They did not want to change their rating during or after the process of problem-solving. Some students wanted to change their initial rating and move to a higher one for the tasks they chose to solve. Only two students commented that they wanted to scale down the rating for Task 8 since the students had to endure a lot of difficulties with the conversion of centimetre squares to meter squares. The other student mentioned that Task 5 was more demanding than previously thought, so the student would like to degrade the rating from a 5 to 3 after solving the task. Post-session interviews clearly indicate that the students have decided which task to go for solving after looking at all the aspects involved in the task, and the majority of the students never had a second thought.

6. CONCLUSION

Students are motivated to do mathematics problem-solving by external motivating factors such as grades, marks, rewards, praise. Still, as discussed in the literature section, intrinsic motivation is probably a deeper factor that is more effective for completing tasks to feel satisfied and achieve goals. In this research, the researcher observed that most of the rating of the task comes from the internally motivating factors and choosing a problem to solve is a combination of both intrinsic and extrinsic motivating factors. So, it is the responsibility of teachers to help make mathematics and problem solving more intrinsically appealing to students. In other words, teachers should investigate all the possibilities of designing or selecting the tasks for problem-solving with the aspects that the students love or feel fun and satisfying.

Among all the motivational factors, visuals (either functional or non-functional), medium to high complexity and high cognitive demand are the attributes of motivation, both intrinsic and extrinsic, that make a task the most favourable one based on this research since they are the most seen attributes that are seen among the most rated and most solved tasks. Students felt the low cognitive demand tasks were less interesting or boring and as a result, tasks constructed with these features ended up as the least favourite ones. The student's disklike for algebra can also be clearly seen, which indicates the hatred for abstract context in mathematics. As a teacher, this researcher feels it is our responsibility to try and make attempts to make algebra less abstract for students. The students' love for the real-life application of mathematics is also clearly seen. The researcher also concluded that as the students move on towards adulthood, the preference for money related tasks is more based on the result of the "percentage" question.

The topmost factor is the presence of a visual, whether it is functional or non-functional. It appeases the students, and they find the visuals really helpful in understanding the task. The tasks that mentioned pets and the visuals of oceans and boats were also intriguing for the students. The other important factor that made the students choose a unit is "recently learned." The time interval between the learning of a topic and when they apply that knowledge is also a crucial factor. The students either forget or have challenges with those topics learned some time ago. So, the teachers are responsible for including such topics whenever and wherever possible, not essentially mathematics teachers but also other subject teachers. Examples are "Inclusion of coordinates when inquiring and learning about countries" and "percentage questions wherever possible." It can be seen that there is an apparent disliking for algebra among the students, so the teachers have come up with solutions to make algebra more interesting.

It is also clearly visible that there is a connection between the students' liking and liking to solve the same task, but that does not necessarily mean that the most desired tasks will always end up as the most solved. The researcher believes, based on the study results, that similar problem-solving sessions for students in the upper level of the primary years' programs at schools should be conducted. This will be more beneficial due to the following reasons: This kind of problem-solving session can allow the students to express their views toward mathematics and problem solving and what aspects they like or dislike about mathematical tasks. This will help teachers design or modify their lesson plans and the way they select tasks for problem-solving.

Conducting such sessions at grade 9 or 10 levels, as this researcher did, may not be the ideal time to do such sessions since the students are almost at a stage where they are about to leave the lower secondary school (Ungdomsskole, ages 13–16). Suppose we try to learn about those motivating factors at a lower level (Barneskole, ages 6-13); in that case, the teachers will have sufficient time to modify their teaching methods and task designing depending on the factors that interest their students. Also, the younger students may think or feel somewhat differently than their elder peers in their perception of the motivating factors in mathematical tasks.

There is no significant difference between the approach of grade 9 and grade 10 students, but some differences in perspectives can be seen. The grade 9 students gave some explicit comments about wanting a reward or grades for problem-solving. The grade 10 students were not most concerned about external rewards. Grade 10 students' love for real-life financial mathematics is way more prominent than that of grade 9.

7. CHALLENGES AND LIMITATIONS

The researcher had a challenging time during data collection where initially the researcher was infected with Covid, and he had to take a break of two weeks. The students also got hit with Covid infections during the planned data collection period and the data collection session must be postponed a couple of times. Even on the day of data collection, the grade 9 students had a less count of 16 as against the actual 21.

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APPENDICES LIST

COMPLETED TASK RATING QUESTIONNAIRES BY STUDENTS

(1)

TASK RATING QUESTIONNAIRE

PART A: Please read and try to understand the following mathematical tasks. There are 14 of them below. After reading the task, rate the task on the degree to which you find it motivating or engaging. Then explain the reasons for why you thought it was so in the space provided. There is no right or wrong answer on this, it is important to indicate just how you feel about them.

TASK NUMBER 1: UNIT MAKES DIFFERENCE

In 1983, an Air Canada flight ran out of fuel halfway through its journey due to a mix-up between pounds and kilograms. The plane needed 22300 kg of fuel for the journey. There were 7682 litres of fuel already in the tanks.

a. One litre of jet fuel has a mass of 0.803 kg. Calculate how much fuel should have been loaded. Give your answer in litres.

b. Instead of 0.803 kg per litre, a conversion of 1.77 was used. (One litre of jet fuel has a mass of 1.77 pounds). Calculate how much fuel was actually loaded. Give your answer in litres.

c. Find how many litres short of fuel the plane was.

TASK 1 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

the question had to much back story

TASK 2: THE MAGIC SQUARES

Show that each square is a magic square by showing that the rows, columns and the diagonals all have the same sum.

2x-2y	-x+3y	2x-y
x + y	x	x-y
y	3x-3y	2y

3y-2x	-x-5y	6x+2y
9x-y	x	y-7x
-4x-2y	3x+5y	4x-3y

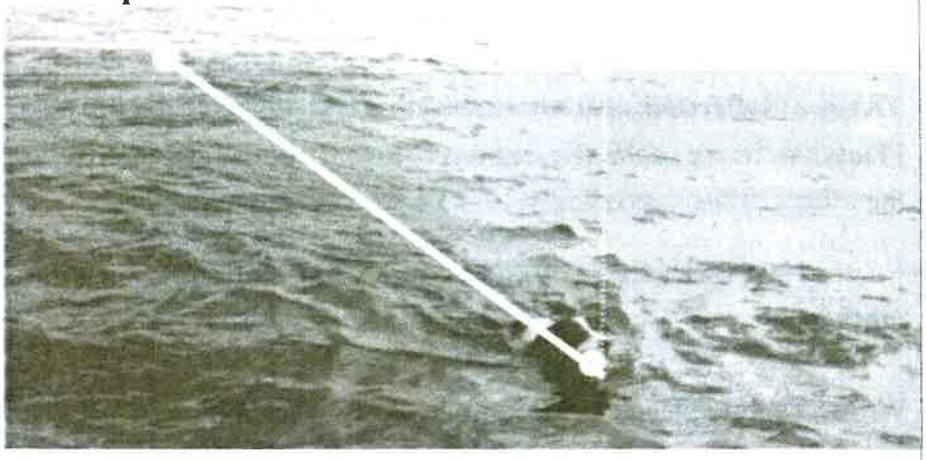
TASK 2 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

TASK 3: APACHE THE BORDER COLLIE

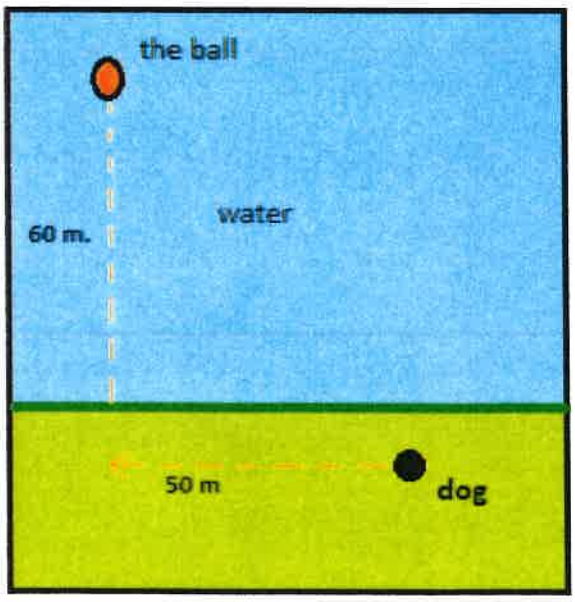
Apache the border Collie



In 2001, Ian Forbes from Edinburgh wrote, in the journal *MicroMath*:

I have a 2-year-old dog, a Border collie named Apache and after a year of avoiding deep water she recently met three Labradors at the local lake. These dogs love to swim and I named them the "submarine brigade" because of their ability to dive straight in and swim after the ball. After meeting them, Apache quickly took to swimming, but being a dog with 'brains,' she discovered that she could beat the rest by running along the bank and then diving in.
The situation is like this: The Labradors jump immediately in the water and swim straight to the ball. Apache runs for about 50 m along the bank and then jumps to swim to the ball.
Why would Apache run 50 m and then have the shortest distance for swimming? Is Apache really smart?

Please note that one meter of swimming takes four meters of running in time.)



Less talk about the story and explain math more.

Please explain your solution.

TASK 3 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

to much unusfull info and to little about the question.

TASK 4: A4 PUZZLE

Take two sheets of A4 size paper. Roll one into a short cylinder and the other into a tall cylinder. Does one hold more than the other?

Please explain your answer and show your work.

TASK 4 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

the question made no sense. Does one hold more like had what

TASK 5: PERCENTAGES

Find the unknowns: X, Y, Z.

S.No	Name of the item	Marked Price	Selling Price	Discount
i)	Book 225 kr	X	8%	
ii)	LED TV	Y	11970 kr	5%
iii)	Digital clock	750 kr	615 kr	Z

Show your work here.

i.

ii.

iii.

TASK 5 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

TASK 6: LOGICAL REASONING

Your friend says she passes a field every day on the way to school, and each day, without exception, she sees **a farmer wearing a straw hat feeding a carrot to a brown horse.** Look at the following general statements and rank them in order from most likely to be true to least likely to be true.

- *The horse never eats anything but carrots.*
- *The farmer feeds the horse only on school days.*
- *The farmer is the only person who feeds the house.*
- *Your friend never walks to school.*
- *The farmer always wears a hat.*
- *The horse is not a racing horse.*
- *Your friend travels to school at the same time every day.*

your friend travels to school at the same time
the farmer always wears a hat
the farmer is the only person that feed the horse.
the horse eats only carrot
the horse is not a racing horse
your friend never walks to school

TASK 6 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------((4)) -------(5) Very motivated

Write a short explanation below why you felt that way.

The question was an opinion question so there were no coret answer so it felt comforting because there isint the stress that the question was wrong.

TASK 7: DIVISIBLE BY 7

Is **3843** evenly divisible by 7? To see if a number is evenly divisible by 7, remove the units digit of the number, double the removed digit and subtract the doubled amount from the remaining number. If the result is evenly divisible by 7, then the original number is also divisible by 7. The method may need to be repeated several times.

3843 remove the units digit, 3, leaving 384:

384
-6 subtract the doubled number 3

378 remove the units digit, 8, leaving 37:

37
-16 subtract the doubled number 8

21 This is a multiple of 7, so 3843 is evenly divisible by 7.

This is a specific example that works with the method described.
Use the above method to check whether 3374 is evenly divisible by 7

3374 — 24

337
-8

324

32
-8

24

TASK 7 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

the question was motivating due to it having a example so I would know what to do.

TASK 8: LOGICAL REASONING

Stuart has a 330 mL bottle of orange juice. He thinks he can pour it all into his glass, which is a cylinder with diameter 7 cm and height 8 cm. Stuart's friend Patrick thinks the glass will overflow. Answer the following questions.

a. Will Stuart's glass overflow?
b. If the glass was full, what volume of fluid would it contain.

Show your work here.

TASK 8 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

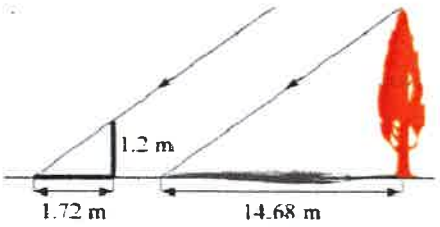
Write a short explanation below why you felt that way. the question I know how to do but the question was not gonna help me with anything IRL the real world

TASK 9: LOGICAL REASONING

Dean needs to accurately find the height of a tree in his garden. Local Council regulations prohibit the growth of garden trees beyond 20 m. They argue that in storm conditions falling branches and uprooted large trees are dangers to houses and lives. As Dean cannot climb the tree, he decides to use shadows to help solve the problem. On a windless sunny day, he stands a 1.2 m stick vertically on the ground. The length of the stick's shadow is 1.72 m and at the same time, the tree's shadow measures 14.68 m.

Using the diagram to estimate:

- The height of the tree
- The angle of elevation of the sun (the angle that the sun's rays make with the horizontal ground



TASK 9 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- ((2)) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I don't like the image because it makes the picture look harder than it actuly is.

TASK 10: HEARTBEAT

The average person's heart beats 70 times per minute. It can be shown that the average person's heart beats 2.57 billion times in a lifetime.

a. According to this information, how long is the average life span?

b. What assumptions have to be made to solve this problem? How do they affect your answer to part **a?**

Show your work and explain.

TASK 10 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

the question look simple but when you do it it become hard.

TASK 11: PALEONTOLOGY

Archaeologists use a coordinate grid system when excavating a site. This allows them to easily record the location of artefacts at a site, which simplifies future excavations. If the coordinates (in cm) of the top and bottom of the arm bone of this dinosaur skeleton are (6.2, 22.3) and (9.1, 11.8), find the length of the arm bone, rounded to the nearest tenth of a centimetre. (Assume that the arm bone is perfectly straight).

TASK 11 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

this

TASK 12: GREAT BLUE HOLE TASK

When faced with the problem of trying to breathe underwater, ocean explorer, Jacques Cousteau, designed an underwater breathing apparatus called the Aqualung. It was the precursor of today's scuba gear and allowed Cousteau to explore places that had never been seen before. In 1972, he explored the Great Blue Hole, a cylindrical formation in Belize which began forming over 70 million years ago. The great Blue Hole has a depth of roughly 125 m. If there is 9132700 m^3 of water in the Great Blue Hole, find its radius. Round your answer to the nearest tenth. (Volume of cylinder = $\pi r^2 h$).

TASK 12 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

TASK 13: CURRENCY CONVERSION TASK

Claudia lives in Canada. She is planning a holiday to Norway. She exchanges 2000 CAD into Norwegian kroners at a rate of 1 CAD = 6.99 CAD.

1. Calculate how many Norwegian Kroners she receives.
2. Before she even leaves Canada, Claudia becomes ill and has to cancel her holiday. She sells the Norwegian Kroners back to the bank at a rate of 1 NOK = 0.12 CAD. Calculate how many Canadian Dollars she receives.
3. Determine how much money the bank makes from the two transactions.
4. Calculate Claudia's loss as percentage of her original 2000 CAD.

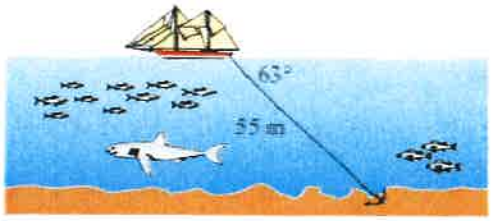
TASK 13 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

TASK 14: WHERE THE ANCHOR LIES

A boat has an anchor rope length of 55 m. The boat drifts with the ocean current so that the rope makes an angle of 63 degrees with the surface of the water. Find the depth of the water at the position where the anchor lies at the bottom.



TASK 14 Reflection: Just by reading this task, do you feel motivated to solve it?
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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Solution 1:

Solution 2:

(4)

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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.
The question seems achievable but there is a lot of text for the questions. This does not / is not a bad thing though.

TASK 2: THE MAGIC SQUARES

Show that each square is a magic square by showing that the rows, columns and the diagonals all have the same sum.

2x-2y	-x+3y	2x-y
x+y	x	x-y
y	3x-3y	2y

3y-2x	-x-5y	6x+2y
9x-y	x	y-7x
-4x-2y	3x+5y	4x-3y

TASK 2 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

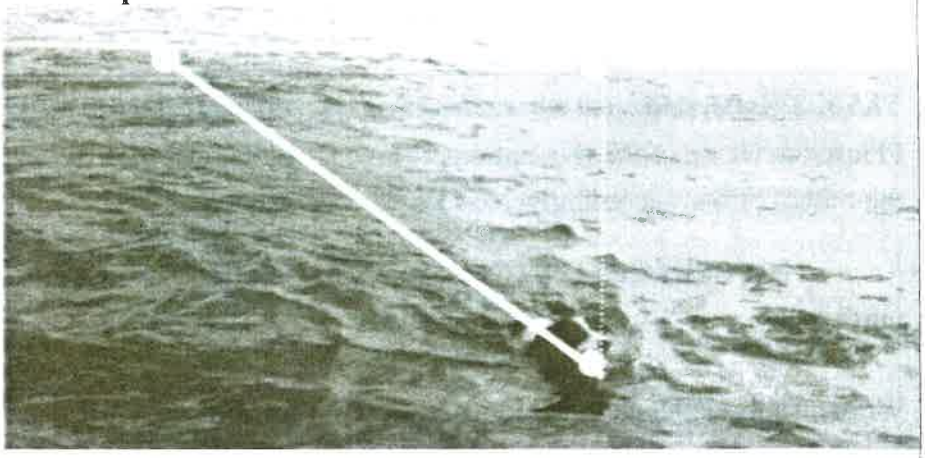
Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

It is in between 2 & 3 but leaning more towards 3. I feel like it could be organized better & maybe an extra sentence. it was hard to understand at first but maker sense when looking at it better.

TASK 3: APACHE THE BORDER COLLIE

Apache the border Collie



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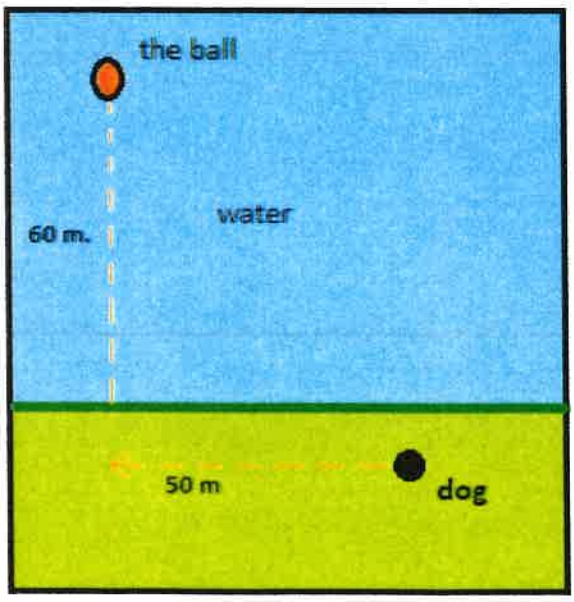
The situation is like this: The Labradors jump immediately in the water and swim straight to the ball. Apache runs for about 50 m along the bank and then jumps to swim to the ball. Why would Apache run 50 m and then have the shortest distance for swimming? Is Apache really smart?

Please note that one meter of swimming takes four meters of running in time.)



Please explain your solution.

TASK 3 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

The question seems interesting and also is different. For me though, I would prefer to do questions with a straightforward answer.

TASK 4: A4 PUZZLE

Take two sheets of A4 size paper. Roll one into a short cylinder and the other into a tall cylinder. Does one hold more than the other?

Please explain your answer and show your work.

TASK 4 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4)-------(5) Very motivated

Write a short explanation below why you felt that way.

The question is simple and there is a correct answer when things are done correctly. My answer is in between 4 & 5.

TASK 5: PERCENTAGES

Find the unknowns: X, Y, Z.

S.No	Name of the item	Marked Price	Selling Price	Discount
i)	Book 225 kr	X	8%	
ii)	LED TV	Y	11970 kr	5%
iii)	Digital clock	750 kr	615 kr	Z

Show your work here.

i.

ii.

iii.

TASK 5 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

The question is kind of hard to understand due to the way it is organized. The space is also limited to do working out.

TASK 6: LOGICAL REASONING

Your friend says she passes a field every day on the way to school, and each day, without exception, she sees **a farmer wearing a straw hat feeding a carrot to a brown horse**. Look at the following general statements and rank them in order from most likely to be true to least likely to be true.

- *The horse never eats anything but carrots.*
- *The farmer feeds the horse only on school days.*
- *The farmer is the only person who feeds the house.*
- *Your friend never walks to school.*
- *The farmer always wears a hat.*
- *The horse is not a racing horse.*
- *Your friend travels to school at the same time every day.*

TASK 6 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

At first it seemed tiring to do but when looking closely at the questions & bullet points, it does not seem so hard and looks easy to do.

TASK 7: DIVISIBLE BY 7

Is **3843** evenly divisible by 7? To see if a number is evenly divisible by 7, remove the units digit of the number, double the removed digit and subtract the doubled amount from the remaining number. If the result is evenly divisible by 7, then the original number is also divisible by 7. The method may need to be repeated several times.

3843 remove the units digit, 3, leaving 384:

384
-6 subtract the doubled number 3

378 remove the units digit, 8, leaving 37:

37
-16 subtract the doubled number 8

21 This is a multiple of 7, so 3843 is evenly divisible by 7.

This is a specific example that works with the method described.
Use the above method to check whether 3374 is evenly divisible by 7

TASK 7 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.
Along with a written explanation, there is also an example & it seems to be easy & a good brain activity.

TASK 8: LOGICAL REASONING

Stuart has a 330 mL bottle of orange juice. He thinks he can pour it all into his glass, which is a cylinder with diameter 7 cm and height 8 cm. Stuart's friend Patrick thinks the glass will overflow. Answer the following questions.

a. Will Stuart's glass overflow?
b. If the glass was full, what volume of fluid would it contain.

Show your work here.

TASK 8 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

The question is simple & does not include a lot of random numbers.

TASK 9: LOGICAL REASONING

Dean needs to accurately find the height of a tree in his garden. Local Council regulations prohibit the growth of garden trees beyond 20 m. They argue that in storm conditions falling branches and uprooted large trees are dangers to houses and lives. As Dean cannot climb the tree, he decides to use shadows to help solve the problem. On a windless sunny day, he stands a 1.2 m stick vertically on the ground. The length of the stick's shadow is 1.72 m and at the same time, the tree's shadow measures 14.68 m.

Using the diagram to estimate:

- The height of the tree
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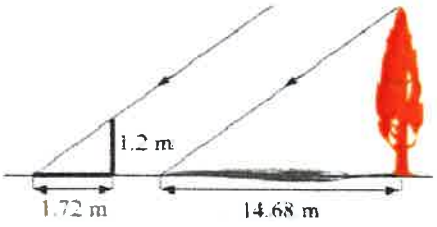

TASK 9 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

The question / task is easy & straight-forward but there is a lot of text in the first paragraph.

TASK 10: HEARTBEAT

The average person's heart beats 70 times per minute. It can be shown that the average person's heart beats 2.57 billion times in a lifetime.

a. According to this information, how long is the average life span?

b. What assumptions have to be made to solve this problem? How do they affect your answer to part **a?**

Show your work and explain.

TASK 10 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

It is not a boring question & seems interesting but also requires a lot of background info.

TASK 11: PALEONTOLOGY

Archaeologists use a coordinate grid system when excavating a site. This allows them to easily record the location of artefacts at a site, which simplifies future excavations. If the coordinates (in cm) of the top and bottom of the arm bone of this dinosaur skeleton are (6.2, 22.3) and (9.1, 11.8), find the length of the arm bone, rounded to the nearest tenth of a centimetre. (Assume that the arm bone is perfectly straight).

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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

The task is simple & easy to do but I feel it could be worded differently.

TASK 12: GREAT BLUE HOLE TASK

When faced with the problem of trying to breathe underwater, ocean explorer, Jacques Cousteau, designed an underwater breathing apparatus called the Aqualung. It was the precursor of today's scuba gear and allowed Cousteau to explore places that had never been seen before. In 1972, he explored the Great Blue Hole, a cylindrical formation in Belize which began forming over 70 million years ago. The great Blue Hole has a depth of roughly 125 m. If there is 9132700 m^3 of water in the Great Blue Hole, find its radius. Round your answer to the nearest tenth. (Volume of cylinder = $\pi r^2 h$).

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Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

The text felt a bit squashed & but the image was nice. I wouldn't willingly want to solve this because of the numbers (9132700) & the effort it would require.

TASK 13: CURRENCY CONVERSION TASK

Claudia lives in Canada. She is planning a holiday to Norway. She exchanges 2000 CAD into Norwegian kroners at a rate of 1 CAD = 6.99 CAD.

1. Calculate how many Norwegian Kroners she receives.
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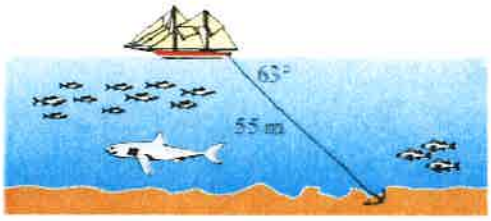
Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

The task is short & each question is being built up slowly which I like. I although feel there could be an accidental mistake when multiplying so many times.

TASK 14: WHERE THE ANCHOR LIES

A boat has an anchor rope length of 55 m. The boat drifts with the ocean current so that the rope makes an angle of 63 degrees with the surface of the water. Find the depth of the water at the position where the anchor lies at the bottom.



TASK 14 Reflection: Just by reading this task, do you feel motivated to solve it?
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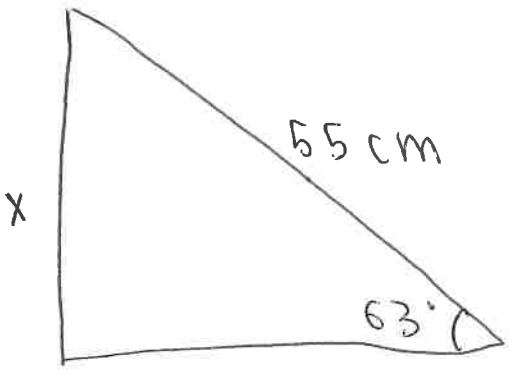
Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

the task & image & text is easy to understand. The relevant image makes the task a bit more easier and the text is short & simple.

Solution 1: (question 14)



$\sin 63 = \frac{x}{55}$

$55 \sin 63 = x$

$49\ cm = x$

$49\ cm = x$

(question 8)

volume = $\pi \times 3.5^2 \times 8$

$= 307.72\ cm^3$

a. yes, it will.

b. --

Solution 2: (question 7)

3374

337
- 8

329

329

32
- 18

14

14 is a factor of 7 and so,
3374 is evenly divisible by 7.

(5)

TASK RATING QUESTIONNAIRE

PART A: Please read and try to understand the following mathematical tasks. There are 14 of them below. After reading the task, rate the task on the degree to which you find it motivating or engaging. Then explain the reasons for why you thought it was so in the space provided. There is no right or wrong answer on this, it is important to indicate just how you feel about them.

TASK NUMBER 1: UNIT MAKES DIFFERENCE

In 1983, an Air Canada flight ran out of fuel halfway through its journey due to a mix-up between pounds and kilograms. The plane needed 22300 kg of fuel for the journey. There were 7682 litres of fuel already in the tanks.

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b. Instead of 0.803 kg per litre, a conversion of 1.77 was used. (One litre of jet fuel has a mass of 1.77 pounds). Calculate how much fuel was actually loaded. Give your answer in litres.

c. Find how many litres short of fuel the plane was.

TASK 1 Reflection: Just by reading this task, do you feel motivated to solve it?
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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Conversion and many numbers is hard, but the image made me choose 2

TASK 2: THE MAGIC SQUARES

Show that each square is a magic square by showing that the rows, columns and the diagonals all have the same sum.

2x-2y	-x+3y	2x-y
x + y	x	x-y
y	3x-3y	2y

3y-2x	-x-5y	6x+2y
9x-y	x	y-7x
-4x-2y	3x+5y	4x-3y

TASK 2 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

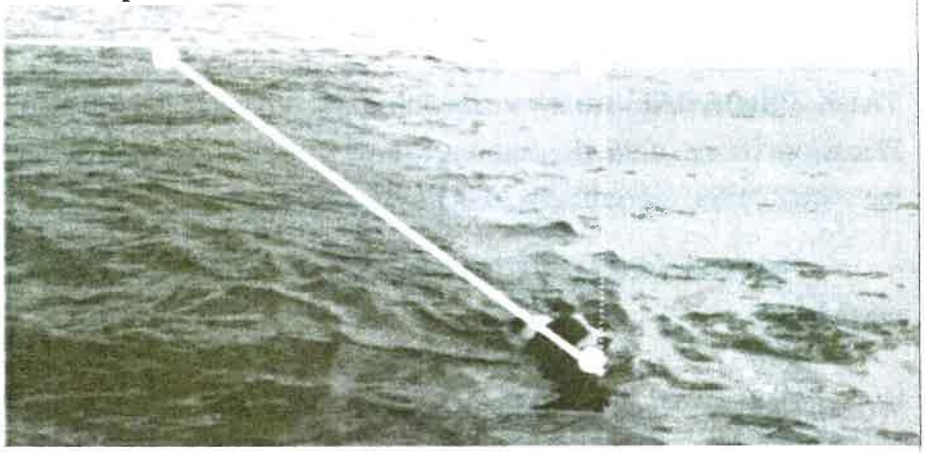
Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I don't understand it and I don't like algebra.

TASK 3: APACHE THE BORDER COLLIE

Apache the border Collie



In 2001, Ian Forbes from Edinburgh wrote, in the journal *MicroMath*:

I have a 2-year-old dog, a Border collie named Apache and after a year of avoiding deep water she recently met three Labradors at the local lake. These dogs love to swim and I named them the "submarine brigade" because of their ability to dive straight in and swim after the ball. After meeting them, Apache quickly took to swimming, but being a dog with 'brains,' she discovered that she could beat the rest by running along the bank and then diving in.
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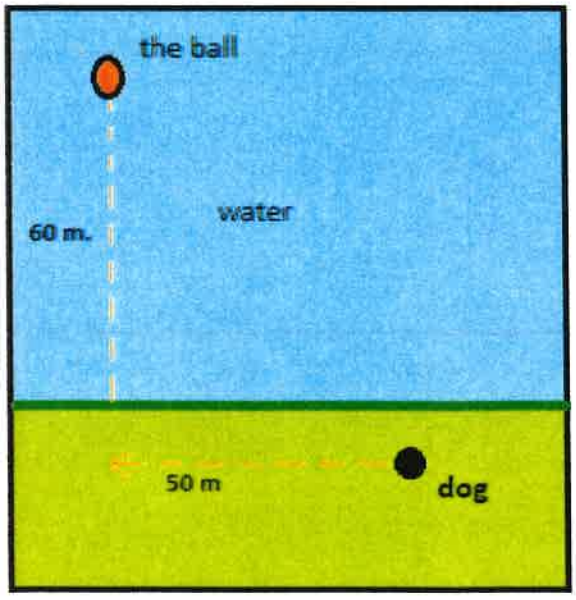
Please note that one meter of swimming takes four meters of running in time.)



Please explain your solution.

TASK 3 Reflection: Just by reading this task, do you feel motivated to solve it?
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Not motivated at all (1) ------- (2) ------- (3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Too much text, but naming the dog makes me want to do it.

TASK 4: A4 PUZZLE

Take two sheets of A4 size paper. Roll one into a short cylinder and the other into a tall cylinder. Does one hold more than the other?

Please explain your answer and show your work.

TASK 4 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3)-------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

The physical aspect seems fun, but the three lines of text seems boring.

TASK 5: PERCENTAGES

Find the unknowns: X, Y, Z.

S.No	Name of the item	Marked Price	Selling Price	Discount
i)	Book 225 kr	X		8%
ii)	LED TV	Y	11970 kr	5%
iii)	Digital clock 750 kr		615 kr	Z

Show your work here.

i.

ii.

iii.

TASK 5 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I don't understand it.

TASK 6: LOGICAL REASONING

Your friend says she passes a field every day on the way to school, and each day, without exception, she sees **a farmer wearing a straw hat feeding a carrot to a brown horse**. Look at the following general statements and rank them in order from most likely to be true to least likely to be true.

- *The horse never eats anything but carrots.*
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TASK 6 Reflection: Just by reading this task, do you feel motivated to solve it?
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Not motivated at all (1) ------- (2) -------(3)-------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Too many options, but the farmer and the horse are fun.

TASK 7: DIVISIBLE BY 7

Is **3843** evenly divisible by 7? To see if a number is evenly divisible by 7, remove the units digit of the number, double the removed digit and subtract the doubled amount from the remaining number. If the result is evenly divisible by 7, then the original number is also divisible by 7. The method may need to be repeated several times.

3843 remove the units digit, 3, leaving 384:

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-6 subtract the doubled number 3

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378 remove the units digit, 8, leaving 37:

37
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---

21 This is a multiple of 7, so 3843 is evenly divisible by 7.

This is a specific example that works with the method described.
Use the above method to check whether 3374 is evenly divisible by 7

TASK 7 Reflection: Just by reading this task, do you feel motivated to solve it?
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Not motivated at all (1) ------- (2) -------(3)-------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

The formula is dumb, but the vest is motivating.

TASK 8: LOGICAL REASONING

Stuart has a 330 mL bottle of orange juice. He thinks he can pour it all into his glass, which is a cylinder with diameter 7 cm and height 8 cm. Stuart's friend Patrick thinks the glass will overflow. Answer the following questions.

a. Will Stuart's glass overflow?
b. If the glass was full, what volume of fluid would it contain.

Show your work here.

TASK 8 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

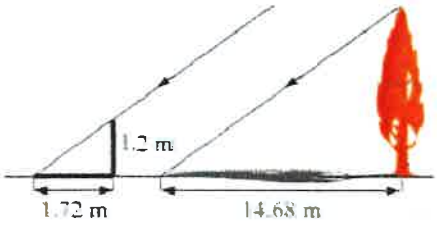
There is a picture, named characters and not too much text.

TASK 9: LOGICAL REASONING

Dean needs to accurately find the height of a tree in his garden. Local Council regulations prohibit the growth of garden trees beyond 20 m. They argue that in storm conditions falling branches and uprooted large trees are dangers to houses and lives. As Dean cannot climb the tree, he decides to use shadows to help solve the problem. On a windless sunny day, he stands a 1.2 m stick vertically on the ground. The length of the stick's shadow is 1.72 m and at the same time, the tree's shadow measures 14.68 m.

Using the diagram to estimate:

- The height of the tree
- The angle of elevation of the sun (the angle that the sun's rays make with the horizontal ground



TASK 9 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Way too much text but the diagram is good.

TASK 10: HEARTBEAT

The average person's heart beats 70 times per minute. It can be shown that the average person's heart beats 2.57 billion times in a lifetime.

a. According to this information, how long is the average life span?

b. What assumptions have to be made to solve this problem? How do they affect your answer to part **a?**

Show your work and explain.

TASK 10 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

It is simple and straight to the point.

TASK 11: PALEONTOLOGY

Archaeologists use a coordinate grid system when excavating a site. This allows them to easily record the location of artefacts at a site, which simplifies future excavations. If the coordinates (in cm) of the top and bottom of the arm bone of this dinosaur skeleton are (6.2, 22.3) and (9.1, 11.8), find the length of the arm bone, rounded to the nearest tenth of a centimetre. (Assume that the arm bone is perfectly straight).

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Not motivated at all (1) ------- (2) ------- (3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Too much text and question is confusing but dinosaurs are cool and so is the picture.

TASK 12: GREAT BLUE HOLE TASK

When faced with the problem of trying to breathe underwater, ocean explorer, Jacques Cousteau, designed an underwater breathing apparatus called the Aqualung. It was the precursor of today's scuba gear and allowed Cousteau to explore places that had never been seen before. In 1972, he explored the Great Blue Hole, a cylindrical formation in Belize which began forming over 70 million years ago. The great Blue Hole has a depth of roughly 125 m. If there is 9132700 m^3 of water in the Great Blue Hole, find its radius. Round your answer to the nearest tenth. (Volume of cylinder = $\pi r^2 h$).

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Not motivated at all (1) ------- (2) ------- (3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Again too much text but cool picture.

TASK 13: CURRENCY CONVERSION TASK

Claudia lives in Canada. She is planning a holiday to Norway. She exchanges 2000 CAD into Norwegian kroners at a rate of 1 CAD = 6.99 CAD.

1. Calculate how many Norwegian Kroners she receives.
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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) **Very motivated**

Write a short explanation below why you felt that way.

I don't like currency conversion.

TASK 14: WHERE THE ANCHOR LIES

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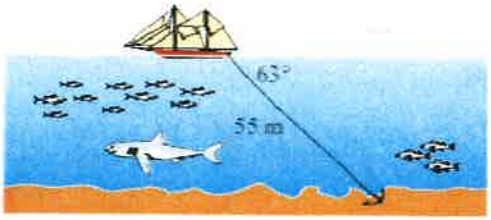

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Not motivated at all (1) ------- (2) ------- (3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Just don't like it.

Solution 1:

Task 8

a) $7 \div 2 = 3.5$

$\pi \times 3.5^2 \times 8$

$= 307.88$ (2dp) cm^3

$= 307.88 dl$

$= 30788 ml$

dl	cl	ml
30	7	8
	8	8
	3	0

It will overflow

b) $330 ml$ (not) $= 3.3 dl = 33 cm^3$

It would contain

$3.3 cm^3$

Solution 2:

Task 10

a) 70 bpm = [redacted]

= 4200 beats per hour

= 100800 beats per 24 hours

= 36792000 beats per year (without Feb 29)

(7)

TASK RATING QUESTIONNAIRE

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Write a short explanation below why you felt that way.

I chose 4 because I understand the task clearly and I'm motivated to find out the answers.

TASK 2: THE MAGIC SQUARES

Show that each square is a magic square by showing that the rows, columns and the diagonals all have the same sum.

2x-2y	-x+3y	2x-y
x + y	x	x-y
y	3x-3y	2y

3y-2x	-x-5y	6x+2y
9x-y	x	y-7x
-4x-2y	3x+5y	4x-3y

TASK 2 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

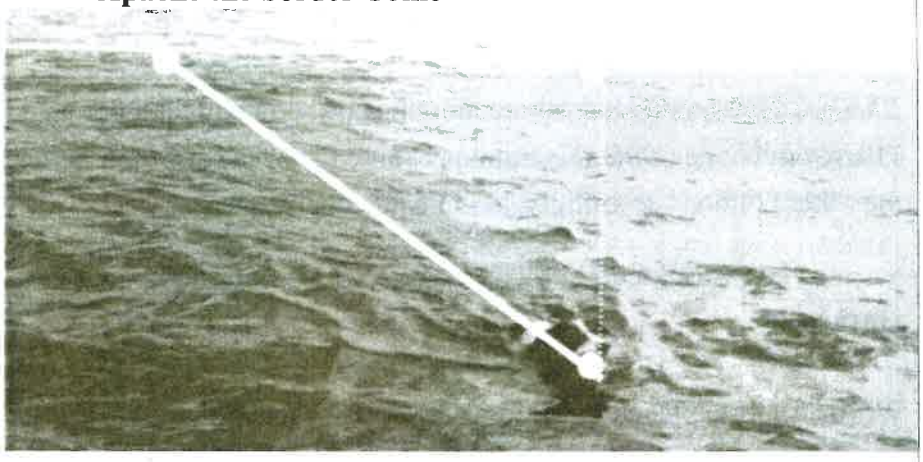
Not motivated at all (1) ------- ((2)) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I have problems with understanding the task and therefore I don't feel motivated

TASK 3: APACHE THE BORDER COLLIE

Apache the border Collie



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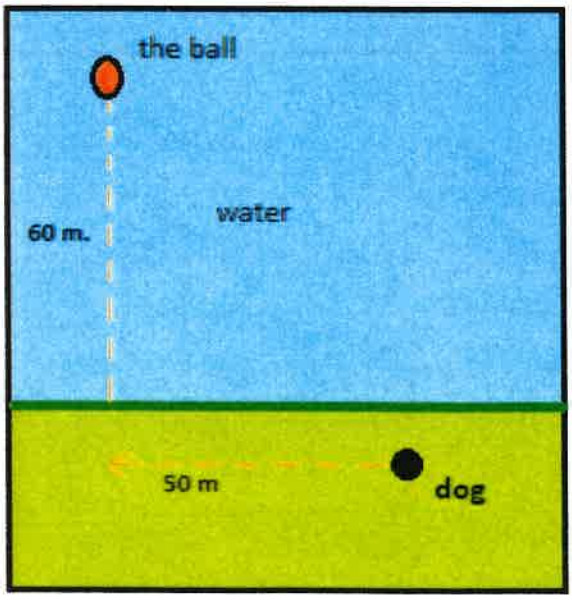
The situation is like this: The Labradors jump immediately in the water and swim straight to the ball. Apache runs for about 50 m along the bank and then jumps to swim to the ball. Why would Apache run 50 m and then have the shortest distance for swimming? Is Apache really smart?

Please note that one meter of swimming takes four meters of running in time.)



Please explain your solution.

TASK 3 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(④) -------(5) Very motivated

Write a short explanation below why you felt that way.

The task seems easy and therefore I'm more motivated to do it.

TASK 4: A4 PUZZLE

Take two sheets of A4 size paper. Roll one into a short cylinder and the other into a tall cylinder. Does one hold more than the other?

Please explain your answer and show your work.

TASK 4 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Difficult task, didn't understand.

TASK 5: PERCENTAGES

Find the unknowns: X, Y, Z.

S.No	Name of the item	Marked Price	Selling Price	Discount
i)	Book 225 kr	X	8%	
ii)	LED TV	Y	11970 kr	5%
iii)	Digital clock	750 kr	615 kr	Z

Show your work here.

i.

ii.

iii.

TASK 5 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Understood half of the task but lost motivation at iii.

TASK 6: LOGICAL REASONING

Your friend says she passes a field every day on the way to school, and each day, without exception, she sees **a farmer wearing a straw hat feeding a carrot to a brown horse.** Look at the following general statements and rank them in order from most likely to be true to least likely to be true.

- *The horse never eats anything but carrots.* 1 ✓
- *The farmer feeds the horse only on school days.* 2 ✓
- *The farmer is the only person who feeds the house.* 3 ✓
- *Your friend never walks to school.* 4
- *The farmer always wears a hat.* 5 ✓
- *The horse is not a racing horse.* 6
- *Your friend travels to school at the same time every day.* 7 ✓

TASK 6 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I feel motivated because I understand the task and it includes items from criteria D.

TASK 7: DIVISIBLE BY 7

Is **3843** evenly divisible by 7? To see if a number is evenly divisible by 7, remove the units digit of the number, double the removed digit and subtract the doubled amount from the remaining number. If the result is evenly divisible by 7, then the original number is also divisible by 7. The method may need to be repeated several times.

3843 remove the units digit, 3, leaving 384:

384
-6 subtract the doubled number 3

378 remove the units digit, 8, leaving 37:

37
-16 subtract the doubled number 8

21 This is a multiple of 7, so 3843 is evenly divisible by 7.

This is a specific example that works with the method described.
Use the above method to check whether 3374 is evenly divisible by 7

TASK 7 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

It shows how to do it to make it clearer for us.

TASK 8: LOGICAL REASONING

Stuart has a 330 mL bottle of orange juice. He thinks he can pour it all into his glass, which is a cylinder with diameter 7 cm and height 8 cm. Stuart's friend Patrick thinks the glass will overflow. Answer the following questions.

a. Will Stuart's glass overflow?
b. If the glass was full, what volume of fluid would it contain.

Show your work here.

TASK 8 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

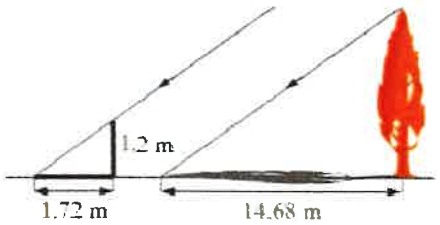
I didn't understand how to get the answers for the task.

TASK 9: LOGICAL REASONING

Dean needs to accurately find the height of a tree in his garden. Local Council regulations prohibit the growth of garden trees beyond 20 m. They argue that in storm conditions falling branches and uprooted large trees are dangers to houses and lives. As Dean cannot climb the tree, he decides to use shadows to help solve the problem. On a windless sunny day, he stands a 1.2 m stick vertically on the ground. The length of the stick's shadow is 1.72 m and at the same time, the tree's shadow measures 14.68 m.

Using the diagram to estimate:

- The height of the tree
- The angle of elevation of the sun (the angle that the sun's rays make with the horizontal ground



TASK 9 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

The task was confusing.

TASK 10: HEARTBEAT

The average person's heart beats 70 times per minute. It can be shown that the average person's heart beats 2.57 billion times in a lifetime.

a. According to this information, how long is the average life span?

b. What assumptions have to be made to solve this problem? How do they affect your answer to part **a?**

Show your work and explain.

TASK 10 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------((4)) -------(5) Very motivated

Write a short explanation below why you felt that way.

I feel motivated because it's a real life scenario.

TASK 11: PALEONTOLOGY

Archaeologists use a coordinate grid system when excavating a site. This allows them to easily record the location of artefacts at a site, which simplifies future excavations. If the coordinates (in cm) of the top and bottom of the arm bone of this dinosaur skeleton are (6.2, 22.3) and (9.1, 11.8), find the length of the arm bone, rounded to the nearest tenth of a centimetre. (Assume that the arm bone is perfectly straight).

TASK 11 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(④) -------(5) Very motivated

Write a short explanation below why you felt that way.

The task is simple and makes me motivated.

TASK 12: GREAT BLUE HOLE TASK

When faced with the problem of trying to breathe underwater, ocean explorer, Jacques Cousteau, designed an underwater breathing apparatus called the Aqualung. It was the precursor of today's scuba gear and allowed Cousteau to explore places that had never been seen before. In 1972, he explored the Great Blue Hole, a cylindrical formation in Belize which began forming over 70 million years ago. The great Blue Hole has a depth of roughly 125 m. If there is 9132700 m^3 of water in the Great Blue Hole, find its radius. Round your answer to the nearest tenth. (Volume of cylinder = $\pi r^2 h$).

TASK 12 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Didn't understand the task.

TASK 13: CURRENCY CONVERSION TASK

Claudia lives in Canada. She is planning a holiday to Norway. She exchanges 2000 CAD into Norwegian kroners at a rate of 1 CAD = 6.99 CAD.

1. Calculate how many Norwegian Kroners she receives.
2. Before she even leaves Canada, Claudia becomes ill and has to cancel her holiday. She sells the Norwegian Kroners back to the bank at a rate of 1 NOK = 0.12 CAD. Calculate how many Canadian Dollars she receives.
3. Determine how much money the bank makes from the two transactions.
4. Calculate Claudia's loss as percentage of her original 2000 CAD.

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Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

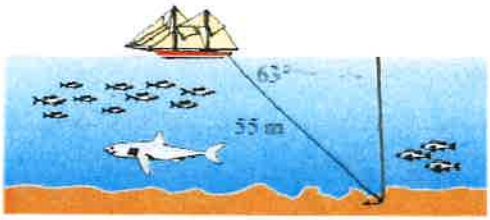
Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Is a real life situation but is too long.

TASK 14: WHERE THE ANCHOR LIES

A boat has an anchor rope length of 55 m. The boat drifts with the ocean current so that the rope makes an angle of 63 degrees with the surface of the water. Find the depth of the water at the position where the anchor lies at the bottom.



TASK 14 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(④) -------(5) Very motivated

Write a short explanation below why you felt that way.

I understand the task clearly and its easy.

Solution 1: Task 6

- 7 because to see the farmer everyday before school everyday she has to be there at around the same time 5 times a week to see it
- 5 the farmer wears the hat at least for 5 days a week
- 2 the friend only sees the farmer on school days
- 1 she has only ever seen the horse eat carrots
- 3 she only ever sees the farmer feeding the horse.
- 6 we dont know
- 4 she must walk to school to see the farmer feeding the horse

Solution 2: Task 7

3374 = 337

337
-8

329 = 32

32
-18

14 2 · 7 = 14

(9)

TASK RATING QUESTIONNAIRE

PART A: Please read and try to understand the following mathematical tasks. There are 14 of them below. After reading the task, rate the task on the degree to which you find it motivating or engaging. Then explain the reasons for why you thought it was so in the space provided. There is no right or wrong answer on this, it is important to indicate just how you feel about them.

TASK NUMBER 1: UNIT MAKES DIFFERENCE

In 1983, an Air Canada flight ran out of fuel halfway through its journey due to a mix-up between pounds and kilograms. The plane needed 22300 kg of fuel for the journey. There were 7682 litres of fuel already in the tanks.

a. One litre of jet fuel has a mass of 0.803 kg. Calculate how much fuel should have been loaded. Give your answer in litres.

b. Instead of 0.803 kg per litre, a conversion of 1.77 was used. (One litre of jet fuel has a mass of 1.77 pounds). Calculate how much fuel was actually loaded. Give your answer in litres.

c. Find how many litres short of fuel the plane was.

TASK 1 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------((3)) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

The first question (a) confused me, but b and c were ok. The picture helped even though it didn't have any info.

TASK 2: THE MAGIC SQUARES

Show that each square is a magic square by showing that the rows, columns and the diagonals all have the same sum.

2x-2y	-x+3y	2x-y
x + y	x	x-y
y	3x-3y	2y

3y-2x	-x-5y	6x+2y
9x-y	x	y-7x
-4x-2y	3x+5y	4x-3y

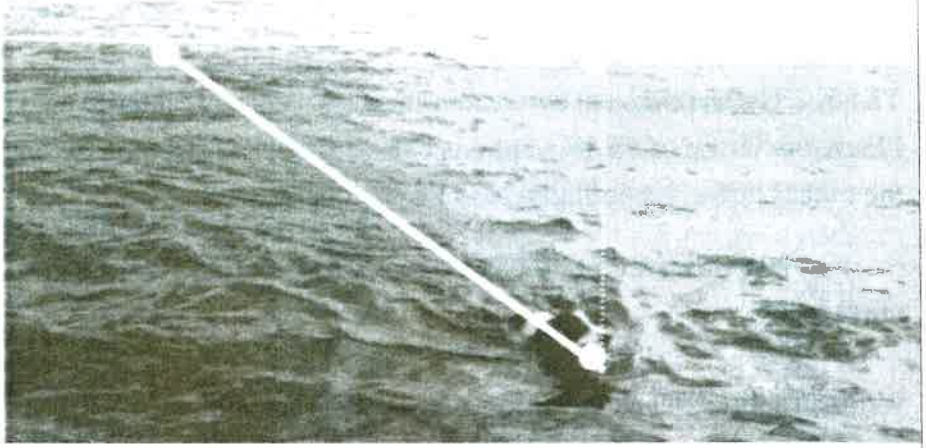
TASK 2 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

TASK 3: APACHE THE BORDER COLLIE

Apache the border Collie



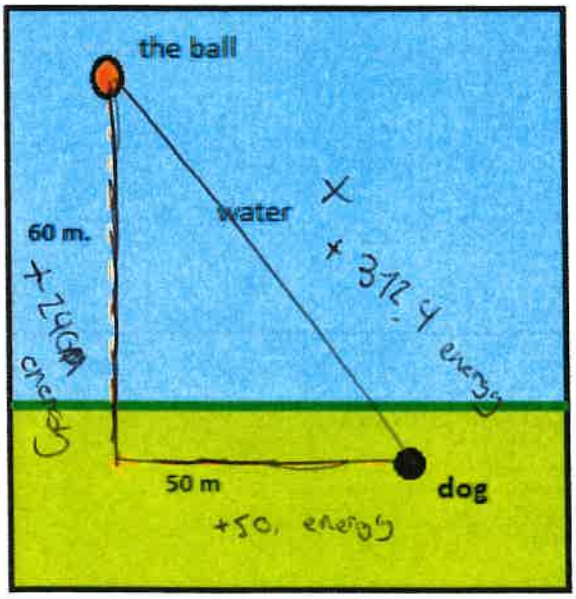
In 2001, Ian Forbes from Edinburgh wrote, in the journal *MicroMath*:

I have a 2-year-old dog, a Border collie named Apache and after a year of avoiding deep water she recently met three Labradors at the local lake. These dogs love to swim and I named them the "submarine brigade" because of their ability to dive straight in and swim after the ball. After meeting them, Apache quickly took to swimming, but being a dog with 'brains,' she discovered that she could beat the rest by running along the bank and then diving in.

The situation is like this: The Labradors jump immediately in the water and swim straight to the ball. Apache runs for about 50 m along the bank and then jumps to swim to the ball. Why would Apache run 50 m and then have the shortest distance for swimming? Is Apache really smart?

1 m swim = 4 m run

Please note that one meter of swimming takes four meters of running in time.)



$x^2 = 50^2 + 60^2$
$x^2 = 2500 + 3600$
$x^2 = 6100$
$x = \sqrt{6100}$
$x = 78.10$

312.4 m

240 + 50 = 290

78.12 × 4 = 312.4

Decreased distance
deplet energy

The dog is smart because it uses less energy

Please explain your solution.

TASK 3 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I didn't understand if 4m of running is equal to 1m of swimming or other way around

TASK 4: A4 PUZZLE

Take two sheets of A4 size paper. Roll one into a short cylinder and the other into a tall cylinder. Does one hold more than the other?

Please explain your answer and show your work.

TASK 4 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I think it is boring

TASK 5: PERCENTAGES

Find the unknowns: X, Y, Z.

S.No	Name of the item	Marked Price	Selling Price	Discount
i)	Book 225 kr	X	8%	
ii)	LED TV	Y	11970 kr	5%
iii)	Digital clock 750 kr	615 kr	Z	

Show your work here.

i.

ii.

iii.

TASK 5 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I didn't understand the context

TASK 6: LOGICAL REASONING

Your friend says she passes a field every day on the way to school, and each day, without exception, she sees **a farmer wearing a straw hat feeding a carrot to a brown horse**. Look at the following general statements and rank them in order from most likely to be true to least likely to be true.

- *The horse never eats anything but carrots.*
- *The farmer feeds the horse only on school days.*
- *The farmer is the only person who feeds the house.*
- *Your friend never walks to school.*
- *The farmer always wears a hat.*
- *The horse is not a racing horse.*
- *Your friend travels to school at the same time every day.*

7/7 most true

1/7 least true

TASK 6 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- ((2)) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Now All of them are unlikely

TASK 7: DIVISIBLE BY 7

Is **3843** evenly divisible by 7? To see if a number is evenly divisible by 7, remove the units digit of the number, double the removed digit and subtract the doubled amount from the remaining number. If the result is evenly divisible by 7, then the original number is also divisible by 7. The method may need to be repeated several times.

3843 remove the units digit, 3, leaving 384:

384
-6 subtract the doubled number 3

---

378 remove the units digit, 8, leaving 37:

37
-16 subtract the doubled number 8

---

21 This is a multiple of 7, so 3843 is evenly divisible by 7.

This is a specific example that works with the method described.
Use the above method to check whether 3374 is evenly divisible by 7

TASK 7 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Too many different numbers

TASK 8: LOGICAL REASONING

Stuart has a 330 mL bottle of orange juice. He thinks he can pour it all into his glass, which is a cylinder with diameter 7 cm and height 8 cm. Stuart's friend Patrick thinks the glass will overflow. Answer the following questions.

a. Will Stuart's glass overflow?
b. If the glass was full, what volume of fluid would it contain.

b) $V = \pi 3.50^2 8$

$V = 307.87\ cm^3$

a) The juice will flow over because the glass is too small

Show your work here.

TASK 8 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(⑤) Very motivated

Write a short explanation below why you felt that way.

Because the formula is already given and the information is fairly clear

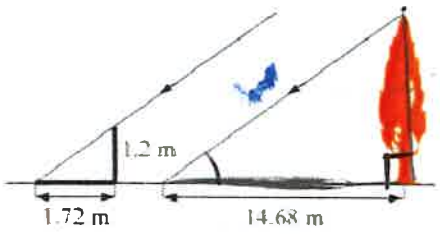
TASK 9: LOGICAL REASONING

Dean needs to accurately find the height of a tree in his garden. Local Council regulations prohibit the growth of garden trees beyond 20 m. They argue that in storm conditions falling branches and uprooted large trees are dangers to houses and lives. As Dean cannot climb the tree, he decides to use shadows to help solve the problem. On a windless sunny day, he stands a 1.2 m stick vertically on the ground. The length of the stick's shadow is 1.72 m and at the same time, the tree's shadow measures 14.68 m.

Using the diagram to estimate:

- The height of the tree
- The angle of elevation of the sun (the angle that the sun's rays make with the horizontal ground

soh



TASK 9 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I forgot the formula for SOH CAH TOA

TASK 10: HEARTBEAT

The average person's heart beats 70 times per minute. It can be shown that the average person's heart beats 2.57 billion times in a lifetime.

a. According to this information, how long is the average life span?

b. What assumptions have to be made to solve this problem? How do they affect your answer to part **a?**

Show your work and explain.

TASK 10 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I didn't have time. im sorry

TASK 11: PALEONTOLOGY

Archaeologists use a coordinate grid system when excavating a site. This allows them to easily record the location of artefacts at a site, which simplifies future excavations. If the coordinates (in cm) of the top and bottom of the arm bone of this dinosaur skeleton are (6.2, 22.3) and (9.1, 11.8), find the length of the arm bone, rounded to the nearest tenth of a centimetre. (Assume that the arm bone is perfectly straight).

x_1 y_1
(6.2, 22.3)
(9.1, 11.8)
x_2 y_2

$D = \sqrt{(9.1 - 6.2)^2 + (11.8 - 22.3)^2}$

$D = \sqrt{8.41 + 110.25}$

$D = \sqrt{118.66}$

$D = 10.893\ cm$

$D = 10.9\ cm$

TASK 11 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Because I knew the formula and we just had about it

TASK 12: GREAT BLUE HOLE TASK

When faced with the problem of trying to breathe underwater, ocean explorer, Jacques Cousteau, designed an underwater breathing apparatus called the Aqualung. It was the precursor of today's scuba gear and allowed Cousteau to explore places that had never been seen before. In 1972, he explored the Great Blue Hole, a cylindrical formation in Belize which began forming over 70 million years ago. The great Blue Hole has a depth of roughly 125 m. If there is 9132700 m^3 of water in the Great Blue Hole, find its radius. Round your answer to the nearest tenth. (Volume of cylinder = $\pi r^2 h$).

$\frac{9132700}{\pi} = \pi r^2 125$

$\frac{2907028.698}{125} = r^2 \cancel{125}$

$\sqrt{23256.22958} = r^2$

$152.499 = r$

$152.5m = r$

TASK 12 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I understood it at once

TASK 13: CURRENCY CONVERSION TASK

Claudia lives in Canada. She is planning a holiday to Norway. She exchanges 2000 CAD into Norwegian kroners at a rate of 1 CAD = 6.99 CAD. ?

1. Calculate how many Norwegian Kroners she receives.
2. Before she even leaves Canada, Claudia becomes ill and has to cancel her holiday. She sells the Norwegian Kroners back to the bank at a rate of 1 NOK = 0.12 CAD. Calculate how many Canadian Dollars she receives.
3. Determine how much money the bank makes from the two transactions.
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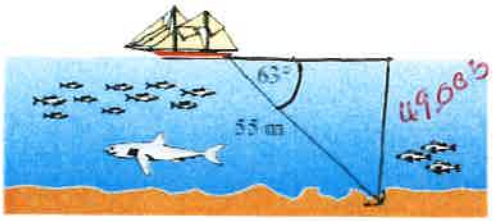
Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I got confused by CAb

TASK 14: WHERE THE ANCHOR LIES

A boat has an anchor rope length of 55 m. The boat drifts with the ocean current so that the rope makes an angle of 63 degrees with the surface of the water. Find the depth of the water at the position where the anchor lies at the bottom.



$\sin 63 = \frac{x}{55}$

$55 \sin 63 = x$

$55 \sin 63 = 49.05$

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Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

It is linked to previous lessons

Solution 1:

Solution 2:

(10)

TASK RATING QUESTIONNAIRE

PART A: Please read and try to understand the following mathematical tasks. There are 14 of them below. After reading the task, rate the task on the degree to which you find it motivating or engaging. Then explain the reasons for why you thought it was so in the space provided. There is no right or wrong answer on this, it is important to indicate just how you feel about them.

TASK NUMBER 1: UNIT MAKES DIFFERENCE

In 1983, an Air Canada flight ran out of fuel halfway through its journey due to a mix-up between pounds and kilograms. The plane needed 22300 kg of fuel for the journey. There were 7682 litres of fuel already in the tanks.

a. One litre of jet fuel has a mass of 0.803 kg. Calculate how much fuel should have been loaded. Give your answer in litres.

b. Instead of 0.803 kg per litre, a conversion of 1.77 was used. (One litre of jet fuel has a mass of 1.77 pounds). Calculate how much fuel was actually loaded. Give your answer in litres.

c. Find how many litres short of fuel the plane was.

TASK 1 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------(2)------(3)------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Too many terms like pounds, distance, liters, calculate kilos. makes it stressful. It does make it interesting

TASK 2: THE MAGIC SQUARES

Show that each square is a magic square by showing that the rows, columns and the diagonals all have the same sum.

2x-2y	-x+3y	2x-y
x + y	x	x-y
y	3x-3y	2y

3y-2x	-x-5y	6x+2y
9x-y	x	y-7x
-4x-2y	3x+5y	4x-3y

TASK 2 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

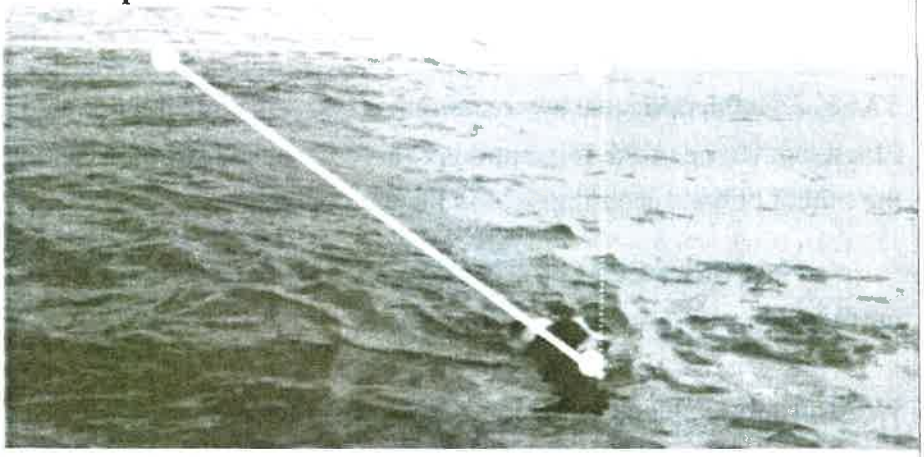
Not motivated at all (1)------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I dont get it. Dislike

TASK 3: APACHE THE BORDER COLLIE

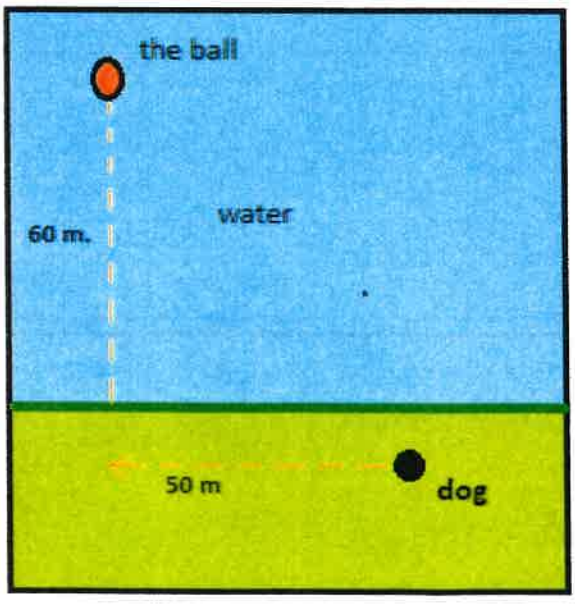
Apache the border Collie



In 2001, Ian Forbes from Edinburgh wrote, in the journal *MicroMath*:

I have a 2-year-old dog, a Border collie named Apache and after a year of avoiding deep water she recently met three Labradors at the local lake. These dogs love to swim and I named them the "submarine brigade" because of their ability to dive straight in and swim after the ball. After meeting them, Apache quickly took to swimming, but being a dog with 'brains,' she discovered that she could beat the rest by running along the bank and then diving in.
The situation is like this: The Labradors jump immediately in the water and swim straight to the ball. Apache runs for about 50 m along the bank and then jumps to swim to the ball. Why would Apache run 50 m and then have the shortest distance for swimming? Is Apache really smart?

Please note that one meter of swimming takes four meters of running in time.)



Please explain your solution.

TASK 3 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) **Very motivated**

Write a short explanation below why you felt that way.

Too much backstory which begins to make it nerveracking. I get the feeling i missed something & if i did, ill mess up. after reading it again i understand it and would like to do it.

TASK 4: A4 PUZZLE

Take two sheets of A4 size paper. Roll one into a short cylinder and the other into a tall cylinder. Does one hold more than the other?

Please explain your answer and show your work.

TASK 4 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3)-------(4)-------(5) Very motivated

Write a short explanation below why you felt that way.

alot of do-ing makes it easier to focus and think about volume.

If this was in a test, i would do it but as a class task, id skip cause its too "much work"

TASK 5: PERCENTAGES

Find the unknowns: X, Y, Z.

S.No	Name of the item	Marked Price	Selling Price	Discount
i)	Book 225 kr	X	8%	
ii)	LED TV	Y	11970 kr	5%
iii)	Digital clock 750 kr	615 kr	Z	

Show your work here.

i.

ii.

iii.

TASK 5 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) -------(2)-------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

loads of numbers and filling out

TASK 6: LOGICAL REASONING

Your friend says she passes a field every day on the way to school, and each day, without exception, she sees **a farmer wearing a straw hat feeding a carrot to a brown horse.** Look at the following general statements and rank them in order from most likely to be true to least likely to be true.

- *The horse never eats anything but carrots.*
- *The farmer feeds the horse only on school days.*
- *The farmer is the only person who feeds the house.*
- *Your friend never walks to school.*
- *The farmer always wears a hat.*
- *The horse is not a racing horse.*
- *Your friend travels to school at the same time every day.*

TASK 6 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

simplistic and ~~to~~ formatted in a way to have good reasoning

TASK 7: DIVISIBLE BY 7

Is **3843** evenly divisible by 7? To see if a number is evenly divisible by 7, remove the units digit of the number, double the removed digit and subtract the doubled amount from the remaining number. If the result is evenly divisible by 7, then the original number is also divisible by 7. The method may need to be repeated several times.

3843 remove the units digit, 3, leaving 384:

384
-6 subtract the doubled number 3

378 remove the units digit, 8, leaving 37:

37
-16 subtract the doubled number 8

21 This is a multiple of 7, so 3843 is evenly divisible by 7.

This is a specific example that works with the method described.
Use the above method to check whether 3374 is evenly divisible by 7

TASK 7 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) **Very motivated**

Write a short explanation below why you felt that way.

Steps with alot of text dont go together.
looks harder than it has to

TASK 8: LOGICAL REASONING

Stuart has a 330 mL bottle of orange juice. He thinks he can pour it all into his glass, which is a cylinder with diameter 7 cm and height 8 cm. Stuart's friend Patrick thinks the glass will overflow. Answer the following questions.

a. Will Stuart's glass overflow?
b. If the glass was full, what volume of fluid would it contain.

Show your work here.

h=8

Total = 330mL

D=7
r=3.5

$V = \pi r^2 h$

$V = \pi(3.5)^2 \times 8$

$V = 307.87$

330 - 307.87 = 22.12

a. yes

b. it would be able to hold 307.87mL with 22.12 leaking out

TASK 8 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

right away understand it, and its about something close to me making it feel more "natural"

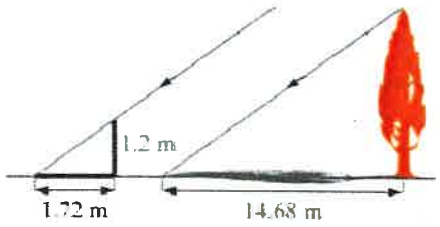
☆ I really liked it

TASK 9: LOGICAL REASONING

Dean needs to accurately find the height of a tree in his garden. Local Council regulations prohibit the growth of garden trees beyond 20 m. They argue that in storm conditions falling branches and uprooted large trees are dangers to houses and lives. As Dean cannot climb the tree, he decides to use shadows to help solve the problem. On a windless sunny day, he stands a 1.2 m stick vertically on the ground. The length of the stick's shadow is 1.72 m and at the same time, the tree's shadow measures 14.68 m.

Using the diagram to estimate:

- The height of the tree
- The angle of elevation of the sun (the angle that the sun's rays make with the horizontal ground



TASK 9 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3)-------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

understand what to do but comparisons makes it feel unusual

TASK 10: HEARTBEAT

The average person's heart beats 70 times per minute. It can be shown that the average person's heart beats 2.57 billion times in a lifetime.

a. According to this information, how long is the average life span?

b. What assumptions have to be made to solve this problem? How do they affect your answer to part **a?**

Show your work and cxplain.

TASK 10 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4)-------(5) Very motivated

Write a short explanation below why you felt that way.

feels close to "me" but when i read it, i already know that there is alot of calculations and ruins it for me. (like number 8)

TASK 11: PALEONTOLOGY

Archaeologists use a coordinate grid system when excavating a site. This allows them to easily record the location of artefacts at a site, which simplifies future excavations. If the coordinates (in cm) of the top and bottom of the arm bone of this dinosaur skeleton are (6.2, 22.3) and (9.1, 11.8), find the length of the arm bone, rounded to the nearest tenth of a centimetre. (Assume that the arm bone is perfectly straight).

TASK 11 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) -------(2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

as i read the question so much information gets thrown at me. got confused imediately and makes me want to go over it. especially ~~[illegible]~~ in test situations making it more stressful

TASK 12: GREAT BLUE HOLE TASK

When faced with the problem of trying to breathe underwater, ocean explorer, Jacques Cousteau, designed an underwater breathing apparatus called the Aqualung. It was the precursor of today's scuba gear and allowed Cousteau to explore places that had never been seen before. In 1972, he explored the Great Blue Hole, a cylindrical formation in Belize which began forming over 70 million years ago. The great Blue Hole has a depth of roughly 125 m. If there is 9132700 m^3 of water in the Great Blue Hole, find its radius. Round your answer to the nearest tenth. (Volume of cylinder = $\pi r^2 h$).

TASK 12 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

alot of unnecessary stuff for me but as i read through the question, i know i just have to reverse solve it.

TASK 13: CURRENCY CONVERSION TASK

Claudia lives in Canada. She is planning a holiday to Norway. She exchanges 2000 CAD into Norwegian kroners at a rate of 1 CAD = 6.99 CAD.

1. Calculate how many Norwegian Kroners she receives.
2. Before she even leaves Canada, Claudia becomes ill and has to cancel her holiday. She sells the Norwegian Kroners back to the bank at a rate of 1 NOK = 0.12 CAD. Calculate how many Canadian Dollars she receives.
3. Determine how much money the bank makes from the two transactions.
4. Calculate Claudia's loss as percentage of her original 2000 CAD.

TASK 13 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

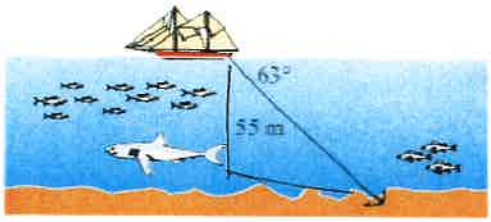
Not motivated at all (1) ------- (2) -------(3)-------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

numbers are just not "fun"

TASK 14: WHERE THE ANCHOR LIES

A boat has an anchor rope length of 55 m. The boat drifts with the ocean current so that the rope makes an angle of 63 degrees with the surface of the water. Find the depth of the water at the position where the anchor lies at the bottom.



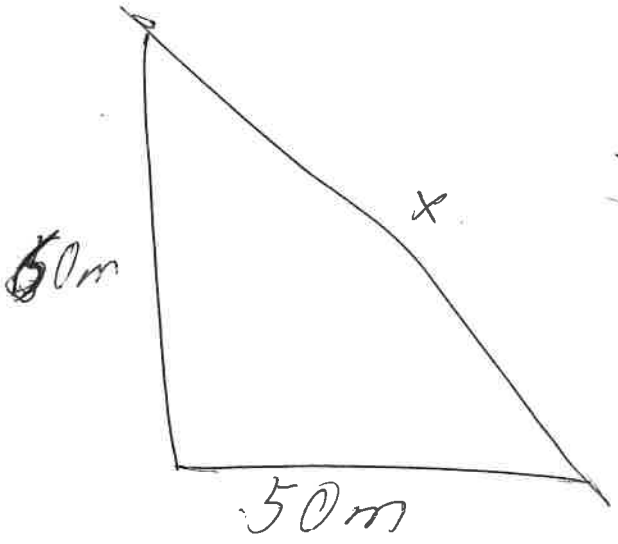
TASK 14 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4)-------(5) Very motivated

Write a short explanation below why you felt that way.

Its something of interest but and i know what to do with soh cah toa but there are others i just prefer

Solution 1: number 3



~~$50^2+50^2=x^2$~~
~~$2500+2500=x^2$~~
~~5000~~

$60^2+50^2=x^2$

$3600+2500=x^2$

$6100=x^2$

$\sqrt{6100}=x$

~~78~~

$78.10=x$

$78.10\times 4=312.4$

~~50x~~ $60\times 4=240$

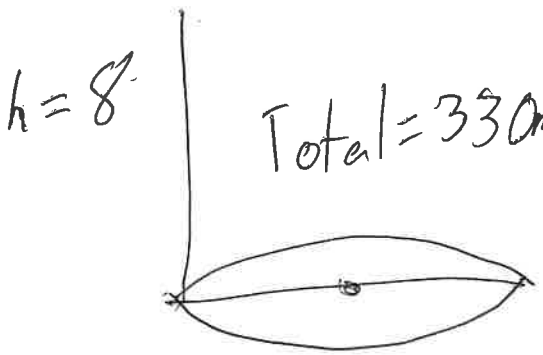
$240+30=290$

$290<312.4$

1m swimming = 4m running

dog is smart cus its quicker

Solution 2: number 8



D = 7

r = 3.5

$V = \pi r^2 h$

$V = \pi 3.5^2 \times 8$

$V = 307.87$

$330 - 307.87 = 22.12$

a = yes

b = it would hold 307.87mL until it leaks 22.12mL

(11)

TASK RATING QUESTIONNAIRE

PART A: Please read and try to understand the following mathematical tasks. There are 14 of them below. After reading the task, rate the task on the degree to which you find it motivating or engaging. Then explain the reasons for why you thought it was so in the space provided. There is no right or wrong answer on this, it is important to indicate just how you feel about them.

TASK NUMBER 1: UNIT MAKES DIFFERENCE

In 1983, an Air Canada flight ran out of fuel halfway through its journey due to a mix-up between pounds and kilograms. The plane needed 22300 kg of fuel for the journey. There were 7682 litres of fuel already in the tanks.

a. One litre of jet fuel has a mass of 0.803 kg. Calculate how much fuel should have been loaded. Give your answer in litres.

b. Instead of 0.803 kg per litre, a conversion of 1.77 was used. (One litre of jet fuel has a mass of 1.77 pounds). Calculate how much fuel was actually loaded. Give your answer in litres.

c. Find how many litres short of fuel the plane was.

TASK 1 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4)-------(5) Very motivated

Write a short explanation below why you felt that way.

It's relatively easy since you are given the fuel in pounds plus its real life.

TASK 2: THE MAGIC SQUARES

Show that each square is a magic square by showing that the rows, columns and the diagonals all have the same sum.

2x-2y	-x+3y	2x-y
x + y	x	x-y
y	3x-3y	2y

3y-2x	-x-5y	6x+2y
9x-y	x	y-7x
-4x-2y	3x+5y	4x-3y

TASK 2 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

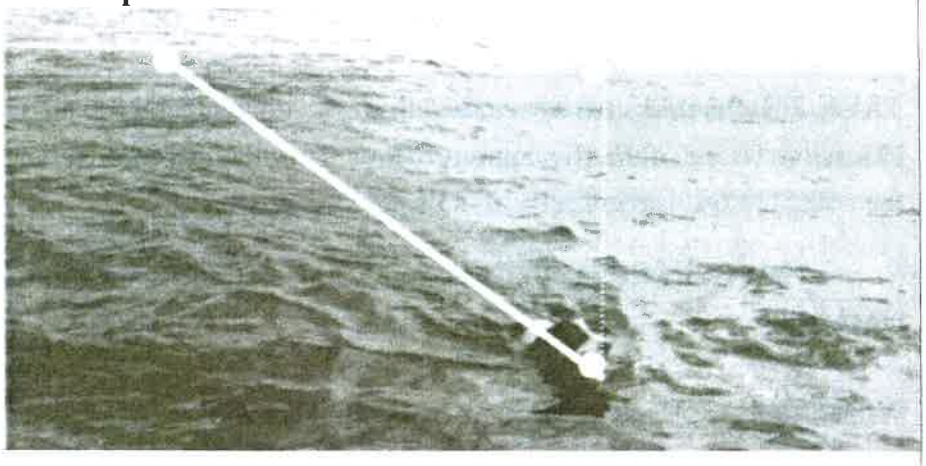
Not motivated at all (1) ------ (2) **-------(3) -------(4) -------(5) Very motivated**

Write a short explanation below why you felt that way.

Just tiring to look at and seems more complex than i think it would've looked like with more visuals.

TASK 3: APACHE THE BORDER COLLIE

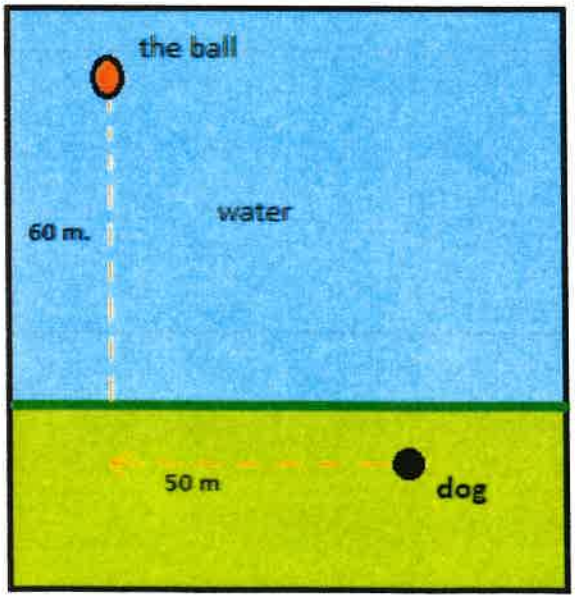
Apache the border Collie



In 2001, Ian Forbes from Edinburgh wrote, in the journal *MicroMath*:

I have a 2-year-old dog, a Border collie named Apache and after a year of avoiding deep water she recently met three Labradors at the local lake. These dogs love to swim and I named them the "submarine brigade" because of their ability to dive straight in and swim after the ball. After meeting them, Apache quickly took to swimming, but being a dog with 'brains,' she discovered that she could beat the rest by running along the bank and then diving in.
The situation is like this: The Labradors jump immediately in the water and swim straight to the ball. Apache runs for about 50 m along the bank and then jumps to swim to the ball. Why would Apache run 50 m and then have the shortest distance for swimming? Is Apache really smart?

Please note that one meter of swimming takes four meters of running in time.)



Please explain your solution.

TASK 3 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Super simple and can easily be explained and understood.

TASK 4: A4 PUZZLE

Take two sheets of A4 size paper. Roll one into a short cylinder and the other into a tall cylinder. Does one hold more than the other?

Please explain your answer and show your work.

TASK 4 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Can be easily done.

TASK 5: PERCENTAGES

Find the unknowns: X, Y, Z.

S.No	Name of the item	Marked Price	Selling Price	Discount
i)	Book	225 kr	X	8%
ii)	LED TV	Y	11970 kr	5%
iii)	Digital clock	750 kr	615 kr	Z

Show your work here.

i.

ii.

iii.

TASK 5 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Feel like the question is easy.

TASK 6: LOGICAL REASONING

Your friend says she passes a field every day on the way to school, and each day, without exception, she sees **a farmer wearing a straw hat feeding a carrot to a brown horse**. Look at the following general statements and rank them in order from most likely to be true to least likely to be true.

- *The horse never eats anything but carrots.*
- *The farmer feeds the horse only on school days.*
- *The farmer is the only person who feeds the house.*
- *Your friend never walks to school.*
- *The farmer always wears a hat.*
- *The horse is not a racing horse.*
- *Your friend travels to school at the same time every day.*

TASK 6 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

you can easily cross out the illogical answers.

TASK 7: DIVISIBLE BY 7

Is **3843** evenly divisible by 7? To see if a number is evenly divisible by 7, remove the units digit of the number, double the removed digit and subtract the doubled amount from the remaining number. If the result is evenly divisible by 7, then the original number is also divisible by 7. The method may need to be repeated several times.

3843 remove the units digit, 3, leaving 384:

384
-6 subtract the doubled number 3

378 remove the units digit, 8, leaving 37:

37
-16 subtract the doubled number 8

21 This is a multiple of 7, so 3843 is evenly divisible by 7.

This is a specific example that works with the method described.
Use the above method to check whether 3374 is evenly divisible by 7

TASK 7 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3)------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

makes sense but without the visual Representation i would have a clue.

TASK 8: LOGICAL REASONING

Stuart has a 330 mL bottle of orange juice. He thinks he can pour it all into his glass, which is a cylinder with diameter 7 cm and height 8 cm. Stuart's friend Patrick thinks the glass will overflow. Answer the following questions.

a. Will Stuart's glass overflow?
b. If the glass was full, what volume of fluid would it contain.

Show your work here.

TASK 8 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

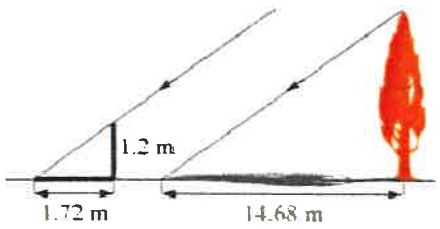
Easy in real life applicable.

TASK 9: LOGICAL REASONING

Dean needs to accurately find the height of a tree in his garden. Local Council regulations prohibit the growth of garden trees beyond 20 m. They argue that in storm conditions falling branches and uprooted large trees are dangers to houses and lives. As Dean cannot climb the tree, he decides to use shadows to help solve the problem. On a windless sunny day, he stands a 1.2 m stick vertically on the ground. The length of the stick's shadow is 1.72 m and at the same time, the tree's shadow measures 14.68 m.

Using the diagram to estimate:

- The height of the tree
- The angle of elevation of the sun (the angle that the sun's rays make with the horizontal ground



TASK 9 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Super confident i could do it and it's a recent subject.

TASK 10: HEARTBEAT

The average person's heart beats 70 times per minute. It can be shown that the average person's heart beats 2.57 billion times in a lifetime.

a. According to this information, how long is the average life span?

b. What assumptions have to be made to solve this problem? How do they affect your answer to part **a?**

Show your work and explain.

TASK 10 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Another real life applicable question I think i could do.

TASK 11: PALEONTOLOGY

Archaeologists use a coordinate grid system when excavating a site. This allows them to easily record the location of artefacts at a site, which simplifies future excavations. If the coordinates (in cm) of the top and bottom of the arm bone of this dinosaur skeleton are (6.2, 22.3) and (9.1, 11.8), find the length of the arm bone, rounded to the nearest tenth of a centimetre. (Assume that the arm bone is perfectly straight).

TASK 11 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Super easy because its a easy question formulated in a hard~~y~~ way.

Tasl

TASK 12: GREAT BLUE HOLE TASK

When faced with the problem of trying to breathe underwater, ocean explorer, Jacques Cousteau, designed an underwater breathing apparatus called the Aqualung. It was the precursor of today's scuba gear and allowed Cousteau to explore places that had never been seen before. In 1972, he explored the Great Blue Hole, a cylindrical formation in Belize which began forming over 70 million years ago. The great Blue Hole has a depth of roughly 125 m. If there is 9132700 m^3 of water in the Great Blue Hole, find its radius. Round your answer to the nearest tenth. (Volume of cylinder = $\pi r^2 h$).

TASK 12 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

again pretty simple i think because you can just reverse operate.

I forget formulas.

TASK 13: CURRENCY CONVERSION TASK

Claudia lives in Canada. She is planning a holiday to Norway. She exchanges 2000 CAD into Norwegian kroners at a rate of 1 CAD = 6.99 CAD.

1. Calculate how many Norwegian Kroners she receives.
2. Before she even leaves Canada, Claudia becomes ill and has to cancel her holiday. She sells the Norwegian Kroners back to the bank at a rate of 1 NOK = 0.12 CAD. Calculate how many Canadian Dollars she receives.
3. Determine how much money the bank makes from the two transactions.
4. Calculate Claudia's loss as percentage of her original 2000 CAD.

TASK 13 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

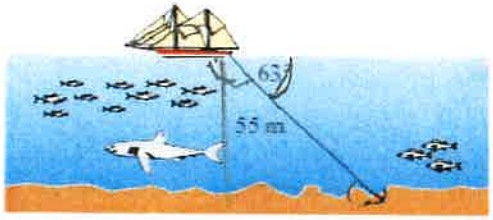
Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Simple calculations.

TASK 14: WHERE THE ANCHOR LIES

A boat has an anchor rope length of 55 m. The boat drifts with the ocean current so that the rope makes an angle of 63 degrees with the surface of the water. Find the depth of the water at the position where the anchor lies at the bottom.



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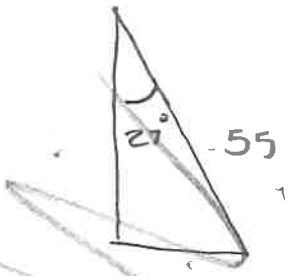
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Easy questions and good visuals.
Oops, im rusty

Solution 1:



SOH CAH TOA

$\sin = \frac{opp}{hyp}$

$\cos = \frac{adj}{hyp}$

$\tan = \frac{opp}{adj}$

TASK : 13

1. $2000 \times 6.49 = 13980,-$
2. $1398 \times 0.12 = 1677.6$ CAD
3. $2000 - 1677.6 = 322.4$ CAD
4. ~~$322 = 100 \times 2000$~~

$\cos\theta = \frac{322}{2000} \times 100 = 16.1\%$

$\cos 27° = \frac{x}{55}$

$\cos 27° \times 55 = x$

$\cos 1485 = x$

$.707 = x$

Solution 2:

a Task 70

a: 2,5713 ÷ 70 = 36714285 71 minutes

$$\frac{36714285 71}{60}$$

$$= \frac{611904.7619}{24} \text{ Hours}$$

$$= \frac{25496.03}{365} = \text{Days}$$

$= 69.8541 = \text{years}$

b. i Assumed you didn't have heart problems and it was an estimated average

Task: 10

$$\sqrt{(x2-x1)^2+(y2-y1)^2}$$

$$\sqrt{(9.1-6.2)^2+(11.8-22.3)^2}$$

2.9^2 8.41 + -10.5^2 8.41 + 110.25 = 118.66

12

TASK RATING QUESTIONNAIRE

PART A: Please read and try to understand the following mathematical tasks. There are 14 of them below. After reading the task, rate the task on the degree to which you find it motivating or engaging. Then explain the reasons for why you thought it was so in the space provided. There is no right or wrong answer on this, it is important to indicate just how you feel about them.

TASK NUMBER 1: UNIT MAKES DIFFERENCE

In 1983, an Air Canada flight ran out of fuel halfway through its journey due to a mix-up between pounds and kilograms. The plane needed 22300 kg of fuel for the journey. There were 7682 litres of fuel already in the tanks.

a. One litre of jet fuel has a mass of 0.803 kg. Calculate how much fuel should have been loaded. Give your answer in litres.

b. Instead of 0.803 kg per litre, a conversion of 1.77 was used. (One litre of jet fuel has a mass of 1.77 pounds). Calculate how much fuel was actually loaded. Give your answer in litres.

c. Find how many litres short of fuel the plane was.

TASK 1 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

There is a a b and c also because it just looks long.

TASK 2: THE MAGIC SQUARES

Show that each square is a magic square by showing that the rows, columns and the diagonals all have the same sum.

2x-2y	-x+3y	2x-y = 3x	3y-2x	-x-5y	6x+2y
x + y	x	x-y = 3x	9x-y	x	y-7x
y	3x-3y	2y = 3x	-4x-2y	3x+5y	4x-3y

TASK 2 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

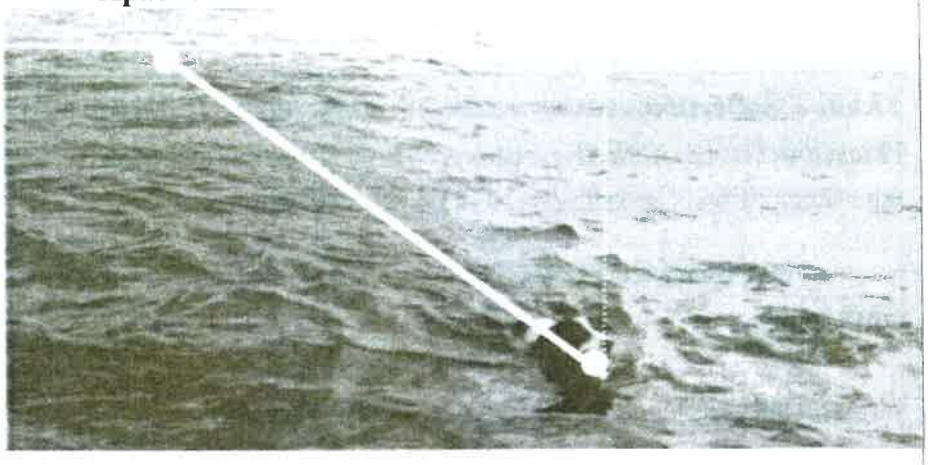
Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

It looks a little long, but still looks better than the last one.

TASK 3: APACHE THE BORDER COLLIE

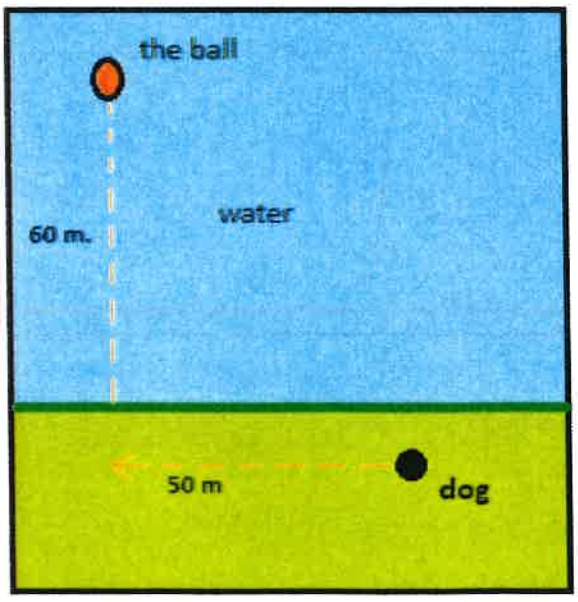
Apache the border Collie



In 2001, Ian Forbes from Edinburgh wrote, in the journal *MicroMath*:

I have a 2-year-old dog, a Border collie named Apache and after a year of avoiding deep water she recently met three Labradors at the local lake. These dogs love to swim and I named them the "submarine brigade" because of their ability to dive straight in and swim after the ball. After meeting them, Apache quickly took to swimming, but being a dog with 'brains,' she discovered that she could beat the rest by running along the bank and then diving in.
The situation is like this: The Labradors jump immediately in the water and swim straight to the ball. Apache runs for about 50 m along the bank and then jumps to swim to the ball. Why would Apache run 50 m and then have the shortest distance for swimming? Is Apache really smart?

Please note that one meter of swimming takes four meters of running in time.)



Please explain your solution.

TASK 3 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Looks so long and boring.
Too much story-line

TASK 4: A4 PUZZLE

Take two sheets of A4 size paper. Roll one into a short cylinder and the other into a tall cylinder. Does one hold more than the other?

Please explain your answer and show your work.

TASK 4 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

It takes too long to do, but it is fun because it is engaging.

TASK 5: PERCENTAGES

Find the unknowns: X, Y, Z.

S.No	Name of the item	Marked Price	Selling Price	Discount
i)	Book 225 kr	X	8%	
ii)	LED TV	Y	11970 kr	5%
iii)	Digital clock	750 kr	615 kr	Z

Show your work here.

i.

ii.

iii.

TASK 5 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(③) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I understand it but it seems too easy.

TASK 6: LOGICAL REASONING

Your friend says she passes a field every day on the way to school, and each day, without exception, she sees **a farmer wearing a straw hat feeding a carrot to a brown horse.** Look at the following general statements and rank them in order from most likely to be true to least likely to be true.

- *The horse never eats anything but carrots.*
- *The farmer feeds the horse only on school days.*
- *The farmer is the only person who feeds the house.*
- *Your friend never walks to school.*
- *The farmer always wears a hat.*
- *The horse is not a racing horse.*
- *Your friend travels to school at the same time every day.*

TASK 6 Reflection: Just by reading this task, do you feel motivated to solve it?'
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------((3)) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Looks fun coz it's not rly related to math, but it's also boring because there is not numbers

TASK 7: DIVISIBLE BY 7

Is **3843** evenly divisible by 7? To see if a number is evenly divisible by 7, remove the units digit of the number, double the removed digit and subtract the doubled amount from the remaining number. If the result is evenly divisible by 7, then the original number is also divisible by 7. The method may need to be repeated several times.

3843 remove the units digit, 3, leaving 384:

384
-6 subtract the doubled number 3

378 remove the units digit, 8, leaving 37:

37
-16 subtract the doubled number 8

21 This is a multiple of 7, so 3843 is evenly divisible by 7.

This is a specific example that works with the method described.
Use the above method to check whether 3374 is evenly divisible by 7

TASK 7 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Looks long and looks stupid.

.

TASK 8: LOGICAL REASONING

Stuart has a 330 mL bottle of orange juice. He thinks he can pour it all into his glass, which is a cylinder with diameter 7 cm and height 8 cm. Stuart's friend Patrick thinks the glass will overflow. Answer the following questions.

a. Will Stuart's glass overflow?
b. If the glass was full, what volume of fluid would it contain.

Show your work here.

TASK 8 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(④) -------(5) Very motivated

Write a short explanation below why you felt that way.

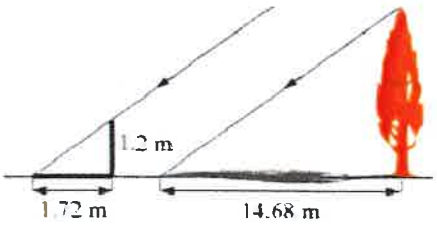
Short and simple. I forgot the formula so that's y im not doing it

TASK 9: LOGICAL REASONING

Dean needs to accurately find the height of a tree in his garden. Local Council regulations prohibit the growth of garden trees beyond 20 m. They argue that in storm conditions falling branches and uprooted large trees are dangers to houses and lives. As Dean cannot climb the tree, he decides to use shadows to help solve the problem. On a windless sunny day, he stands a 1.2 m stick vertically on the ground. The length of the stick's shadow is 1.72 m and at the same time, the tree's shadow measures 14.68 m.

Using the diagram to estimate:

- The height of the tree
- The angle of elevation of the sun (the angle that the sun's rays make with the horizontal ground



TASK 9 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I have done this and hated it.

TASK 10: HEARTBEAT

The average person's heart beats 70 times per minute. It can be shown that the average person's heart beats 2.57 billion times in a lifetime.

a. According to this information, how long is the average life span?

b. What assumptions have to be made to solve this problem? How do they affect your answer to part **a?**

Show your work and explain.

TASK 10 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

It's about life and death

TASK 11: PALEONTOLOGY

Archaeologists use a coordinate grid system when excavating a site. This allows them to easily record the location of artefacts at a site, which simplifies future excavations. If the coordinates (in cm) of the top and bottom of the arm bone of this dinosaur skeleton are (6.2, 22.3) and (9.1, 11.8), find the length of the arm bone, rounded to the nearest tenth of a centimetre. (Assume that the arm bone is perfectly straight).

TASK 11 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (②) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I don't like archaeology.

TASK 12: GREAT BLUE HOLE TASK

When faced with the problem of trying to breathe underwater, ocean explorer, Jacques Cousteau, designed an underwater breathing apparatus called the Aqualung. It was the precursor of today's scuba gear and allowed Cousteau to explore places that had never been seen before. In 1972, he explored the Great Blue Hole, a cylindrical formation in Belize which began forming over 70 million years ago. The great Blue Hole has a depth of roughly 125 m. If there is 9132700 m^3 of water in the Great Blue Hole, find its radius. Round your answer to the nearest tenth. (Volume of cylinder = $\pi r^2 h$).

$9132700 = \pi r^2 h$

$\frac{9132700}{125} = \frac{\pi r^2 \times 125}{125}$

$\frac{73061.6}{\pi} = \frac{\pi r^2}{\pi}$

$\sqrt{23256.2} = \sqrt{r^2}$

$\sqrt{23256.2} = r$

$152.5 = r$

TASK 12 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Sounds interesting and mysterious.

TASK 13: CURRENCY CONVERSION TASK

Claudia lives in Canada. She is planning a holiday to Norway. She exchanges 2000 CAD into Norwegian kroners at a rate of 1 CAD = 6.99 CAD.

1. Calculate how many Norwegian Kroners she receives.
2. Before she even leaves Canada, Claudia becomes ill and has to cancel her holiday. She sells the Norwegian Kroners back to the bank at a rate of 1 NOK = 0.12 CAD. Calculate how many Canadian Dollars she receives.
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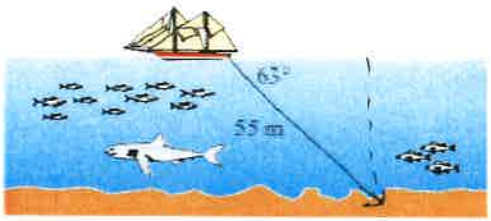
Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Seems simple.

TASK 14: WHERE THE ANCHOR LIES

A boat has an anchor rope length of 55 m. The boat drifts with the ocean current so that the rope makes an angle of 63 degrees with the surface of the water. Find the depth of the water at the position where the anchor lies at the bottom.



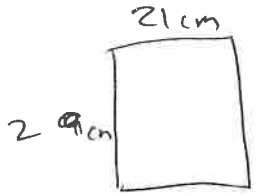
$\sin 63 = \frac{x}{55}$

TASK 14 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I don't like triogonometry.



TASK 4:

Solution 1:

$2\pi r = 29$
$\pi r = 14.5$
$r = 4.62$

$\pi r^2 h$
$= \pi 4.62^2 \times 21$
$= \pi \times 21.345 \times 21$
$= 67.06 \times 21$
$= 1408.26\ cm^3$

→ This one holds more?

$2\pi r = 21$
$\pi r = 10.5$
$r = 3.34$

$\pi r^2 h$
$= \pi \times 3.34^2 \times 29$
$= \pi \times 11.16 \times 29$
$= 1016.34\ cm^3$

TASK 7:

3374

337
− 8
329

32
− 18
14

Yes it is divisible by 7

TASK 8:

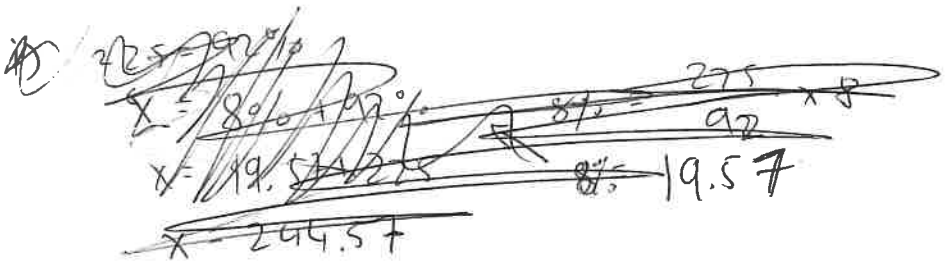
Solution 2:

a) $\pi r^2 h$
$= \pi \times 3.5^2 \times 8$
$= \pi \times 12.25 \times 8$
$= 307.88\ cm^3$

} glass will overflow.

b) 307.88 ml.

Solution 3: TASK 5:



i) $\frac{8}{100} \times 225$
$= 18 \rightarrow 225 - 18$
$= 207$
$X = 207.$

ii)
$11970 = 95\%$
$Y = 95\% + 5\%$
$Y = 11970 + 5\%$
$5\% = \frac{11970}{95} \times 5$
$5\% = 630$
$11970 + 630 = Y$
$12600 = Y$

iii) $\frac{615}{750} = .82$
$615 = 82\%$
$100 - 82 = 18 \rightarrow Z = 18\%$

(13)

TASK RATING QUESTIONNAIRE

PART A: Please read and try to understand the following mathematical tasks. There are 14 of them below. After reading the task, rate the task on the degree to which you find it motivating or engaging. Then explain the reasons for why you thought it was so in the space provided. There is no right or wrong answer on this, it is important to indicate just how you feel about them.

TASK NUMBER 1: UNIT MAKES DIFFERENCE

In 1983, an Air Canada flight ran out of fuel halfway through its journey due to a mix-up between pounds and kilograms. The plane needed 22300 kg of fuel for the journey. There were 7682 litres of fuel already in the tanks.

a. One litre of jet fuel has a mass of 0.803 kg. Calculate how much fuel should have been loaded. Give your answer in litres.

b. Instead of 0.803 kg per litre, a conversion of 1.77 was used. (One litre of jet fuel has a mass of 1.77 pounds). Calculate how much fuel was actually loaded. Give your answer in litres.

c. Find how many litres short of fuel the plane was.

TASK 1 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I find it difficult to calculate these kind of word problems.

TASK 2: THE MAGIC SQUARES

Show that each square is a magic square by showing that the rows, columns and the diagonals all have the same sum.

2x-2y	-x+3y	2x-y
x + y	x	x-y
y	3x-3y	2y

3y-2x	-x-5y	6x+2y
9x-y	x	y-7x
-4x-2y	3x+5y	4x-3y

TASK 2 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

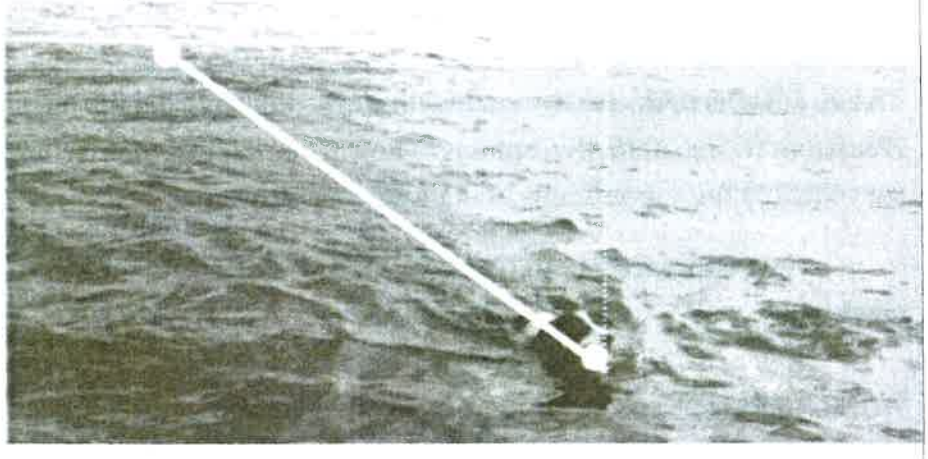
Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

it looks very complicated and ~~i think it is compl~~ seems difficult to complete because we have to "show".

TASK 3: APACHE THE BORDER COLLIE

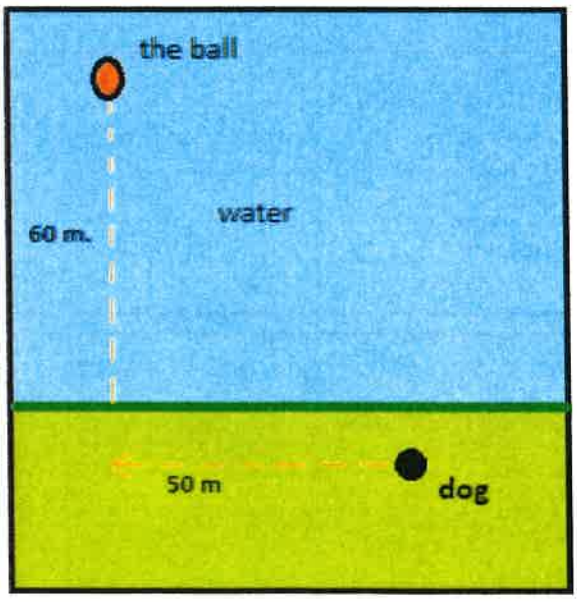
Apache the border Collie



In 2001, Ian Forbes from Edinburgh wrote, in the journal *MicroMath*:

I have a 2-year-old dog, a Border collie named Apache and after a year of avoiding deep water she recently met three Labradors at the local lake. These dogs love to swim and I named them the "submarine brigade" because of their ability to dive straight in and swim after the ball. After meeting them, Apache quickly took to swimming, but being a dog with 'brains,' she discovered that she could beat the rest by running along the bank and then diving in.
The situation is like this: The Labradors jump immediately in the water and swim straight to the ball. Apache runs for about 50 m along the bank and then jumps to swim to the ball. Why would Apache run 50 m and then have the shortest distance for swimming? Is Apache really smart?

Please note that one meter of swimming takes four meters of running in time.)



Please explain your solution.

TASK 3 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

There is a lot of text, but it seems like an easier task.

TASK 4: A4 PUZZLE

Take two sheets of A4 size paper. Roll one into a short cylinder and the other into a tall cylinder. Does one hold more than the other?

Please explain your answer and show your work.

TASK 4 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

it is confusing, and I don't know how to use math to solve the problem.

TASK 5: PERCENTAGES

Find the unknowns: X, Y, Z.

S.No	Name of the item	Marked Price	Selling Price	Discount
i)	Book 225 kr	X	8%	
ii)	LED TV	Y	11970 kr	5%
iii)	Digital clock	750 kr	615 kr	Z

Show your work here.

i.

ii.

iii.

TASK 5 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

TASK 6: LOGICAL REASONING

Your friend says she passes a field every day on the way to school, and each day, without exception, she sees **a farmer wearing a straw hat feeding a carrot to a brown horse**. Look at the following general statements and rank them in order from most likely to be true to least likely to be true.

- *The horse never eats anything but carrots.*
- *The farmer feeds the horse only on school days.*
- *The farmer is the only person who feeds the ~~house~~ horse.*
- *Your friend never walks to school.*
- *The farmer always wears a hat.*
- *The horse is not a racing horse.*
- *Your friend travels to school at the same time every day.*

TASK 6 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I feel motivated to do this task because it seems easy and no math is related.

TASK 7: DIVISIBLE BY 7

Is **3843** evenly divisible by 7? To see if a number is evenly divisible by 7, remove the units digit of the number, double the removed digit and subtract the doubled amount from the remaining number. If the result is evenly divisible by 7, then the original number is also divisible by 7. The method may need to be repeated several times.

3843 remove the units digit, 3, leaving 384:

384
-6 subtract the doubled number 3

378 remove the units digit, 8, leaving 37:

37
-16 subtract the doubled number 8

21 This is a multiple of 7, so 3843 is evenly divisible by 7.

This is a specific example that works with the method described.
Use the above method to check whether 3374 is evenly divisible by 7

TASK 7 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Many steps and a lot of writing.

.

TASK 8: LOGICAL REASONING

Stuart has a 330 mL bottle of orange juice. He thinks he can pour it all into his glass, which is a cylinder with diameter 7 cm and height 8 cm. Stuart's friend Patrick thinks the glass will overflow. Answer the following questions.

a. Will Stuart's glass overflow?
b. If the glass was full, what volume of fluid would it contain.

Show your work here.

TASK 8 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

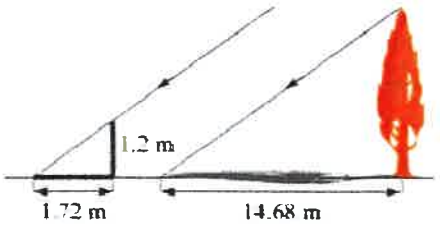
its simple when you know how to do it, but I have forgotten.

TASK 9: LOGICAL REASONING

Dean needs to accurately find the height of a tree in his garden. Local Council regulations prohibit the growth of garden trees beyond 20 m. They argue that in storm conditions falling branches and uprooted large trees are dangers to houses and lives. As Dean cannot climb the tree, he decides to use shadows to help solve the problem. On a windless sunny day, he stands a 1.2 m stick vertically on the ground. The length of the stick's shadow is 1.72 m and at the same time, the tree's shadow measures 14.68 m.

Using the diagram to estimate:

- The height of the tree
- The angle of elevation of the sun (the angle that the sun's rays make with the horizontal ground



TASK 9 Reflection: Just by reading this task, do you feel motivated to solve it?
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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

we have learned about this recently, but I think the answer is phrased weirdly. I would like to have a clearer diagram.

TASK 10: HEARTBEAT

The average person's heart beats 70 times per minute. It can be shown that the average person's heart beats 2.57 billion times in a lifetime.

a. According to this information, how long is the average life span?

b. What assumptions have to be made to solve this problem? How do they affect your answer to part **a?**

Show your work and explain.

TASK 10 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

it is simple and there ~~is~~ is clear information.

TASK 11: PALEONTOLOGY

Archaeologists use a coordinate grid system when excavating a site. This allows them to easily record the location of artefacts at a site, which simplifies future excavations. If the coordinates (in cm) of the top and bottom of the arm bone of this dinosaur skeleton are (6.2, 22.3) and (9.1, 11.8), find the length of the arm bone, rounded to the nearest tenth of a centimetre. (Assume that the arm bone is perfectly straight).

TASK 11 Reflection: Just by reading this task, do you feel motivated to solve it?
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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

we have learned this recently and I feel that I can solve it easily using the distance formula.

TASK 12: GREAT BLUE HOLE TASK

When faced with the problem of trying to breathe underwater, ocean explorer, Jacques Cousteau, designed an underwater breathing apparatus called the Aqualung. It was the precursor of today's scuba gear and allowed Cousteau to explore places that had never been seen before. In 1972, he explored the Great Blue Hole, a cylindrical formation in Belize which began forming over 70 million years ago. The great Blue Hole has a depth of roughly 125 m. If there is 9132700 m^3 of water in the Great Blue Hole, find its radius. Round your answer to the nearest tenth. (Volume of cylinder = $\pi r^2 h$).

TASK 12 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Too Much text.

TASK 13: CURRENCY CONVERSION TASK

Claudia lives in Canada. She is planning a holiday to Norway. She exchanges 2000 CAD into Norwegian kroners at a rate of 1 CAD = 6.99 CAD.

1. Calculate how many Norwegian Kroners she receives.
2. Before she even leaves Canada, Claudia becomes ill and has to cancel her holiday. She sells the Norwegian Kroners back to the bank at a rate of 1 NOK = 0.12 CAD. Calculate how many Canadian Dollars she receives.
3. Determine how much money the bank makes from the two transactions.
4. Calculate Claudia's loss as percentage of her original 2000 CAD.

TASK 13 Reflection: Just by reading this task, do you feel motivated to solve it?
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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

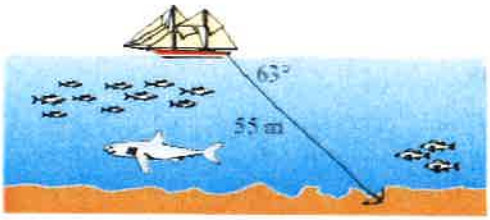
Write a short explanation below why you felt that way.

clear information.

Seems simple.

TASK 14: WHERE THE ANCHOR LIES

A boat has an anchor rope length of 55 m. The boat drifts with the ocean current so that the rope makes an angle of 63 degrees with the surface of the water. Find the depth of the water at the position where the anchor lies at the bottom.



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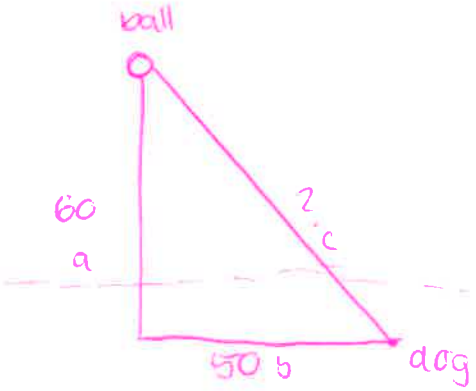
Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

diagram is not clear and i would rather have a question made on the diagram for what we need to find.

Solution 1: TASK 3.



$a^2 + 5^2 = c^2$

$60^2 + 50^2 = c^2$

$3600 + 2500 = c^2$

$6100 = c^2$

$\sqrt{6100} = c$

$4 \times 78.102 = c$

$312.408 = c$

~~50 + 60 = 110~~

$= 50 + 60 \times 4$

$= 50 + 240$

$= 290$

It is smarter to run along the bank first then it is to swim directly across.

Solution 2: TASK 7.

3374

$$\begin{array}{r} 337 \\ -\quad 8 \\ \hline 329 \end{array}$$

$$\begin{array}{r} 32 \\ -\ 18 \\ \hline 14 \end{array}$$

yes, $7 \times 2 = 14$.

(14)

TASK RATING QUESTIONNAIRE

PART A: Please read and try to understand the following mathematical tasks. There are 14 of them below. After reading the task, rate the task on the degree to which you find it motivating or engaging. Then explain the reasons for why you thought it was so in the space provided. There is no right or wrong answer on this, it is important to indicate just how you feel about them.

TASK NUMBER 1: UNIT MAKES DIFFERENCE

In 1983, an Air Canada flight ran out of fuel halfway through its journey due to a mix-up between pounds and kilograms. The plane needed 22300 kg of fuel for the journey. There were 7682 litres of fuel already in the tanks.

a. One litre of jet fuel has a mass of 0.803 kg. Calculate how much fuel should have been loaded. Give your answer in litres.

b. Instead of 0.803 kg per litre, a conversion of 1.77 was used. (One litre of jet fuel has a mass of 1.77 pounds). Calculate how much fuel was actually loaded. Give your answer in litres.

c. Find how many litres short of fuel the plane was.

TASK 1 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4)-------(5) Very motivated

Write a short explanation below why you felt that way.

I feel that this task was pretty motivating because it gives you a lot of information to work with, has multiple answers and has a visual

TASK 2: THE MAGIC SQUARES

Show that each square is a magic square by showing that the rows, columns and the diagonals all have the same sum.

2x-2y	-x+3y	2x-y
x + y	x	x-y
y	3x-3y	2y

3y-2x	-x-5y	6x+2y
9x-y	x	y-7x
-4x-2y	3x+5y	4x-3y

TASK 2 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

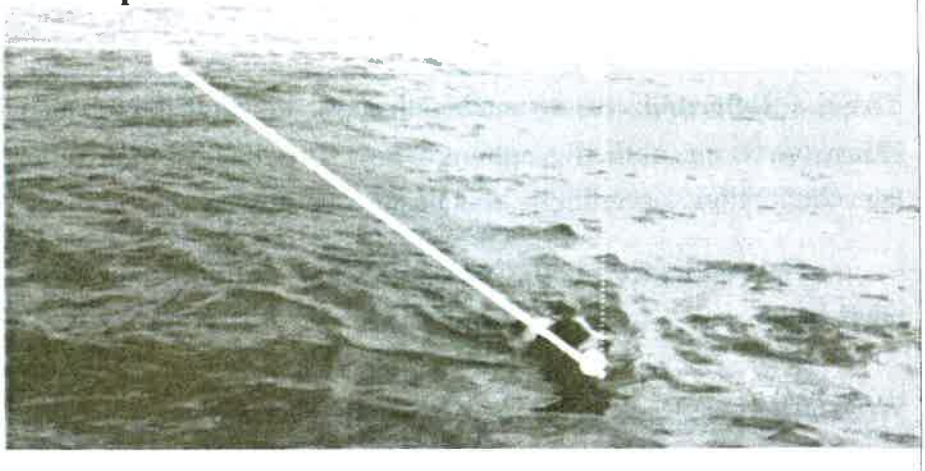
Too many numbers, too much to work with.

Think many people would find this hard to read/interperet.

Genrally too tiring

TASK 3: APACHE THE BORDER COLLIE

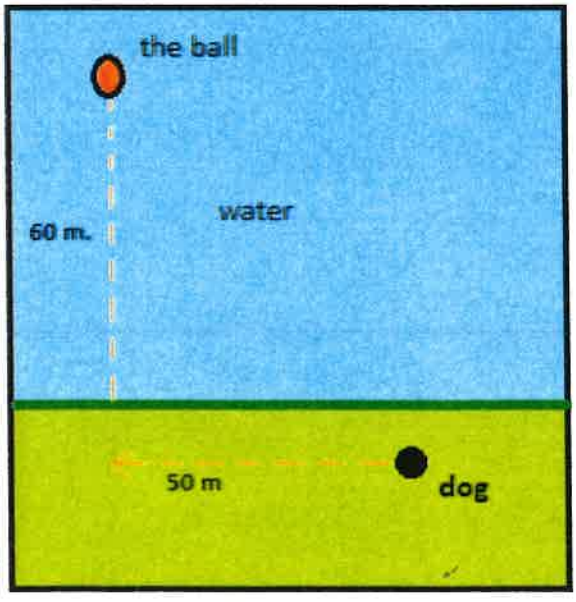
Apache the border Collie



In 2001, Ian Forbes from Edinburgh wrote, in the journal *MicroMath*:

I have a 2-year-old dog, a Border collie named Apache and after a year of avoiding deep water she recently met three Labradors at the local lake. These dogs love to swim and I named them the "submarine brigade" because of their ability to dive straight in and swim after the ball. After meeting them, Apache quickly took to swimming, but being a dog with 'brains,' she discovered that she could beat the rest by running along the bank and then diving in.
The situation is like this: The Labradors jump immediately in the water and swim straight to the ball. Apache runs for about 50 m along the bank and then jumps to swim to the ball. Why would Apache run 50 m and then have the shortest distance for swimming? Is Apache really smart?

Please note that one meter of swimming takes four meters of running in time.)



Please explain your solution.

TASK 3 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Fun topic, easy numbers, looks more fun

TASK 4: A4 PUZZLE

Take two sheets of A4 size paper. Roll one into a short cylinder and the other into a tall cylinder. Does one hold more than the other?

Please explain your answer and show your work.

Depends on the width. But technically, the taller cylinder will be slimmer and the shorter the thicker meaning they will hold the same, depending on the width

TASK 4 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

This one isn't very interesting but it is very simple, meaning I would be more motivated to do the easier or more simple ones with less calculations and complications

TASK 5: PERCENTAGES

Find the unknowns: X, Y, Z.

S.No	Name of the item	Marked Price	Selling Price	Discount
i)	Book	225 kr	X	8%
ii)	LED TV	Y	11970 kr	5%
iii)	Digital clock	750 kr	615 kr	Z

Show your work here.

i.

ii.

iii.

TASK 5 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

A little bit boring, but percentages is something we learned a while ago and it is motivational to do things that are in the core of your knowledge, something you know very well.

TASK 6: LOGICAL REASONING

Your friend says she passes a field every day on the way to school, and each day, without exception, she sees **a farmer wearing a straw hat feeding a carrot to a brown horse.** Look at the following general statements and rank them in order from most likely to be true to least likely to be true.

- *The horse never eats anything but carrots.*
- *The farmer feeds the horse only on school days.*
- *The farmer is the only person who feeds the house.*
- *Your friend never walks to school.*
- *The farmer always wears a hat.*
- *The horse is not a racing horse.*
- *Your friend travels to school at the same time every day.*

- Your friend travels to school at the same time erery day
- ~~The horse is not~~ The farmer is the only person who feeds the horse
~~The horse is not a racing~~
- The farmer always wears a hat
- The horse is not a racing horse
- The horse rever eats anything but carrots
- Your friend never walks to school
- the farmer only feeds the horse on school days

TASK 6 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Motivational because there aren't numbers involved, it looks simple and is easy.

TASK 7: DIVISIBLE BY 7

Is **3843** evenly divisible by 7? To see if a number is evenly divisible by 7, remove the units digit of the number, double the removed digit and subtract the doubled amount from the remaining number. If the result is evenly divisible by 7, then the original number is also divisible by 7. The method may need to be repeated several times.

3843 remove the units digit, 3, leaving 384:

384
-6 subtract the doubled number 3

378 remove the units digit, 8, leaving 37:

37
-16 subtract the doubled number 8

21 This is a multiple of 7, so 3843 is evenly divisible by 7.

This is a specific example that works with the method described.
Use the above method to check whether 3374 is evenly divisible by 7

TASK 7 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4)-------(5) Very motivated

Write a short explanation below why you felt that way.

Many steps, looks fun to work out the problem

.

TASK 8: LOGICAL REASONING

Stuart has a 330 mL bottle of orange juice. He thinks he can pour it all into his glass, which is a cylinder with diameter 7 cm and height 8 cm. Stuart's friend Patrick thinks the glass will overflow. Answer the following questions.

a. Will Stuart's glass overflow?
b. If the glass was full, what volume of fluid would it contain.

Show your work here.

TASK 8 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

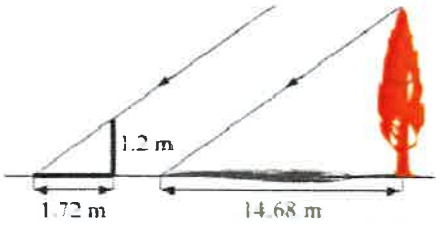
Task that is fun math. working with cm etc. I like visuals and multiple answer/ questions with steps (a, b, c)

TASK 9: LOGICAL REASONING

Dean needs to accurately find the height of a tree in his garden. Local Council regulations prohibit the growth of garden trees beyond 20 m. They argue that in storm conditions falling branches and uprooted large trees are dangers to houses and lives. As Dean cannot climb the tree, he decides to use shadows to help solve the problem. On a windless sunny day, he stands a 1.2 m stick vertically on the ground. The length of the stick's shadow is 1.72 m and at the same time, the tree's shadow measures 14.68 m.

Using the diagram to estimate:

- The height of the tree
- The angle of elevation of the sun (the angle that the sun's rays make with the horizontal ground



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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Not a fan of shapes, triangles etc.
But still an easy task where we know how to solve

TASK 10: HEARTBEAT

The average person's heart beats 70 times per minute. It can be shown that the average person's heart beats 2.57 billion times in a lifetime.

a. According to this information, how long is the average life span?

b. What assumptions have to be made to solve this problem? How do they affect your answer to part **a?**

Show your work and explain.

TASK 10 Reflection: Just by reading this task, do you feel motivated to solve it?
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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

More of a theoretical answer, have to think about "assumption" etc.
Question is open and interesting

TASK 11: PALEONTOLOGY

Archaeologists use a coordinate grid system when excavating a site. This allows them to easily record the location of artefacts at a site, which simplifies future excavations. If the coordinates (in cm) of the top and bottom of the arm bone of this dinosaur skeleton are (6.2, 22.3) and (9.1, 11.8), find the length of the arm bone, rounded to the nearest tenth of a centimetre. (Assume that the arm bone is perfectly straight).

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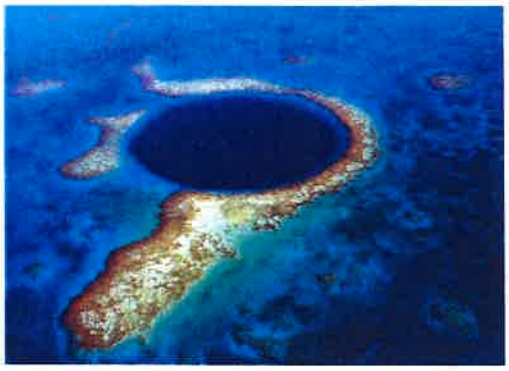
Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

coordinates & which we have learned about
interesting because we can use the
math / think about it in a real life setting

TASK 12: GREAT BLUE HOLE TASK

When faced with the problem of trying to breathe underwater, ocean explorer, Jacques Cousteau, designed an underwater breathing apparatus called the Aqualung. It was the precursor of today's scuba gear and allowed Cousteau to explore places that had never been seen before. In 1972, he explored the Great Blue Hole, a cylindrical formation in Belize which began forming over 70 million years ago. The great Blue Hole has a depth of roughly 125 m. If there is 9132700 m^3 of water in the Great Blue Hole, find its radius. Round your answer to the nearest tenth. (Volume of cylinder = $\pi r^2 h$).



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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Interesting because of the exploration

but too complicated

TASK 13: CURRENCY CONVERSION TASK

Claudia lives in Canada. She is planning a holiday to Norway. She exchanges 2000 CAD into Norwegian kroners at a rate of 1 CAD = 6.99 CAD.

1. Calculate how many Norwegian Kroners she receives.
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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Easy calculations, decimals are fun,

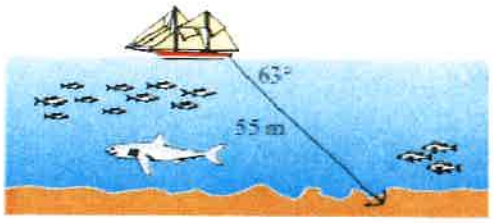
~~too little~~

~~more variations~~

→ good to have a specific Problem

TASK 14: WHERE THE ANCHOR LIES

A boat has an anchor rope length of 55 m. The boat drifts with the ocean current so that the rope makes an angle of 63 degrees with the surface of the water. Find the depth of the water at the position where the anchor lies at the bottom.



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Not motivated at all (1) ------- (2) ------- (3) ------- (4) ------- (5) Very motivated

Write a short explanation below why you felt that way.

Visual, ~~fun because it's something to watch~~ ~~cut in a fun~~

easy to do, fun question

Solution 1:

Solution 2: Task 7

3374 ÷ 7

→ 337~~4~~

3 37 - 8 ⟶ 4 × 2 = 8

=

329

→ 32~~9~~

32 - 18 ⟶ 9 × 2 = 18

= 14

14 is a multiple of 7

15

TASK RATING QUESTIONNAIRE

PART A: Please read and try to understand the following mathematical tasks. There are 14 of them below. After reading the task, rate the task on the degree to which you find it motivating or engaging. Then explain the reasons for why you thought it was so in the space provided. There is no right or wrong answer on this, it is important to indicate just how you feel about them.

TASK NUMBER 1: UNIT MAKES DIFFERENCE

In 1983, an Air Canada flight ran out of fuel halfway through its journey due to a mix-up between pounds and kilograms. The plane needed 22300 kg of fuel for the journey. There were 7682 litres of fuel already in the tanks.

a. One litre of jet fuel has a mass of 0.803 kg. Calculate how much fuel should have been loaded. Give your answer in litres.

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Not motivated at all (1) ------- (2) -------(③) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I feel like it is in the midle of the motivation scale. Because it can feel like it is a bit hard

TASK 2: THE MAGIC SQUARES

Show that each square is a magic square by showing that the rows, columns and the diagonals all have the same sum.

2x-2y	-x+3y	2x-y
x + y	x	x-y
y	3x-3y	2y

3y-2x	-x-5y	6x+2y
9x-y	x	y-7x
-4x-2y	3x+5y	4x-3y

TASK 2 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

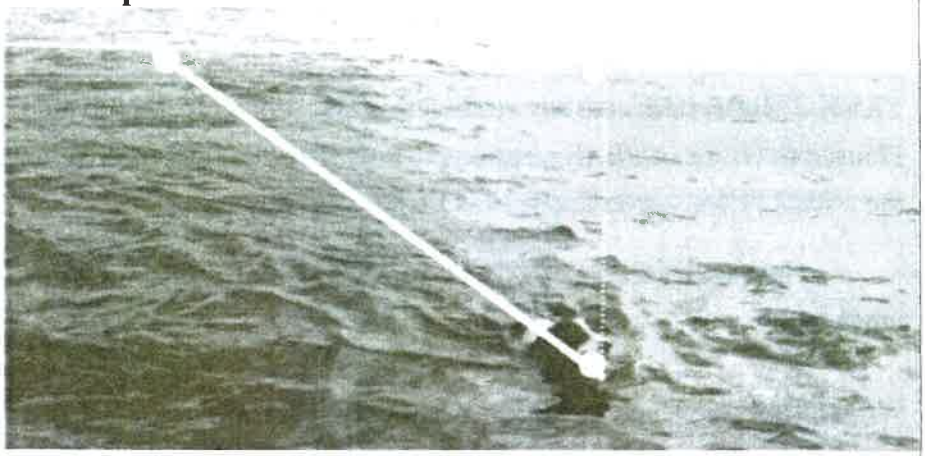
Not motivated at all (1) ------- (2) -------(3) -------((4)) -------(5) Very motivated

Write a short explanation below why you felt that way.

it looks easy and not to hard and it can be easly understood

TASK 3: APACHE THE BORDER COLLIE

Apache the border Collie



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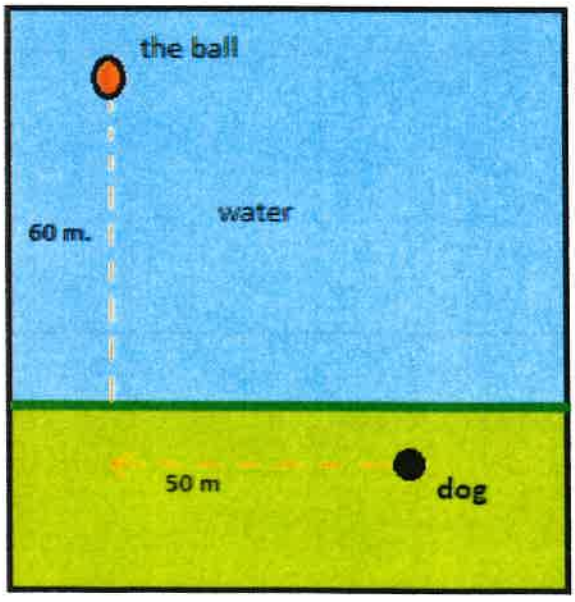
Please note that one meter of swimming takes four meters of running in time.)



Please explain your solution.

TASK 3 Reflection: Just by reading this task, do you feel motivated to solve it?
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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

It has animals and animals are motivating for some people.
You can understand this easy too

TASK 4: A4 PUZZLE

Take two sheets of A4 size paper. Roll one into a short cylinder and the other into a tall cylinder. Does one hold more than the other?

Please explain your answer and show your work.

TASK 4 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

This is something you have/do not have to write down and you can move a little bit

TASK 5: PERCENTAGES

Find the unknowns: X, Y, Z.

S.No	Name of the item	Marked Price	Selling Price	Discount
i)	Book	225 kr	X	8%
ii)	LED TV	Y	11970 kr	5%
iii)	Digital clock	750 kr	615 kr	Z

Show your work here.

i.

ii.

iii.

TASK 5 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(③) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

It is too cramped and it is hard to understand. you have to think way more and you dont just start the task

TASK 6: LOGICAL REASONING

Your friend says she passes a field every day on the way to school, and each day, without exception, she sees **a farmer wearing a straw hat feeding a carrot to a brown horse**. Look at the following general statements and rank them in order from most likely to be true to least likely to be true.

- *The horse never eats anything but carrots.*
- *The farmer feeds the horse only on school days.*
- *The farmer is the only person who feeds the ~~horse~~ horse.*
- *Your friend never walks to school.*
- *The farmer always wears a hat.*
- *The horse is not a racing horse.*
- *Your friend travels to school at the same time every day.*

TASK 6 Reflection: Just by reading this task, do you feel motivated to solve it?
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Not motivated at all (1) ------- (2) -------(3) -------(④) -------(5) Very motivated

Write a short explanation below why you felt that way.

Again has animals and it is easy to understand.

TASK 7: DIVISIBLE BY 7

Is **3843** evenly divisible by 7? To see if a number is evenly divisible by 7, remove the units digit of the number, double the removed digit and subtract the doubled amount from the remaining number. If the result is evenly divisible by 7, then the original number is also divisible by 7. The method may need to be repeated several times.

3843 remove the units digit, 3, leaving 384:

384
-6 subtract the doubled number 3

378 remove the units digit, 8, leaving 37:

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21 This is a multiple of 7, so 3843 is evenly divisible by 7.

This is a specific example that works with the method described.
Use the above method to check whether 3374 is evenly divisible by 7

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Not motivated at all (1) ------- (2) -------(3) -------(④) -------(5) Very motivated

Write a short explanation below why you felt that way.

Seems easy and easy to understand. Like that there are examples of how to solve it

.

TASK 8: LOGICAL REASONING

Stuart has a 330 mL bottle of orange juice. He thinks he can pour it all into his glass, which is a cylinder with diameter 7 cm and height 8 cm. Stuart's friend Patrick thinks the glass will overflow. Answer the following questions.

a. Will Stuart's glass overflow?
b. If the glass was full, what volume of fluid would it contain.

Show your work here.

TASK 8 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

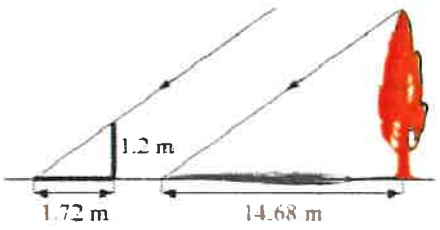
It was a bit hard to understand

TASK 9: LOGICAL REASONING

Dean needs to accurately find the height of a tree in his garden. Local Council regulations prohibit the growth of garden trees beyond 20 m. They argue that in storm conditions falling branches and uprooted large trees are dangers to houses and lives. As Dean cannot climb the tree, he decides to use shadows to help solve the problem. On a windless sunny day, he stands a 1.2 m stick vertically on the ground. The length of the stick's shadow is 1.72 m and at the same time, the tree's shadow measures 14.68 m.

Using the diagram to estimate:

- The height of the tree
- The angle of elevation of the sun (the angle that the sun's rays make with the horizontal ground



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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I felt like he should have measured it another way and not by shadows but maby by his height

TASK 10: HEARTBEAT

The average person's heart beats 70 times per minute. It can be shown that the average person's heart beats 2.57 billion times in a lifetime.

a. According to this information, how long is the average life span?

b. What assumptions have to be made to solve this problem? How do they affect your answer to part **a?**

Show your work and explain.

TASK 10 Reflection: Just by reading this task, do you feel motivated to solve it?
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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

It feels like its not just math but also science.
it also feels easy to solve

TASK 11: PALEONTOLOGY

Archaeologists use a coordinate grid system when excavating a site. This allows them to easily record the location of artefacts at a site, which simplifies future excavations. If the coordinates (in cm) of the top and bottom of the arm bone of this dinosaur skeleton are (6.2, 22.3) and (9.1, 11.8), find the length of the arm bone, rounded to the nearest tenth of a centimetre. (Assume that the arm bone is perfectly straight).

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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

we can "esali" find it you have to think a bit but thats okay

TASK 12: GREAT BLUE HOLE TASK

When faced with the problem of trying to breathe underwater, ocean explorer, Jacques Cousteau, designed an underwater breathing apparatus called the Aqualung. It was the precursor of today's scuba gear and allowed Cousteau to explore places that had never been seen before. In 1972, he explored the Great Blue Hole, a cylindrical formation in Belize which began forming over 70 million years ago. The great Blue Hole has a depth of roughly 125 m. If there is 9132700 m^3 of water in the Great Blue Hole, find its radius. Round your answer to the nearest tenth. (Volume of cylinder = $\pi r^2 h$).

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Write a short explanation below why you felt that way.

It is a lot of text the picture is cool and might be a bit motevating

TASK 13: CURRENCY CONVERSION TASK

Claudia lives in Canada. She is planning a holiday to Norway. She exchanges 2000 CAD into Norwegian kroners at a rate of 1 CAD = 6.99 CAD.

1. Calculate how many Norwegian Kroners she receives.
2. Before she even leaves Canada, Claudia becomes ill and has to cancel her holiday. She sells the Norwegian Kroners back to the bank at a rate of 1 NOK = 0.12 CAD. Calculate how many Canadian Dollars she receives.
3. Determine how much money the bank makes from the two transactions.
4. Calculate Claudia's loss as percentage of her original 2000 CAD.

TASK 13 Reflection: Just by reading this task, do you feel motivated to solve it?
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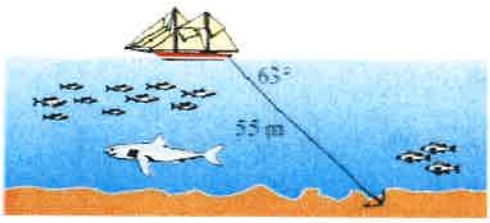
Not motivated at all (1) ------- (2) -------(3) -------(④) -------(5) Very motivated

Write a short explanation below why you felt that way.

It has four small tanks in one end little height

TASK 14: WHERE THE ANCHOR LIES

A boat has an anchor rope length of 55 m. The boat drifts with the ocean current so that the rope makes an angle of 63 degrees with the surface of the water. Find the depth of the water at the position where the anchor lies at the bottom.



TASK 14 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

It is little Debrest and the picture gives.

Solution 1: Task 6

- Your friend travels to school at the same time every day
- The farmer always wears a hat
- The farmer is the only one who feeds the horse
- The horse never eats anything but carrots
- The horse is not a racing horse
- The farmer only feeds the horse on school days
- Your friend never walks to school

Solution 2: 7

3347 take away the unit 7 leaving 334

334
-14 Dubble 7 then substract it
320 remove the unit 8 0 leaving 32

32 remove the substracted number

16

TASK RATING QUESTIONNAIRE

PART A: Please read and try to understand the following mathematical tasks. There are 14 of them below. After reading the task, rate the task on the degree to which you find it motivating or engaging. Then explain the reasons for why you thought it was so in the space provided. There is no right or wrong answer on this, it is important to indicate just how you feel about them.

TASK NUMBER 1: UNIT MAKES DIFFERENCE

In 1983, an Air Canada flight ran out of fuel halfway through its journey due to a mix-up between pounds and kilograms. The plane needed 22300 kg of fuel for the journey. There were 7682 litres of fuel already in the tanks.

a. One litre of jet fuel has a mass of 0.803 kg. Calculate how much fuel should have been loaded. Give your answer in litres.

b. Instead of 0.803 kg per litre, a conversion of 1.77 was used. (One litre of jet fuel has a mass of 1.77 pounds). Calculate how much fuel was actually loaded. Give your answer in litres.

c. Find how many litres short of fuel the plane was.

TASK 1 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1)------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I don't know how to transfer kg to L or L to kg.

TASK 2: THE MAGIC SQUARES

Show that each square is a magic square by showing that the rows, columns and the diagonals all have the same sum.

2x-2y	-x+3y	2x-y
x + y	x	x-y
y	3x-3y	2y

3y-2x	-x-5y	6x+2y
9x-y	x	y-7x
-4x-2y	3x+5y	4x-3y

TASK 2 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

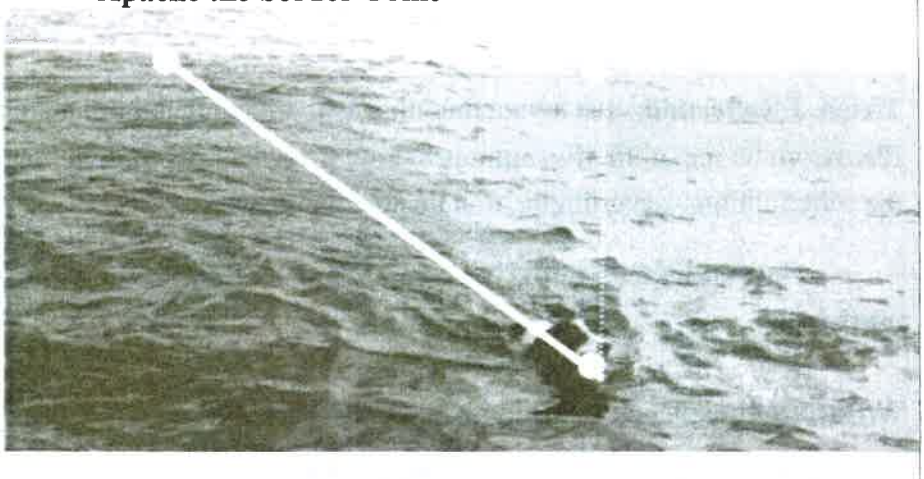
Not motivated at all (1) -------(2)-------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

It looks confusing and doesn't make sense to me.

TASK 3: APACHE THE BORDER COLLIE

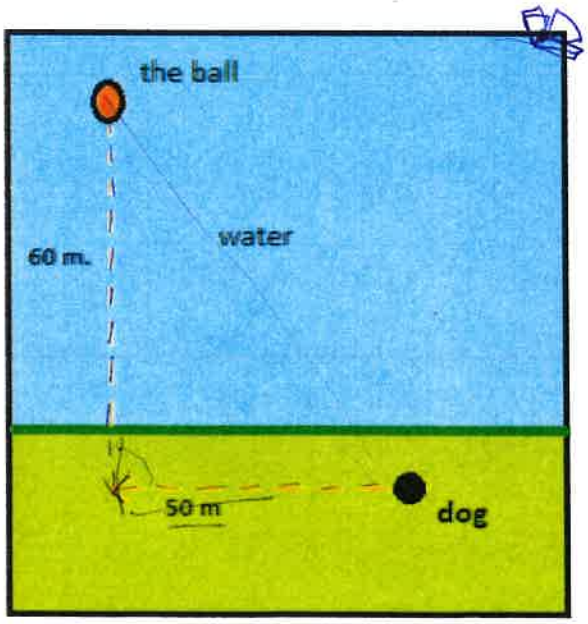
Apache the border Collie



In 2001, Ian Forbes from Edinburgh wrote, in the journal *MicroMath*:

I have a 2-year-old dog, a Border collie named Apache and after a year of avoiding deep water she recently met three Labradors at the local lake. These dogs love to swim and I named them the "submarine brigade" because of their ability to dive straight in and swim after the ball. After meeting them, Apache quickly took to swimming, but being a dog with 'brains,' she discovered that she could beat the rest by running along the bank and then diving in.
The situation is like this: The Labradors jump immediately in the water and swim straight to the ball. Apache runs for about 50 m along the bank and then jumps to swim to the ball. Why would Apache run 50 m and then have the shortest distance for swimming? Is Apache really smart?

Please note that one meter of swimming takes four meters of running in time.)



$60^2 + 50^2 = *C^2$

$3600 + 2500 = C^2$

$3600 + 2500 = 6100$

$\sqrt{6100} = 78.10$

$78.10 \times 4 = 312.4$

Please explain your solution.

TASK 3 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Looks easy and interesting.

TASK 4: A4 PUZZLE

Take two sheets of A4 size paper. Roll one into a short cylinder and the other into a tall cylinder. Does one hold more than the other?

Please explain your answer and show your work.

TASK 4 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Sounds simple but also hard to prove

TASK 5: PERCENTAGES

Find the unknowns: X, Y, Z.

S.No	Name of the item	Marked Price	Selling Price	Discount
i)	Book 225 kr	X	8%	
ii)	LED TV	Y	11970 kr	5%
iii)	Digital clock	750 kr	615 kr	Z

Show your work here.

i.

ii.

iii.

TASK 5 Reflection: Just by reading this task, do you feel motivated to solve it?
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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

confusing

TASK 6: LOGICAL REASONING

Your friend says she passes a field every day on the way to school, and each day, without exception, she sees **a farmer wearing a straw hat feeding a carrot to a brown horse.** Look at the following general statements and rank them in order from most likely to be true to least likely to be true.

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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Eagy to answer

TASK 7: DIVISIBLE BY 7

Is **3843** evenly divisible by 7? To see if a number is evenly divisible by 7, remove the units digit of the number, double the removed digit and subtract the doubled amount from the remaining number. If the result is evenly divisible by 7, then the original number is also divisible by 7. The method may need to be repeated several times.

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This is a specific example that works with the method described.
Use the above method to check whether 3374 is evenly divisible by 7

TASK 7 Reflection: Just by reading this task, do you feel motivated to solve it?
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Not motivated at all **(1)** ------ **(2)** -------**(3)** -------**(4)** -------**(5) Very motivated**

Write a short explanation below why you felt that way.

Just use calculator ???

TASK 8: LOGICAL REASONING

Stuart has a 330 mL bottle of orange juice. He thinks he can pour it all into his glass, which is a cylinder with diameter 7 cm and height 8 cm. Stuart's friend Patrick thinks the glass will overflow. Answer the following questions.

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Show your work here.

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Write a short explanation below why you felt that way.

I don't know how to solve it.

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Dean needs to accurately find the height of a tree in his garden. Local Council regulations prohibit the growth of garden trees beyond 20 m. They argue that in storm conditions falling branches and uprooted large trees are dangers to houses and lives. As Dean cannot climb the tree, he decides to use shadows to help solve the problem. On a windless sunny day, he stands a 1.2 m stick vertically on the ground. The length of the stick's shadow is 1.72 m and at the same time, the tree's shadow measures 14.68 m.

Using the diagram to estimate:

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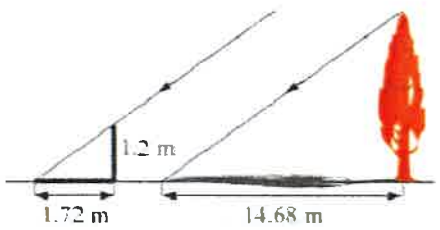

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Not motivated at all (1) ------- (2) -------(3) -------(4)-------(5) Very motivated

Write a short explanation below why you felt that way.

Sounds interesting but, confusing.

TASK 10: HEARTBEAT

The average person's heart beats 70 times per minute. It can be shown that the average person's heart beats 2.57 billion times in a lifetime.

a. According to this information, how long is the average life span?

b. What assumptions have to be made to solve this problem? How do they affect your answer to part **a?**

Show your work and explain.

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Write a short explanation below why you felt that way.

confusing.

TASK 12: GREAT BLUE HOLE TASK

When faced with the problem of trying to breathe underwater, ocean explorer, Jacques Cousteau, designed an underwater breathing apparatus called the Aqualung. It was the precursor of today's scuba gear and allowed Cousteau to explore places that had never been seen before. In 1972, he explored the Great Blue Hole, a cylindrical formation in Belize which began forming over 70 million years ago. The great Blue Hole has a depth of roughly 125 m. If there is 9132700 m^3 of water in the Great Blue Hole, find its radius. Round your answer to the nearest tenth. (Volume of cylinder = $\pi r^2 h$).

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Write a short explanation below why you felt that way.

complicated

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Claudia lives in Canada. She is planning a holiday to Norway. She exchanges 2000 CAD into Norwegian kroners at a rate of 1 CAD = 6.99 CAD.

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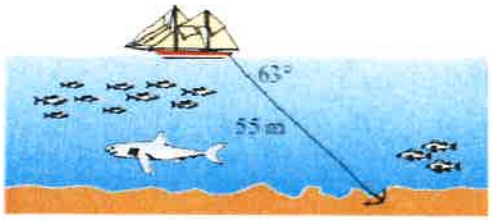
Not motivated at all **(1)** ------- **(2)** -------**(3)** -------**(4)** -------**(5) Very motivated**

Write a short explanation below why you felt that way.

Not interested

TASK 14: WHERE THE ANCHOR LIES

A boat has an anchor rope length of 55 m. The boat drifts with the ocean current so that the rope makes an angle of 63 degrees with the surface of the water. Find the depth of the water at the position where the anchor lies at the bottom.



TASK 14 Reflection: Just by reading this task, do you feel motivated to solve it?
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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

not interested

Solution 1: Task 3

$a^2 + 5^2 = c^2$

$50^2 + 60^2 = c^2$

$2500 + 3600 = c^2$

$2500 + 3600 = 6100$

$\sqrt{6100} = 78.10$

$78.10 \times 4 = 312.4$

$50 + 60 = 110$

312 is longer than 110 therefore ~~it~~ takes longer to get to the ball.

The dog is smart because it chose the shortest option.

Solution 2: Task 6

option seven (7) is correct

Because the farmer gives the horse food everytime she goes to school and he probably has a schedule for food. This means she walks past everytime it's time for the horse to eat.

17

TASK RATING QUESTIONNAIRE

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a. One litre of jet fuel has a mass of 0.803 kg. Calculate how much fuel should have been loaded. Give your answer in litres.

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Not motivated at all (1) ------- (2) -------(3) -------((4)) -------(5) Very motivated

Write a short explanation below why you felt that way.

Takes into account something I'm curious about.

TASK 2: THE MAGIC SQUARES

Show that each square is a magic square by showing that the rows, columns and the diagonals all have the same sum.

2x-2y	-x+3y	2x-y
x + y	x	x-y
y	3x-3y	2y

3y-2x	-x-5y	6x+2y
9x-y	x	y-7x
-4x-2y	3x+5y	4x-3y

TASK 2 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

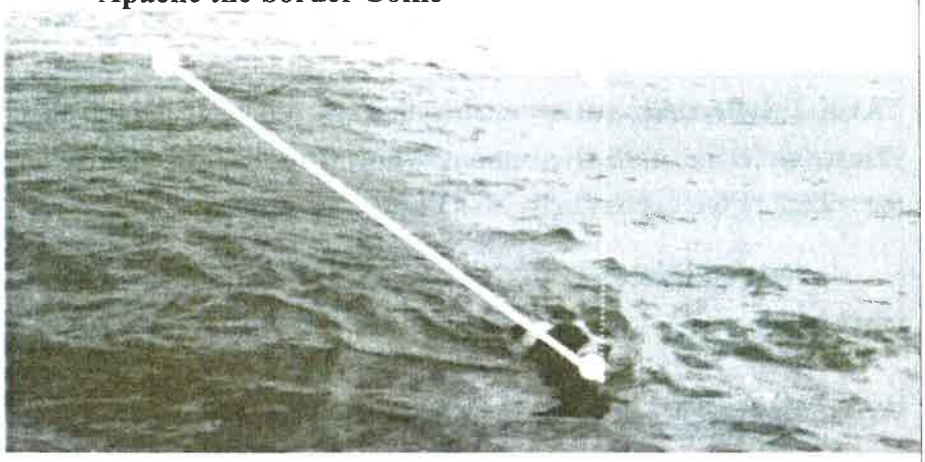
Not motivated at all (①) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

The question gives little context and information and I don't understand it.

TASK 3: APACHE THE BORDER COLLIE

Apache the border Collie



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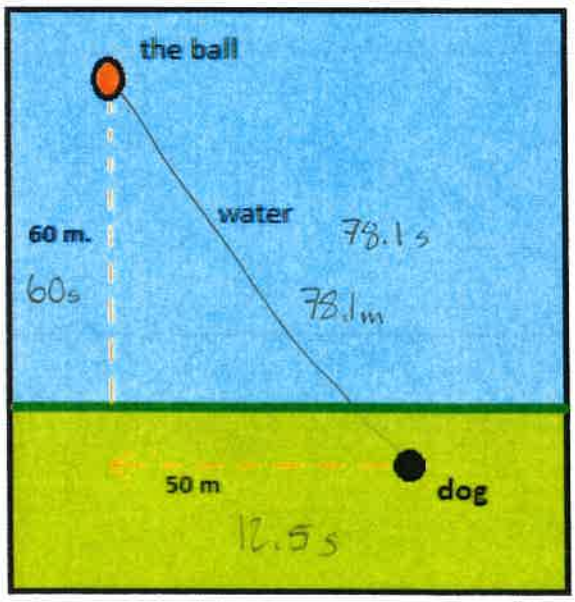
I have a 2-year-old dog, a Border collie named Apache and after a year of avoiding deep water she recently met three Labradors at the local lake. These dogs love to swim and I named them the "submarine brigade" because of their ability to dive straight in and swim after the ball. After meeting them, Apache quickly took to swimming, but being a dog with 'brains,' she discovered that she could beat the rest by running along the bank and then diving in.
The situation is like this: The Labradors jump immediately in the water and swim straight to the ball. Apache runs for about 50 m along the bank and then jumps to swim to the ball. Why would Apache run 50 m and then have the shortest distance for swimming? Is Apache really smart?

Please note that one meter of swimming takes four meters of running in time.)



Please explain your solution.

TASK 3 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(⑤) Very motivated

Write a short explanation below why you felt that way.

The question is well explained and the topic is very liteable.

TASK 4: A4 PUZZLE

Take two sheets of A4 size paper. Roll one into a short cylinder and the other into a tall cylinder. Does one hold more than the other?

Please explain your answer and show your work.

TASK 4 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(③) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

The question is relevant, however it requires or seems to require a lot of calculations.

TASK 5: PERCENTAGES

Find the unknowns: X, Y, Z.

S.No	Name of the item	Marked Price	Selling Price	Discount
i)	Book	225 kr	X	8%
ii)	LED TV	Y	11970 kr	5%
iii)	Digital clock	750 kr	615 kr	Z

Show your work here.

i.

ii.

iii.

TASK 5 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

The question is very messy and confusing. It as well doesn't tell me what I need to do.

TASK 6: LOGICAL REASONING

Your friend says she passes a field every day on the way to school, and each day, without exception, she sees **a farmer wearing a straw hat feeding a carrot to a brown horse**. Look at the following general statements and rank them in order from most likely to be true to least likely to be true.

- *The horse never eats anything but carrots.*
- *The farmer feeds the horse only on school days.*
- *The farmer is the only person who feeds the house.*
- *Your friend never walks to school.*
- *The farmer always wears a hat.*
- *The horse is not a racing horse.*
- *Your friend travels to school at the same time every day.*

TASK 6 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(③) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

This question requires no mathematics to be completed but is easily understood.

TASK 7: DIVISIBLE BY 7

Is **3843** evenly divisible by 7? To see if a number is evenly divisible by 7, remove the units digit of the number, double the removed digit and subtract the doubled amount from the remaining number. If the result is evenly divisible by 7, then the original number is also divisible by 7. The method may need to be repeated several times.

3843 remove the units digit, 3, leaving 384:

384
-6 subtract the doubled number 3

---

378 remove the units digit, 8, leaving 37:

37
-16 subtract the doubled number 8

---

21 This is a multiple of 7, so 3843 is evenly divisible by 7.

This is a specific example that works with the method described.
Use the above method to check whether 3374 is evenly divisible by 7

TASK 7 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

The question is well ~~#~~ phrased ~~&~~ and includes an example. I also find it interesting how something works that way.

.

TASK 8: LOGICAL REASONING

Stuart has a 330 mL bottle of orange juice. He thinks he can pour it all into his glass, which is a cylinder with diameter 7 cm and height 8 cm. Stuart's friend Patrick thinks the glass will overflow. Answer the following questions.

a. Will Stuart's glass overflow?
b. If the glass was full, what volume of fluid would it contain.

Show your work here.

TASK 8 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(④) -------(5) Very motivated

Write a short explanation below why you felt that way.

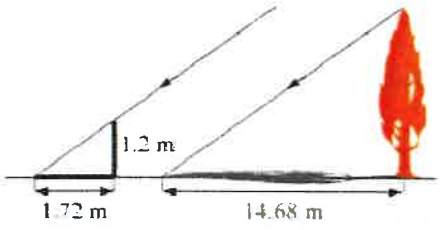
I'd enjoy this question because it tells me what I need to do and the purpose for it, as well as ~~the~~ not being too intimidating of a question

TASK 9: LOGICAL REASONING

Dean needs to accurately find the height of a tree in his garden. Local Council regulations prohibit the growth of garden trees beyond 20 m. They argue that in storm conditions falling branches and uprooted large trees are dangers to houses and lives. As Dean cannot climb the tree, he decides to use shadows to help solve the problem. On a windless sunny day, he stands a 1.2 m stick vertically on the ground. The length of the stick's shadow is 1.72 m and at the same time, the tree's shadow measures 14.68 m.

Using the diagram to estimate:

- The height of the tree
- The angle of elevation of the sun (the angle that the sun's rays make with the horizontal ground



TASK 9 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(④) -------(5) Very motivated

Write a short explanation below why you felt that way.

The question apeals to me because of the mystery, and because it is well phrased. It is also NOT intimidating

TASK 10: HEARTBEAT

The average person's heart beats 70 times per minute. It can be shown that the average person's heart beats 2.57 billion times in a lifetime.

a. According to this information, how long is the average life span?

b. What assumptions have to be made to solve this problem? How do they affect your answer to part **a?**

Show your work and explain.

TASK 10 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

The question is phrased okay and the question is relatively relative.

TASK 11: PALEONTOLOGY

Archaeologists use a coordinate grid system when excavating a site. This allows them to easily record the location of artefacts at a site, which simplifies future excavations. If the coordinates (in cm) of the top and bottom of the arm bone of this dinosaur skeleton are (6.2, 22.3) and (9.1, 11.8), find the length of the arm bone, rounded to the nearest tenth of a centimetre. (Assume that the arm bone is perfectly straight).

TASK 11 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (②) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

The question provides a lot of complicated words and is somewhat clustered in information.

TASK 12: GREAT BLUE HOLE TASK

When faced with the problem of trying to breathe underwater, ocean explorer, Jacques Cousteau, designed an underwater breathing apparatus called the Aqualung. It was the precursor of today's scuba gear and allowed Cousteau to explore places that had never been seen before. In 1972, he explored the Great Blue Hole, a cylindrical formation in Belize which began forming over 70 million years ago. The great Blue Hole has a depth of roughly 125 m. If there is 9132700 m^3 of water in the Great Blue Hole, find its radius. Round your answer to the nearest tenth. (Volume of cylinder = $\pi r^2 h$).

TASK 12 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(④) -------(5) Very motivated

Write a short explanation below why you felt that way.

The question speaks of a relevant and interesting topic while being well phrased.

TASK 13: CURRENCY CONVERSION TASK

Claudia lives in Canada. She is planning a holiday to Norway. She exchanges 2000 CAD into Norwegian kroners at a rate of 1 CAD = 6.99 CAD.

1. Calculate how many Norwegian Kroners she receives.
2. Before she even leaves Canada, Claudia becomes ill and has to cancel her holiday. She sells the Norwegian Kroners back to the bank at a rate of 1 NOK = 0.12 CAD. Calculate how many Canadian Dollars she receives.
3. Determine how much money the bank makes from the two transactions.
4. Calculate Claudia's loss as percentage of her original 2000 CAD.

TASK 13 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

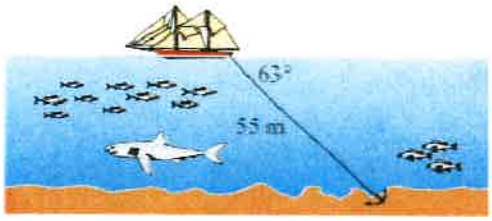
Not motivated at all (1) ------- (2) -------(③) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

There are a lot of steps but they appear to be simple.

TASK 14: WHERE THE ANCHOR LIES

A boat has an anchor rope length of 55 m. The boat drifts with the ocean current so that the rope makes an angle of 63 degrees with the surface of the water. Find the depth of the water at the position where the anchor lies at the bottom.



TASK 14 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(④) -------(5) Very motivated

Write a short explanation below why you felt that way.

The question is structured and easily understood.

Solution 1:

Across Land 1: $\frac{50}{4} = 12.5$ s

Across Land 2: $\frac{60}{1} = 60$ s

$12.5 + 60 = 72.5$ s

Water: $\sqrt{(50^2 + 60^2)} = 78.1 \rightarrow \frac{78.1}{1} \rightarrow 78.1$ s

The dog is smart because it is faster

Solution 2:

3374 → $4 \times 2 = 8$

$= 337 - 8 = 329$ → $9 \times 2 = 18$

$= 32 - 19 = 13$

3374 is not divisible by 4

(18)

TASK RATING QUESTIONNAIRE

PART A: Please read and try to understand the following mathematical tasks. There are 14 of them below. After reading the task, rate the task on the degree to which you find it motivating or engaging. Then explain the reasons for why you thought it was so in the space provided. There is no right or wrong answer on this, it is important to indicate just how you feel about them.

TASK NUMBER 1: UNIT MAKES DIFFERENCE

In 1983, an Air Canada flight ran out of fuel halfway through its journey due to a mix-up between pounds and kilograms. The plane needed 22300 kg of fuel for the journey. There were 7682 litres of fuel already in the tanks.

a. One litre of jet fuel has a mass of 0.803 kg. Calculate how much fuel should have been loaded. Give your answer in litres.

b. Instead of 0.803 kg per litre, a conversion of 1.77 was used. (One litre of jet fuel has a mass of 1.77 pounds). Calculate how much fuel was actually loaded. Give your answer in litres.

c. Find how many litres short of fuel the plane was.

TASK 1 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.
I wrote 2, because I know that I am very bad with different weight units. Therefore I knew it would be difficult for me to answer this question.

TASK 2: THE MAGIC SQUARES

Show that each square is a magic square by showing that the rows, columns and the diagonals all have the same sum.

a.

2x-2y	-x+3y	2x-y
x + y	x	x-y
y	3x-3y	2y

b.

3y-2x	-x-5y	6x+2y
9x-y	x	y-7x
-4x-2y	3x+5y	4x-3y

TASK 2 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

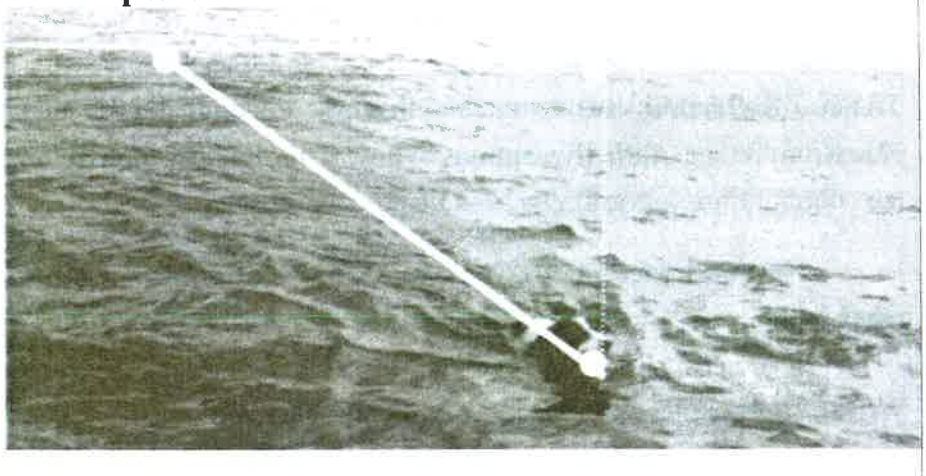
Not motivated at all (1) ------- (2) -------(3) -------(4) -------(⑤) Very motivated

Write a short explanation below why you felt that way.

I chose 5 because it looked like an interesting puzle that would get me thinking. Also, it seemed kinda fun to solve.

TASK 3: APACHE THE BORDER COLLIE

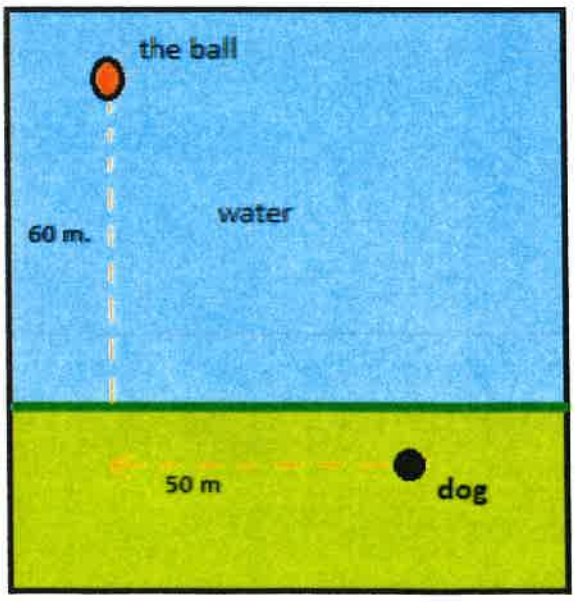
Apache the border Collie



In 2001, Ian Forbes from Edinburgh wrote, in the journal *MicroMath*:

I have a 2-year-old dog, a Border collie named Apache and after a year of avoiding deep water she recently met three Labradors at the local lake. These dogs love to swim and I named them the "submarine brigade" because of their ability to dive straight in and swim after the ball. After meeting them, Apache quickly took to swimming, but being a dog with 'brains,' she discovered that she could beat the rest by running along the bank and then diving in.
The situation is like this: The Labradors jump immediately in the water and swim straight to the ball. Apache runs for about 50 m along the bank and then jumps to swim to the ball. Why would Apache run 50 m and then have the shortest distance for swimming? Is Apache really smart?

Please note that one meter of swimming takes four meters of running in time.)



Please explain your solution.

TASK 3 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I chose 5 because it looked like an easy question to solve. with little requirement for thinking too much

TASK 4: A4 PUZZLE

Take two sheets of A4 size paper. Roll one into a short cylinder and the other into a tall cylinder. Does one hold more than the other?

Please explain your answer and show your work.

TASK 4 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1)) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I chose 1 because it looked really difficult to answer and it feels like it would probably be a waste of time because I dought that I coud solve it within 15 min, without giving up. I don't think the mathematics would be that hard, I just don't remember the formulae for the volumes of cylinders. If I had my mind refreshed and was told the formula again. I think I could probably solve it.

TASK 5: PERCENTAGES

Find the unknowns: X, Y, Z.

S.No	Name of the item	Marked Price	Selling Price	Discount
i)	Book 225 kr	X	8%	
ii)	LED TV	Y	11970 kr	5%
iii)	Digital clock	750 kr	615 kr	Z

Show your work here.

i.

ii.

iii.

TASK 5 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

by the initial look of the task it seemed to confusing.

TASK 6: LOGICAL REASONING

Your friend says she passes a field every day on the way to school, and each day, without exception, she sees **a farmer wearing a straw hat feeding a carrot to a brown horse**. Look at the following general statements and rank them in order from most likely to be true to least likely to be true.

- *The horse never eats anything but carrots.*
- *The farmer feeds the horse only on school days.*
- *The farmer is the only person who feeds the house.*
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- *The farmer always wears a hat.*
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TASK 6 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

looks simple and easy, a bit boring because it doesn't require as much thinking as ~~other~~ some of the other questions.

TASK 7: DIVISIBLE BY 7

Is **3843** evenly divisible by 7? To see if a number is evenly divisible by 7, remove the units digit of the number, double the removed digit and subtract the doubled amount from the remaining number. If the result is evenly divisible by 7, then the original number is also divisible by 7. The method may need to be repeated several times.

3843 remove the units digit, 3, leaving 384:

384
-6 subtract the doubled number 3

378 remove the units digit, 8, leaving 37:

37
-16 subtract the doubled number 8

21 This is a multiple of 7, so 3843 is evenly divisible by 7.

This is a specific example that works with the method described.
Use the above method to check whether 3374 is evenly divisible by 7

TASK 7 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.
looks like fun and not too hard to solve.

.

TASK 8: LOGICAL REASONING

Stuart has a 330 mL bottle of orange juice. He thinks he can pour it all into his glass, which is a cylinder with diameter 7 cm and height 8 cm. Stuart's friend Patrick thinks the glass will overflow. Answer the following questions.

a. Will Stuart's glass overflow?
b. If the glass was full, what volume of fluid would it contain.

Show your work here.

TASK 8 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4)-------(5) Very motivated

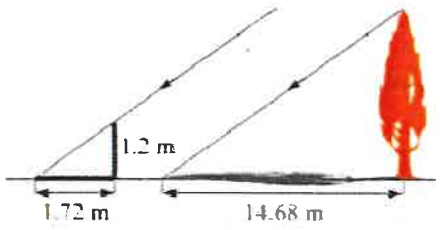
Write a short explanation below why you felt that way.
looks like a tricky question that would deferently get me thinking, however I don't remember how to measure the volume of cylinders

TASK 9: LOGICAL REASONING

Dean needs to accurately find the height of a tree in his garden. Local Council regulations prohibit the growth of garden trees beyond 20 m. They argue that in storm conditions falling branches and uprooted large trees are dangers to houses and lives. As Dean cannot climb the tree, he decides to use shadows to help solve the problem. On a windless sunny day, he stands a 1.2 m stick vertically on the ground. The length of the stick's shadow is 1.72 m and at the same time, the tree's shadow measures 14.68 m.

Using the diagram to estimate:

- The height of the tree
- The angle of elevation of the sun (the angle that the sun's rays make with the horizontal ground



TASK 9 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

~~looks like fun and not too difficult.~~
looks like a fun task and I would honestly love to solve it, however I am lazy and can't be bothered to do so, because this isn't a graded test.

TASK 10: HEARTBEAT

The average person's heart beats 70 times per minute. It can be shown that the average person's heart beats 2.57 billion times in a lifetime.

a. According to this information, how long is the average life span?

b. What assumptions have to be made to solve this problem? How do they affect your answer to part **a?**

Show your work and explain.

TASK 10 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

looks by the initial thought in my mind that it was way too difficult for me to put my efforts into an attempt of solving it.

TASK 11: PALEONTOLOGY

Archaeologists use a coordinate grid system when excavating a site. This allows them to easily record the location of artefacts at a site, which simplifies future excavations. If the coordinates (in cm) of the top and bottom of the arm bone of this dinosaur skeleton are (6.2, 22.3) and (9.1, 11.8), find the length of the arm bone, rounded to the nearest tenth of a centimetre. (Assume that the arm bone is perfectly straight).

TASK 11 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) ------- (3) ------- (4) ------- (5) Very motivated

Write a short explanation below why you felt that way.

looks interesting and hard. Doesn't really look fun to solve though.

TASK 12: GREAT BLUE HOLE TASK

When faced with the problem of trying to breathe underwater, ocean explorer, Jacques Cousteau, designed an underwater breathing apparatus called the Aqualung. It was the precursor of today's scuba gear and allowed Cousteau to explore places that had never been seen before. In 1972, he explored the Great Blue Hole, a cylindrical formation in Belize which began forming over 70 million years ago. The great Blue Hole has a depth of roughly 125 m. If there is 9132700 m^3 of water in the Great Blue Hole, find its radius. Round your answer to the nearest tenth. (Volume of cylinder = $\pi r^2 h$).

Inca

TASK 12 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

looks fun and difficult. I can see that I am given the formula for the volume of a cylinder on this one. However I still don't feel the bother to solve it. With this formula, I might be more motivated to solve some of the erlier ones.

TASK 13: CURRENCY CONVERSION TASK

Claudia lives in Canada. She is planning a holiday to Norway. She exchanges 2000 CAD into Norwegian kroners at a rate of 1 CAD = 6.99 CAD.

1. Calculate how many Norwegian Kroners she receives.
2. Before she even leaves Canada, Claudia becomes ill and has to cancel her holiday. She sells the Norwegian Kroners back to the bank at a rate of 1 NOK = 0.12 CAD. Calculate how many Canadian Dollars she receives.
3. Determine how much money the bank makes from the two transactions.
4. Calculate Claudia's loss as percentage of her original 2000 CAD.

TASK 13 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

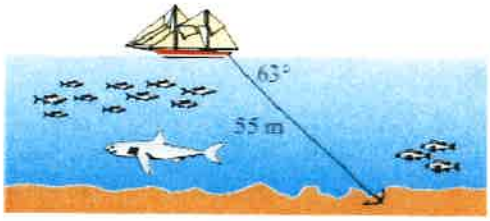
Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

looks too boring

TASK 14: WHERE THE ANCHOR LIES

A boat has an anchor rope length of 55 m. The boat drifts with the ocean current so that the rope makes an angle of 63 degrees with the surface of the water. Find the depth of the water at the position where the anchor lies at the bottom.



TASK 14 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

doesn't seem that difficult. And it may be fun to solve. But, I would rather ~~be~~ want to solve some of the earlier ones.

Solution 1: Task 3.

length from dog to the ball:

$50^2 + 60^2 = 6100$

$\sqrt{6100} = 78.10$

because the length of the land to the ball in the water from after runnin 50m is 60m and the length from the "dog" to the ball is 78.1 if Apache can run the 50m faster than the others can swim 18.1m in water he is smart.

Solution 2:

19

TASK RATING QUESTIONNAIRE

PART A: Please read and try to understand the following mathematical tasks. There are 14 of them below. After reading the task, rate the task on the degree to which you find it motivating or engaging. Then explain the reasons for why you thought it was so in the space provided. There is no right or wrong answer on this, it is important to indicate just how you feel about them.

TASK NUMBER 1: UNIT MAKES DIFFERENCE

In 1983, an Air Canada flight ran out of fuel halfway through its journey due to a mix-up between pounds and kilograms. The plane needed 22300 kg of fuel for the journey. There were 7682 litres of fuel already in the tanks.

a. One litre of jet fuel has a mass of 0.803 kg. Calculate how much fuel should have been loaded. Give your answer in litres.

b. Instead of 0.803 kg per litre, a conversion of 1.77 was used. (One litre of jet fuel has a mass of 1.77 pounds). Calculate how much fuel was actually loaded. Give your answer in litres.

c. Find how many litres short of fuel the plane was.

TASK 1 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3)-------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

too much text!

TASK 2: THE MAGIC SQUARES

Show that each square is a magic square by showing that the rows, columns and the diagonals all have the same sum.

2x-2y	-x+3y	2x-y
x + y	x	x-y
y	3x-3y	2y

3y-2x	-x-5y	6x+2y
9x-y	x	y-7x
-4x-2y	3x+5y	4x-3y

TASK 2 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

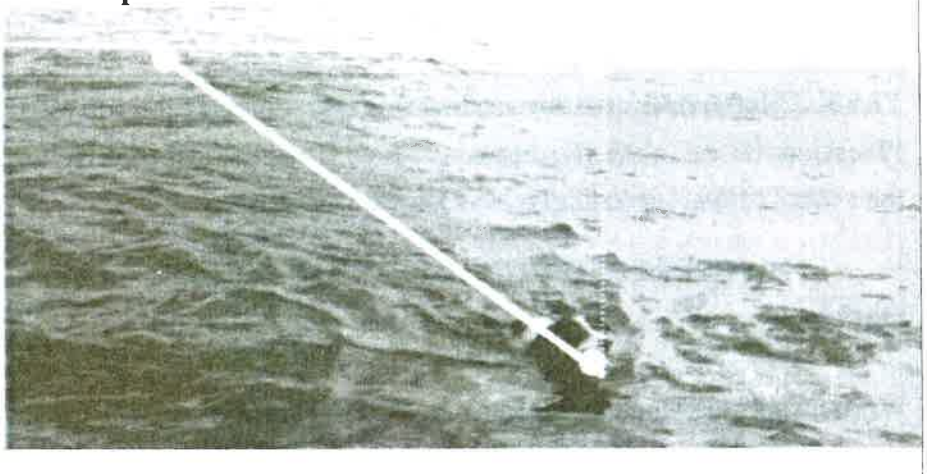
Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I Like that it doesn't have so much text.

TASK 3: APACHE THE BORDER COLLIE

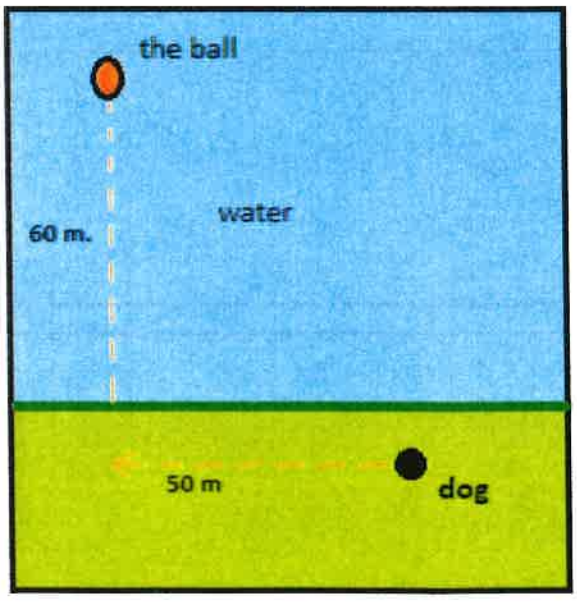
Apache the border Collie



In 2001, Ian Forbes from Edinburgh wrote, in the journal *MicroMath*:

I have a 2-year-old dog, a Border collie named Apache and after a year of avoiding deep water she recently met three Labradors at the local lake. These dogs love to swim and I named them the "submarine brigade" because of their ability to dive straight in and swim after the ball. After meeting them, Apache quickly took to swimming, but being a dog with 'brains,' she discovered that she could beat the rest by running along the bank and then diving in.
The situation is like this: The Labradors jump immediately in the water and swim straight to the ball. Apache runs for about 50 m along the bank and then jumps to swim to the ball.
Why would Apache run 50 m and then have the shortest distance for swimming? Is Apache really smart?

Please note that one meter of swimming takes four meters of running in time.)



Please explain your solution.

TASK 3 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3)-------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

A lot of text & a lot to remember. but the story kept me motivated

TASK 4: A4 PUZZLE

Take two sheets of A4 size paper. Roll one into a short cylinder and the other into a tall cylinder. Does one hold more than the other?

Please explain your answer and show your work.

TASK 4 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

This is fun because it an "activity" task. instead of just writing we get to actually do something

TASK 5: PERCENTAGES

Find the unknowns: X, Y, Z.

S.No	Name of the item	Marked Price	Selling Price	Discount
i)	Book 225 kr	X	8%	
ii)	LED TV	Y	11970 kr	5%
iii)	Digital clock	750 kr	615 kr	Z

Show your work here.

i.

ii.

iii.

TASK 5 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

very messy, hard to understand what im supposed to do

TASK 6: LOGICAL REASONING

Your friend says she passes a field every day on the way to school, and each day, without exception, she sees **a farmer wearing a straw hat feeding a carrot to a brown horse.** Look at the following general statements and rank them in order from most likely to be true to least likely to be true.

- *The horse never eats anything but carrots.* 6
- *The farmer feeds the horse only on school days.* 7
- *The farmer is the only person who feeds the horse.* 5
- *Your friend never walks to school.* 4
- *The farmer always wears a hat.* 3
- *The horse is not a racing horse.* 1
- *Your friend travels to school at the same time every day.* 2

TASK 6 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

very easy and also good explination

TASK 7: DIVISIBLE BY 7

Is **3843** evenly divisible by 7? To see if a number is evenly divisible by 7, remove the units digit of the number, double the removed digit and subtract the doubled amount from the remaining number. If the result is evenly divisible by 7, then the original number is also divisible by 7. The method may need to be repeated several times.

3843 remove the units digit, 3, leaving 384:

384
-6 subtract the doubled number 3

378 remove the units digit, 8, leaving 37:

37
-16 subtract the doubled number 8

21 This is a multiple of 7, so 3843 is evenly divisible by 7.

This is a specific example that works with the method described.
Use the above method to check whether 3374 is evenly divisible by 7

TASK 7 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

This gives the explination on how to do it very clear.

TASK 8: LOGICAL REASONING

Stuart has a 330 mL bottle of orange juice. He thinks he can pour it all into his glass, which is a cylinder with diameter 7 cm and height 8 cm. Stuart's friend Patrick thinks the glass will overflow. Answer the following questions.

a. Will Stuart's glass overflow?
b. If the glass was full, what volume of fluid would it contain.

Show your work here.

TASK 8 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

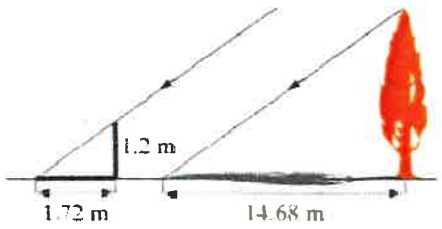
Pretty good organized, but boring.

TASK 9: LOGICAL REASONING

Dean needs to accurately find the height of a tree in his garden. Local Council regulations prohibit the growth of garden trees beyond 20 m. They argue that in storm conditions falling branches and uprooted large trees are dangers to houses and lives. As Dean cannot climb the tree, he decides to use shadows to help solve the problem. On a windless sunny day, he stands a 1.2 m stick vertically on the ground. The length of the stick's shadow is 1.72 m and at the same time, the tree's shadow measures 14.68 m.

Using the diagram to estimate:

- The height of the tree
- The angle of elevation of the sun (the angle that the sun's rays make with the horizontal ground



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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Too much writing, boring.

TASK 10: HEARTBEAT

The average person's heart beats 70 times per minute. It can be shown that the average person's heart beats 2.57 billion times in a lifetime.

a. According to this information, how long is the average life span?

b. What assumptions have to be made to solve this problem? How do they affect your answer to part **a?**

Show your work and explain.

TASK 10 Reflection: Just by reading this task, do you feel motivated to solve it?
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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

This task is ok. its not too confusing its well organized and the Question is pretty simple

TASK 11: PALEONTOLOGY

Archaeologists use a coordinate grid system when excavating a site. This allows them to easily record the location of artefacts at a site, which simplifies future excavations. If the coordinates (in cm) of the top and bottom of the arm bone of this dinosaur skeleton are (6.2, 22.3) and (9.1, 11.8), find the length of the arm bone, rounded to the nearest tenth of a centimetre. (Assume that the arm bone is perfectly straight).

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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

too much text. If I got this in a math lesson and I was tired I would not attempt it.

TASK 12: GREAT BLUE HOLE TASK

When faced with the problem of trying to breathe underwater, ocean explorer, Jacques Cousteau, designed an underwater breathing apparatus called the Aqualung. It was the precursor of today's scuba gear and allowed Cousteau to explore places that had never been seen before. In 1972, he explored the Great Blue Hole, a cylindrical formation in Belize which began forming over 70 million years ago. The great Blue Hole has a depth of roughly 125 m. If there is 9132700 m^3 of water in the Great Blue Hole, find its radius. Round your answer to the nearest tenth. (Volume of cylinder = $\pi r^2 h$).

TASK 12 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Fun and interesting information. Too much text

TASK 13: CURRENCY CONVERSION TASK

Claudia lives in Canada. She is planning a holiday to Norway. She exchanges 2000 CAD into Norwegian kroners at a rate of 1 CAD = 6.99 CAD.

1. Calculate how many Norwegian Kroners she receives.
2. Before she even leaves Canada, Claudia becomes ill and has to cancel her holiday. She sells the Norwegian Kroners back to the bank at a rate of 1 NOK = 0.12 CAD. Calculate how many Canadian Dollars she receives.
3. Determine how much money the bank makes from the two transactions.
4. Calculate Claudia's loss as percentage of her original 2000 CAD.

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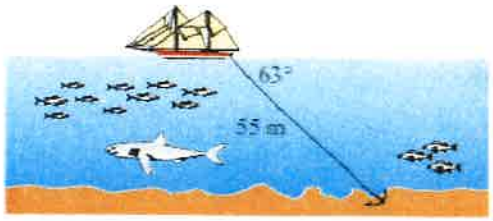
Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Too long.

TASK 14: WHERE THE ANCHOR LIES

A boat has an anchor rope length of 55 m. The boat drifts with the ocean current so that the rope makes an angle of 63 degrees with the surface of the water. Find the depth of the water at the position where the anchor lies at the bottom.



TASK 14 Reflection: Just by reading this task, do you feel motivated to solve it?
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Not motivated at all (1) ------- (2) -------(3) -------(④) -------(5) Very motivated

Write a short explanation below why you felt that way.

Good amount of text pretty oranized.

Solution 1: Task 6

1. horse is not a racing horse
2. your friend travels to school sometime everyday
3. The farmer always wears a hat
4. Your friend never walks to school
5. The Farmer is the only person who feeds the horse
6. The horse never eats anything but carrots
7. Farmer only feeds horse on weekdays.

Solution 2:

$3374 - X$

$337 - 8 = 329$

$329 - 32$

-18

14

201

TASK RATING QUESTIONNAIRE

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Write a short explanation below why you felt that way.

I gave it a 4 because its a multiple choice question with visuals

TASK 2: THE MAGIC SQUARES

Show that each square is a magic square by showing that the rows, columns and the diagonals all have the same sum.

2x-2y	-x+3y	2x-y
x + y	x	x-y
y	3x-3y	2y

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9x-y	x	y-7x
-4x-2y	3x+5y	4x-3y

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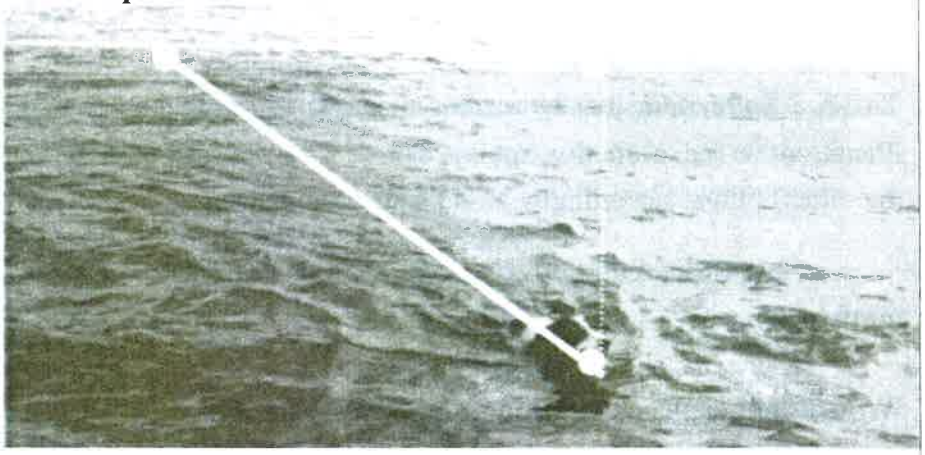
Not motivated at all (1) ------- (2) ------- (3) ------- (4) ------- (5) Very motivated

Write a short explanation below why you felt that way.

~~It could~~ It is fine but there is nothing that is very exciting about it

TASK 3: APACHE THE BORDER COLLIE

Apache the border Collie



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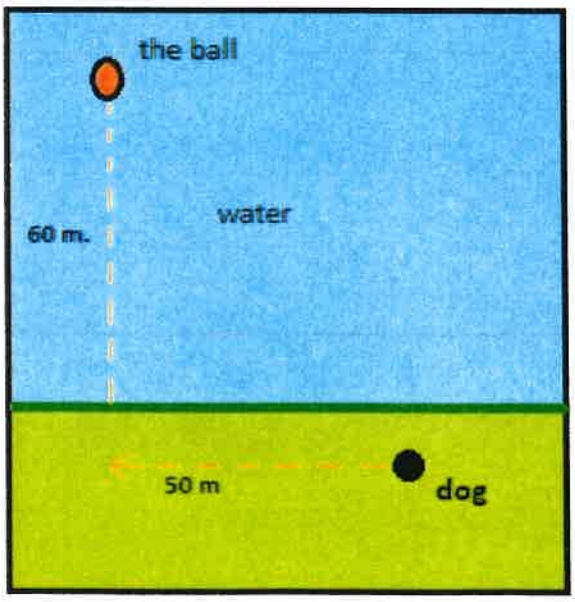

Please explain your solution.

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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I give it a 4 because it is more of a fun question, it has a text which gives us information that we have to find, and it has visuals

TASK 4: A4 PUZZLE

Take two sheets of A4 size paper. Roll one into a short cylinder and the other into a tall cylinder. Does one hold more than the other?

Please explain your answer and show your work.

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Write a short explanation below why you felt that way.

It is an active excersise that seems fun

TASK 5: PERCENTAGES

Find the unknowns: X, Y, Z.

S.No	Name of the item	Marked Price	Selling Price	Discount
i)	Book 225 kr	X	8%	
ii)	LED TV	Y	11970 kr	5%
iii)	Digital clock	750 kr	615 kr	Z

Show your work here.

i.

ii.

iii.

TASK 5 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

This one is very plain and confusing

TASK 6: LOGICAL REASONING

Your friend says she passes a field every day on the way to school, and each day, without exception, she sees **a farmer wearing a straw hat feeding a carrot to a brown horse.** Look at the following general statements and rank them in order from most likely to be true to least likely to be true.

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2. *The farmer feeds the horse only on school days.*
3. *The farmer is the only person who feeds the house.*
4. *Your friend never walks to school.*
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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

It seems easy and fun.

TASK 7: DIVISIBLE BY 7

Is **3843** evenly divisible by 7? To see if a number is evenly divisible by 7, remove the units digit of the number, double the removed digit and subtract the doubled amount from the remaining number. If the result is evenly divisible by 7, then the original number is also divisible by 7. The method may need to be repeated several times.

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21 This is a multiple of 7, so 3843 is evenly divisible by 7.

This is a specific example that works with the method described.
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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) **Very motivated**

Write a short explanation below why you felt that way.

It would be easier to just divide it by 7 and see if the result was a whole number.

TASK 8: LOGICAL REASONING

Stuart has a 330 mL bottle of orange juice. He thinks he can pour it all into his glass, which is a cylinder with diameter 7 cm and height 8 cm. Stuart's friend Patrick thinks the glass will overflow. Answer the following questions.

a. Will Stuart's glass overflow?
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Show your work here.

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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

it looks easy and simple, it is also a multiple choice question, which is fun.

TASK 9: LOGICAL REASONING

Dean needs to accurately find the height of a tree in his garden. Local Council regulations prohibit the growth of garden trees beyond 20 m. They argue that in storm conditions falling branches and uprooted large trees are dangers to houses and lives. As Dean cannot climb the tree, he decides to use shadows to help solve the problem. On a windless sunny day, he stands a 1.2 m stick vertically on the ground. The length of the stick's shadow is 1.72 m and at the same time, the tree's shadow measures 14.68 m.

Using the diagram to estimate:

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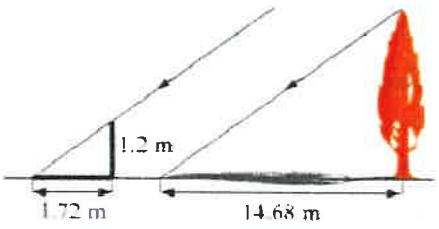

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Write a short explanation below why you felt that way.

I like the concept, and diagrams are good.

TASK 10: HEARTBEAT

The average person's heart beats 70 times per minute. It can be shown that the average person's heart beats 2.57 billion times in a lifetime.

a. According to this information, how long is the average life span?

b. What assumptions have to be made to solve this problem? How do they affect your answer to part **a?**

Show your work and explain.

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Not motivated at all (1) ------- (2) -------(3) -------(4) ------(5) Very motivated

Write a short explanation below why you felt that way.

this one seems quite fun and fast which is good

TASK 11: PALEONTOLOGY

Archaeologists use a coordinate grid system when excavating a site. This allows them to easily record the location of artefacts at a site, which simplifies future excavations. If the coordinates (in cm) of the top and bottom of the arm bone of this dinosaur skeleton are (6.2, 22.3) and (9.1, 11.8), find the length of the arm bone, rounded to the nearest tenth of a centimetre. (Assume that the arm bone is perfectly straight).

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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

It seems boring, and the task isn't very attractive but + for picture

TASK 12: GREAT BLUE HOLE TASK

When faced with the problem of trying to breathe underwater, ocean explorer, Jacques Cousteau, designed an underwater breathing apparatus called the Aqualung. It was the precursor of today's scuba gear and allowed Cousteau to explore places that had never been seen before. In 1972, he explored the Great Blue Hole, a cylindrical formation in Belize which began forming over 70 million years ago. The great Blue Hole has a depth of roughly 125 m. If there is 9132700 m^3 of water in the Great Blue Hole, find its radius. Round your answer to the nearest tenth. (Volume of cylinder = $\pi r^2 h$).

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Write a short explanation below why you felt that way.

The question doesn't sound entertaining.
+ Picture

TASK 13: CURRENCY CONVERSION TASK

Claudia lives in Canada. She is planning a holiday to Norway. She exchanges 2000 CAD into Norwegian kroners at a rate of 1 CAD = 6.99 ~~CAD~~. CC

1. Calculate how many Norwegian Kroners she receives.
2. Before she even leaves Canada, Claudia becomes ill and has to cancel her holiday. She sells the Norwegian Kroners back to the bank at a rate of 1 NOK = 0.12 CAD. Calculate how many Canadian Dollars she receives.
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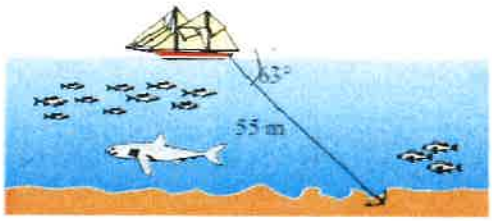
Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

More entertaing questions, and there is more of them

TASK 14: WHERE THE ANCHOR LIES

A boat has an anchor rope length of 55 m. The boat drifts with the ocean current so that the rope makes an angle of 63 degrees with the surface of the water. Find the depth of the water at the position where the anchor lies at the bottom.



TASK 14 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

easy and simple question, it also has an image

Task 6

Solution 1:

1. Your friend travels to school at the same time everyday
2. The horse is not a racing horse
3. Your friend never walks to school
4. The farmer is the only one who feeds the horse
5. The horse never eats anything ~~For~~ but carrots
6. The farmer always wears a hat
7. The farmer only feeds the horse on schooldays

Task 7

Solution 2: 3374 ÷ 7?

$4 \times 2 = 8$

337 - 8

329

32 - 18 $\quad 9 \times 2 = 18$

= 14

14 is a multiple of 7, so

3374 is evenly dev~~ided~~isible by 7

(1)

TASK RATING QUESTIONNAIRE

PART A: Please read and try to understand the following mathematical tasks. There are 14 of them below. After reading the task, rate the task on the degree to which you find it motivating or engaging. Then explain the reasons for why you thought it was so in the space provided. There is no right or wrong answer on this, it is important to indicate just how you feel about them.

TASK NUMBER 1: UNIT MAKES DIFFERENCE

In 1983, an Air Canada flight ran out of fuel halfway through its journey due to a mix-up between pounds and kilograms. The plane needed 22300 kg of fuel for the journey. There were 7682 litres of fuel already in the tanks.

a. One litre of jet fuel has a mass of 0.803 kg. Calculate how much fuel should have been loaded. Give your answer in litres.
b. Instead of 0.803 kg per litre, a conversion of 1.77 was used. (One litre of jet fuel has a mass of 1.77 pounds). Calculate how much fuel was actually loaded. Give your answer in litres.
c. Find how many litres short of fuel the plane was.

TASK 1 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3)-------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

There are many numbers and a lot of info which makes it less motivational but it also seems interesting which is why I gave it a 3

TASK 2: THE MAGIC SQUARES

Show that each square is a magic square by showing that the rows, columns and the diagonals all have the same sum.

2x-2y	-x+3y	2x-y
x + y	x	x-y
y	3x-3y	2y

3y-2x	-x-5y	6x+2y
9x-y	x	y-7x
-4x-2y	3x+5y	4x-3y

TASK 2 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

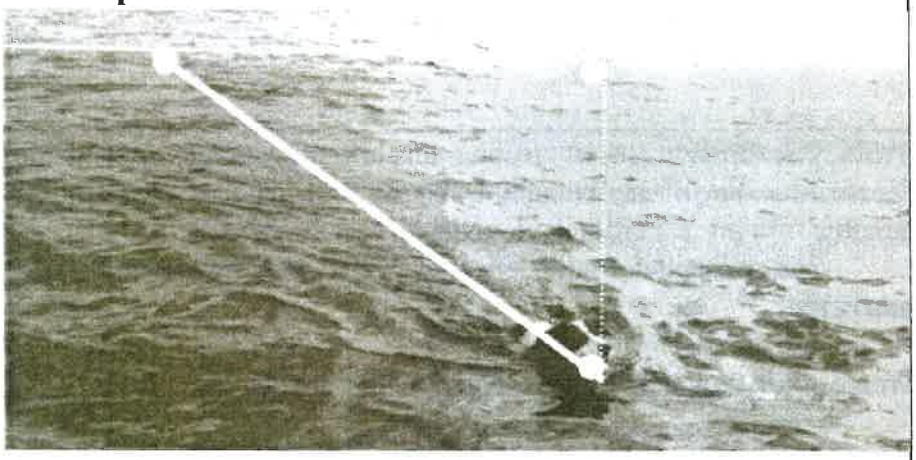
Not motivated at all (1) ------- (2) -------(3) -------(4)-------(5) Very motivated

Write a short explanation below why you felt that way.

Many numbers and variables
But explanation was clear and short
making it motivational

TASK 3: APACHE THE BORDER COLLIE

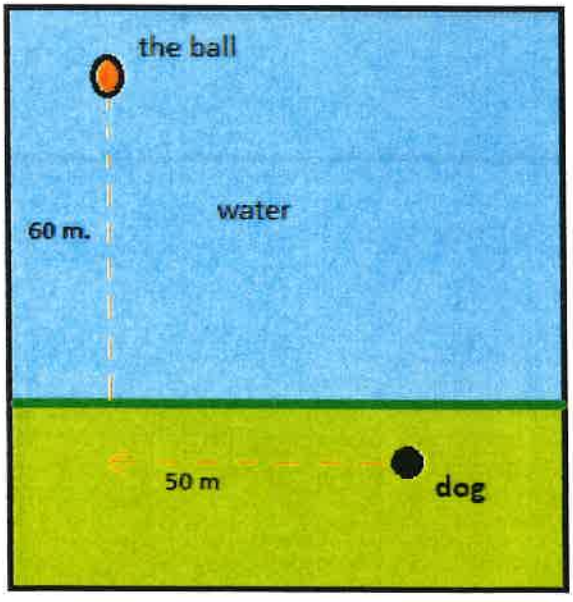
Apache the border Collie



In 2001, Ian Forbes from Edinburgh wrote, in the journal *MicroMath*:

I have a 2-year-old dog, a Border collie named Apache and after a year of avoiding deep water she recently met three Labradors at the local lake. These dogs love to swim and I named them the "submarine brigade" because of their ability to dive straight in and swim after the ball. After meeting them, Apache quickly took to swimming, but being a dog with 'brains,' she discovered that she could beat the rest by running along the bank and then diving in.
The situation is like this: The Labradors jump immediately in the water and swim straight to the ball. Apache runs for about 50 m along the bank and then jumps to swim to the ball. Why would Apache run 50 m and then have the shortest distance for swimming? Is Apache really smart?

Please note that one meter of swimming takes four meters of running in time.)



Please explain your solution.

TASK 3 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) -------(2)-------(3)-------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

To much explanation / context
Makes it less motivational

TASK 4: A4 PUZZLE

Take two sheets of A4 size paper. Roll one into a short cylinder and the other into a tall cylinder. Does one hold more than the other?

Please explain your answer and show your work.

TASK 4 Reflection: Just by reading this task, do you feel motivated to solve it?

Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4)-------(5) Very motivated

Write a short explanation below why you felt that way.

Good and concrete explanation given

TASK 5: PERCENTAGES

Find the unknowns: X, Y, Z.

S.No	Name of the item	Marked Price	Selling Price	Discount
i)	Book	225 kr	X	8%
ii)	LED TV	Y	11970 kr	5%
iii)	Digital clock	750 kr	615 kr	Z

Show your work here.

i.

ii.

iii.

TASK 5 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3)-------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Looks confusing

TASK 6: LOGICAL REASONING

Your friend says she passes a field every day on the way to school, and each day, without exception, she sees **a farmer wearing a straw hat feeding a carrot to a brown horse**. Look at the following general statements and rank them in order from most likely to be true to least likely to be true.

- *The horse never eats anything but carrots.*
- *The farmer feeds the horse only on school days.*
- *The farmer is the only person who feeds the house.*
- *Your friend never walks to school.*
- *The farmer always wears a hat.*
- *The horse is not a racing horse.*
- *Your friend travels to school at the same time every day.*

TASK 6 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------((4))-------(5) Very motivated

Write a short explanation below why you felt that way.

Since there are no calculation needed it looks simpler.
Good amount of info
But a lot of text

TASK 7: DIVISIBLE BY 7

Is **3843** evenly divisible by 7? To see if a number is evenly divisible by 7, remove the units digit of the number, double the removed digit and subtract the doubled amount from the remaining number. If the result is evenly divisible by 7, then the original number is also divisible by 7. The method may need to be repeated several times.

3843 remove the units digit, 3, leaving 384:

384
-6 subtract the doubled number 3

378 remove the units digit, 8, leaving 37:

37
-16 subtract the doubled number 8

21 This is a multiple of 7, so 3843 is evenly divisible by 7.

This is a specific example that works with the method described.
Use the above method to check whether 3374 is evenly divisible by 7

TASK 7 Reflection: Just by reading this task, do you feel motivated to solve it?
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Not motivated at all (1) ------- (2) -------(3) -------(4) ------(5) Very motivated

Write a short explanation below why you felt that way.

method included makes it motivational

TASK 8: LOGICAL REASONING

Stuart has a 330 mL bottle of orange juice. He thinks he can pour it all into his glass, which is a cylinder with diameter 7 cm and height 8 cm. Stuart's friend Patrick thinks the glass will overflow. Answer the following questions.

a. Will Stuart's glass overflow?

b. If the glass was full, what volume of fluid would it contain.

Show your work here.

TASK 8 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) ------(5) Very motivated

Write a short explanation below why you felt that way.

Not too many no. and explanation

TASK 9: LOGICAL REASONING

Dean needs to accurately find the height of a tree in his garden. Local Council regulations prohibit the growth of garden trees beyond 20 m. They argue that in storm conditions falling branches and uprooted large trees are dangers to houses and lives. As Dean cannot climb the tree, he decides to use shadows to help solve the problem. On a windless sunny day, he stands a 1.2 m stick vertically on the ground. The length of the stick's shadow is 1.72 m and at the same time, the tree's shadow measures 14.68 m.

Using the diagram to estimate:

- The height of the tree
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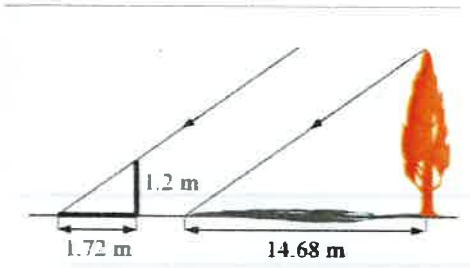

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Not motivated at all (1) ------- (2) ------- (3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Looks interesting
I liked this unit making it motivational

TASK 10: HEARTBEAT

The average person's heart beats 70 times per minute. It can be shown that the average person's heart beats 2.57 billion times in a lifetime.

a. According to this information, how long is the average life span?
b. What assumptions have to be made to solve this problem? How do they affect your answer to part **a?**

Show your work and explain.

TASK 10 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Clear instructions
Just I dont remember how to do it

TASK 11: PALEONTOLOGY

Archaeologists use a coordinate grid system when excavating a site. This allows them to easily record the location of artefacts at a site, which simplifies future excavations. If the coordinates (in cm) of the top and bottom of the arm bone of this dinosaur skeleton are (6.2, 22.3) and (9.1, 11.8), find the length of the arm bone, rounded to the nearest tenth of a centimetre. (Assume that the arm bone is perfectly straight).

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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

clear question

TASK 12: GREAT BLUE HOLE TASK

When faced with the problem of trying to breathe underwater, ocean explorer, Jacques Cousteau, designed an underwater breathing apparatus called the Aqualung. It was the precursor of today's scuba gear and allowed Cousteau to explore places that had never been seen before. In 1972, he explored the Great Blue Hole, a cylindrical formation in Belize which began forming over 70 million years ago. The great Blue Hole has a depth of roughly 125 m. If there is 9132700 m^3 of water in the Great Blue Hole, find its radius. Round your answer to the nearest tenth. (Volume of cylinder = $\pi r^2 h$).

TASK 12 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Dont need the whole backstory
If it started from "The great Blue Hole..."
would be better

TASK 13: CURRENCY CONVERSION TASK

Claudia lives in Canada. She is planning a holiday to Norway. She exchanges 2000 CAD into Norwegian kroners at a rate of 1 CAD = 6.99 CAD.

1. Calculate how many Norwegian Kroners she receives.
2. Before she even leaves Canada, Claudia becomes ill and has to cancel her holiday. She sells the Norwegian Kroners back to the bank at a rate of 1 NOK = 0.12 CAD. Calculate how many Canadian Dollars she receives.
3. Determine how much money the bank makes from the two transactions.
4. Calculate Claudia's loss as percentage of her original 2000 CAD.

TASK 13 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

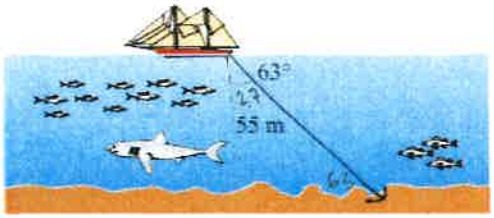
Write a short explanation below why you felt that way.

Too much text

Seems like a lot to do

TASK 14: WHERE THE ANCHOR LIES

A boat has an anchor rope length of 55 m. The boat drifts with the ocean current so that the rope makes an angle of 63 degrees with the surface of the water. Find the depth of the water at the position where the anchor lies at the bottom.



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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Clear info
Not too much info
Since it's visual I can picture it more
making it more motivational

Solution 1: Question 7

3374

4 x 2 = 8

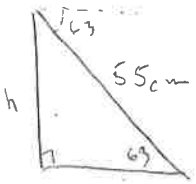
= 337
- 8
329

9 x 2 = 18

32
- 18
14

14 is a multiple of 7 therefore 3374 is evenly divisible by 7

Solution 2: Question 14



$$\sin 63 = \frac{h}{55}$$

$$55 \times \sin 63 = \frac{h}{55} \times 55$$

$$55(\sin 63) = h$$

$$49\text{cm} = h$$

(2)

TASK RATING QUESTIONNAIRE

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In 1983, an Air Canada flight ran out of fuel halfway through its journey due to a mix-up between pounds and kilograms. The plane needed 22300 kg of fuel for the journey. There were 7682 litres of fuel already in the tanks.

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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Too much text

TASK 2: THE MAGIC SQUARES

Show that each square is a magic square by showing that the rows, columns and the diagonals all have the same sum.

2x-2y	-x+3y	2x-y
x + y	x	x-y
y	3x-3y	2y

3y-2x	-x-5y	6x+2y
9x-y	x	y-7x
-4x-2y	3x+5y	4x-3y

TASK 2 Reflection: Just by reading this task, do you feel motivated to solve it?
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Not motivated at all (1) ------- (2) -------(3) -------(4)-------(5) Very motivated

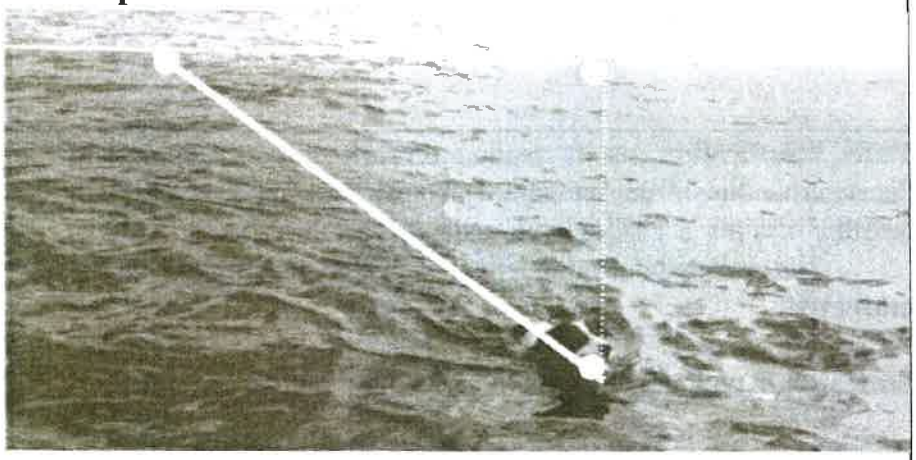
Write a short explanation below why you felt that way.

It was a bit complicated too read.

But diagram is very ~~good~~ clear.

TASK 3: APACHE THE BORDER COLLIE

Apache the border Collie



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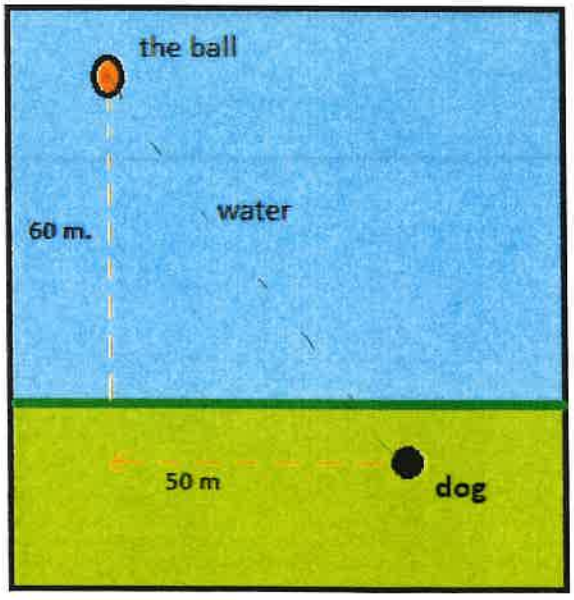

Please explain your solution.

TASK 3 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3)-------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

A lot of text

Diagram is clear.

TASK 4: A4 PUZZLE

Take two sheets of A4 size paper. Roll one into a short cylinder and the other into a tall cylinder. Does one hold more than the other?

Please explain your answer and show your work.

TASK 4 Reflection: Just by reading this task, do you feel motivated to solve it?

Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4)-------(5) Very motivated

Write a short explanation below why you felt that way.

clear instruction I just don't remember how to do it

TASK 5: PERCENTAGES

Find the unknowns: X, Y, Z.

S.No	Name of the item	Marked Price	Selling Price	Discount
i)	Book	225 kr	X	8%
ii)	LED TV	Y	11970 kr	5%
iii)	Digital clock	750 kr	615 kr	Z

Show your work here.

i.

ii.

iii.

TASK 5 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4)-------(5) Very motivated

Write a short explanation below why you felt that way.

Clear instruction

I want to do it but forgot how.

TASK 6: LOGICAL REASONING

Your friend says she passes a field every day on the way to school, and each day, without exception, she sees **a farmer wearing a straw hat feeding a carrot to a brown horse.** Look at the following general statements and rank them in order from most likely to be true to least likely to be true.

- *The horse never eats anything but carrots.*
- *The farmer feeds the horse only on school days.*
- *The farmer is the only person who feeds the house.*
- *Your friend never walks to school.*
- *The farmer always wears a hat.* ✓ 1
- *The horse is not a racing horse.* ✓ 3
- *Your friend travels to school at the same time every day.* ✓ 2

TASK 6 Reflection: Just by reading this task, do you feel motivated to solve it?
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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

The instruction was very clear.

TASK 7: DIVISIBLE BY 7

Is **3843** evenly divisible by 7? To see if a number is evenly divisible by 7, remove the units digit of the number, double the removed digit and subtract the doubled amount from the remaining number. If the result is evenly divisible by 7, then the original number is also divisible by 7. The method may need to be repeated several times.

3843 remove the units digit, 3, leaving 384:

384
-6 subtract the doubled number 3

378 remove the units digit, 8, leaving 37:

37
-16 subtract the doubled number 8

21 This is a multiple of 7, so 3843 is evenly divisible by 7.

This is a specific example that works with the method described.
Use the above method to check whether 3374 is evenly divisible by 7

TASK 7 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3)-------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

too much text

TASK 8: LOGICAL REASONING

Stuart has a 330 mL bottle of orange juice. He thinks he can pour it all into his glass, which is a cylinder with diameter 7 cm and height 8 cm. Stuart's friend Patrick thinks the glass will overflow. Answer the following questions.

a. Will Stuart's glass overflow?

b. If the glass was full, what volume of fluid would it contain.

$V = \pi r^2 h$

Show your work here.

TASK 8 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Very clear text. Easy to understand.
I wanted to do the task but forgot how to

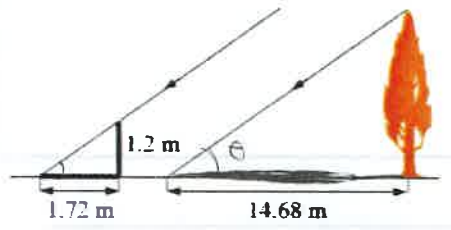
TASK 9: LOGICAL REASONING

Dean needs to accurately find the height of a tree in his garden. Local Council regulations prohibit the growth of garden trees beyond 20 m. They argue that in storm conditions falling branches and uprooted large trees are dangers to houses and lives. As Dean cannot climb the tree, he decides to use shadows to help solve the problem. On a windless sunny day, he stands a 1.2 m stick vertically on the ground. The length of the stick's shadow is 1.72 m and at the same time, the tree's shadow measures 14.68 m.

Using the diagram to estimate:

- The height of the tree
- The angle of elevation of the sun (the angle that the sun's rays make with the horizontal ground

$\cos\theta = \frac{14.68}{\quad}$



TASK 9 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4)-------(5) Very motivated

Write a short explanation below why you felt that way.

Clear instruction.
I just didn't remember how to solve.

TASK 10: HEARTBEAT

The average person's heart beats 70 times per minute. It can be shown that the average person's heart beats 2.57 billion times in a lifetime.

a. According to this information, how long is the average life span?
b. What assumptions have to be made to solve this problem? How do they affect your answer to part **a?**

Show your work and explain.

TASK 10 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

clear instruction

TASK 11: PALEONTOLOGY

Archaeologists use a coordinate grid system when excavating a site. This allows them to easily record the location of artefacts at a site, which simplifies future excavations. If the coordinates (in cm) of the top and bottom of the arm bone of this dinosaur skeleton are (6.2, 22.3) and (9.1, 11.8), find the length of the arm bone, rounded to the nearest tenth of a centimetre. (Assume that the arm bone is perfectly straight).

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Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3)-------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Too complicated, I am very tired.

TASK 12: GREAT BLUE HOLE TASK

When faced with the problem of trying to breathe underwater, ocean explorer, Jacques Cousteau, designed an underwater breathing apparatus called the Aqualung. It was the precursor of today's scuba gear and allowed Cousteau to explore places that had never been seen before. In 1972, he explored the Great Blue Hole, a cylindrical formation in Belize which began forming over 70 million years ago. The great Blue Hole has a depth of roughly 125 m. If there is 9132700 m^3 of water in the Great Blue Hole, find its radius. Round your answer to the nearest tenth. (Volume of cylinder = $\pi r^2 h$).

TASK 12 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) ------- (3) ------- (4) ------- (5) Very motivated

Write a short explanation below why you felt that way.

Too detailed back story, a lot of unnecessary information.

Too much text, it was too confusing to do.

TASK 13: CURRENCY CONVERSION TASK

Claudia lives in Canada. She is planning a holiday to Norway. She exchanges 2000 CAD into Norwegian kroners at a rate of 1 CAD = 6.99 CAD.

1. Calculate how many Norwegian Kroners she receives.
2. Before she even leaves Canada, Claudia becomes ill and has to cancel her holiday. She sells the Norwegian Kroners back to the bank at a rate of 1 NOK = 0.12 CAD. Calculate how many Canadian Dollars she receives.
3. Determine how much money the bank makes from the two transactions.
4. Calculate Claudia's loss as percentage of her original 2000 CAD.

TASK 13 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

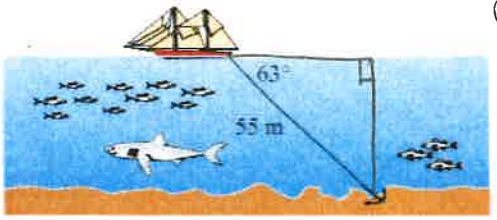
Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Clear instruction.

TASK 14: WHERE THE ANCHOR LIES

A boat has an anchor rope length of 55 m. The boat drifts with the ocean current so that the rope makes an angle of 63 degrees with the surface of the water. Find the depth of the water at the position where the anchor lies at the bottom.



$(55)\sin 63^\circ = \frac{x}{55}$

$x = 49$

TASK 14 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Very clear instruction

Solution 1:

Solution 2:

(3)

TASK RATING QUESTIONNAIRE

PART A: Please read and try to understand the following mathematical tasks. There are 14 of them below. After reading the task, rate the task on the degree to which you find it motivating or engaging. Then explain the reasons for why you thought it was so in the space provided. There is no right or wrong answer on this, it is important to indicate just how you feel about them.

TASK NUMBER 1: UNIT MAKES DIFFERENCE

In 1983, an Air Canada flight ran out of fuel halfway through its journey due to a mix-up between pounds and kilograms. The plane needed 22300 kg of fuel for the journey. There were 7682 litres of fuel already in the tanks.

a. One litre of jet fuel has a mass of 0.803 kg. Calculate how much fuel should have been loaded. Give your answer in litres.
b. Instead of 0.803 kg per litre, a conversion of 1.77 was used. (One litre of jet fuel has a mass of 1.77 pounds). Calculate how much fuel was actually loaded. Give your answer in litres.
c. Find how many litres short of fuel the plane was.

TASK 1 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

There were alot of Question and it seems like a long calculation Process.

TASK 2: THE MAGIC SQUARES

Show that each square is a magic square by showing that the rows, columns and the diagonals all have the same sum.

2x-2y	-x+3y	2x-y
x + y	x	x-y
y	3x-3y	2y

3y-2x	-x-5y	6x+2y
9x-y	x	y-7x
-4x-2y	3x+5y	4x-3y

TASK 2 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

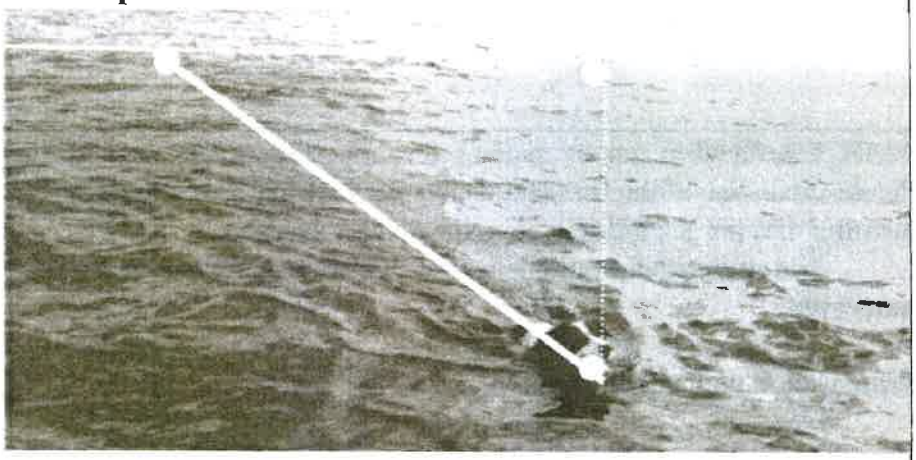
Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I have never worked with this before.

TASK 3: APACHE THE BORDER COLLIE

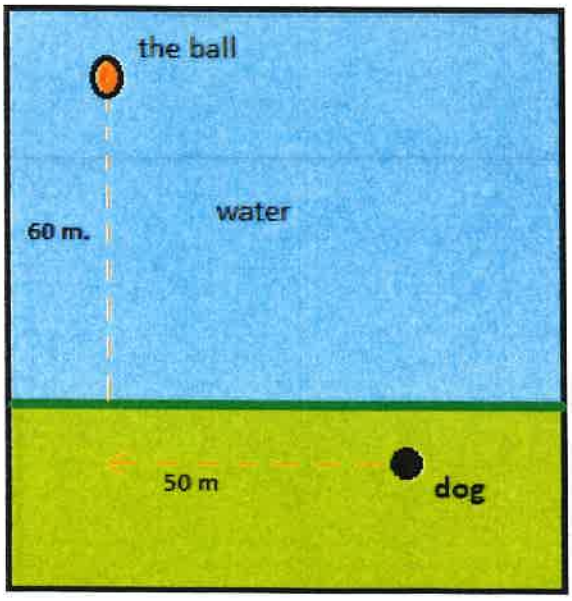
Apache the border Collie



In 2001, Ian Forbes from Edinburgh wrote, in the journal *MicroMath*:

I have a 2-year-old dog, a Border collie named Apache and after a year of avoiding deep water she recently met three Labradors at the local lake. These dogs love to swim and I named them the "submarine brigade" because of their ability to dive straight in and swim after the ball. After meeting them, Apache quickly took to swimming, but being a dog with 'brains,' she discovered that she could beat the rest by running along the bank and then diving in.
The situation is like this: The Labradors jump immediately in the water and swim straight to the ball. Apache runs for about 50 m along the bank and then jumps to swim to the ball. Why would Apache run 50 m and then have the shortest distance for swimming? Is Apache really smart?

Please note that one meter of swimming takes four meters of running in time.)



Please explain your solution.

TASK 3 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

The task was not that interesting.

TASK 4: A4 PUZZLE

Take two sheets of A4 size paper. Roll one into a short cylinder and the other into a tall cylinder. Does one hold more than the other?

Please explain your answer and show your work.

TASK 4 Reflection: Just by reading this task, do you feel motivated to solve it?

Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I can't be bothered to gather other materials to answer a question.

TASK 5: PERCENTAGES

Find the unknowns: X, Y, Z.

S.No	Name of the item	Marked Price	Selling Price	Discount
i)	Book	225 kr	X	8%
ii)	LED TV	Y	11970 kr	5%
iii)	Digital clock	750 kr	615 kr	Z

Show your work here.

i.

ii.

iii.

TASK 5 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4)-------(5) Very motivated

Write a short explanation below why you felt that way.

I forgot how to workout Percentage questions,

TASK 6: LOGICAL REASONING

Your friend says she passes a field every day on the way to school, and each day, without exception, she sees **a farmer wearing a straw hat feeding a carrot to a brown horse.** Look at the following general statements and rank them in order from most likely to be true to least likely to be true.

- *The horse never eats anything but carrots.*
- *The farmer feeds the horse only on school days.*
- *The farmer is the only person who feeds the house.*
- *Your friend never walks to school.*
- *The farmer always wears a hat.*
- *The horse is not a racing horse.*
- *Your friend travels to school at the same time every day.*

TASK 6 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3)-------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

It seems too easy and has a lot of text.

TASK 7: DIVISIBLE BY 7

Is **3843** evenly divisible by 7? To see if a number is evenly divisible by 7, remove the units digit of the number, double the removed digit and subtract the doubled amount from the remaining number. If the result is evenly divisible by 7, then the original number is also divisible by 7. The method may need to be repeated several times.

384 3 remove the units digit, 3, leaving 384:

384
-6 subtract the doubled number 3

378 remove the units digit, 8, leaving 37:

37
-16 subtract the doubled number 8

21 This is a multiple of 7, so 3843 is evenly divisible by 7.

This is a specific example that works with the method described.
Use the above method to check whether 3374 is evenly divisible by 7

TASK 7 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4)-------(5) Very motivated

Write a short explanation below why you felt that way.

I looked at the example on how to solve, it looked easy to follow.

TASK 8: LOGICAL REASONING

Stuart has a 330 mL bottle of orange juice. He thinks he can pour it all into his glass, which is a cylinder with diameter 7 cm and height 8 cm. Stuart's friend Patrick thinks the glass will overflow. Answer the following questions.

a. Will Stuart's glass overflow?

b. If the glass was full, what volume of fluid would it contain.

Show your work here.

TASK 8 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

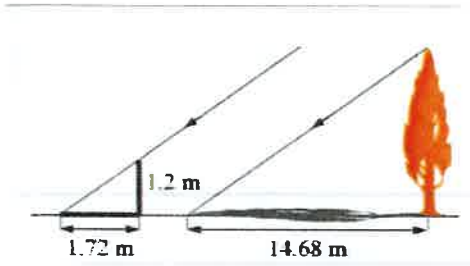
I Dont remember how to do it.

TASK 9: LOGICAL REASONING

Dean needs to accurately find the height of a tree in his garden. Local Council regulations prohibit the growth of garden trees beyond 20 m. They argue that in storm conditions falling branches and uprooted large trees are dangers to houses and lives. As Dean cannot climb the tree, he decides to use shadows to help solve the problem. On a windless sunny day, he stands a 1.2 m stick vertically on the ground. The length of the stick's shadow is 1.72 m and at the same time, the tree's shadow measures 14.68 m.

Using the diagram to estimate:

- The height of the tree
- The angle of elevation of the sun (the angle that the sun's rays make with the horizontal ground



TASK 9 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I can't remember the formula.

TASK 10: HEARTBEAT

The average person's heart beats 70 times per minute. It can be shown that the average person's heart beats 2.57 billion times in a lifetime.

a. According to this information, how long is the average life span?
b. What assumptions have to be made to solve this problem? How do they affect your answer to part **a?**

Show your work and explain.

TASK 10 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I don't know how to do it.

TASK 11: PALEONTOLOGY

Archaeologists use a coordinate grid system when excavating a site. This allows them to easily record the location of artefacts at a site, which simplifies future excavations. If the coordinates (in cm) of the top and bottom of the arm bone of this dinosaur skeleton are (6.2, 22.3) and (9.1, 11.8), find the length of the arm bone, rounded to the nearest tenth of a centimetre. (Assume that the arm bone is perfectly straight).

TASK 11 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3)-------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I don't know how to do it.

TASK 12: GREAT BLUE HOLE TASK

When faced with the problem of trying to breathe underwater, ocean explorer, Jacques Cousteau, designed an underwater breathing apparatus called the Aqualung. It was the precursor of today's scuba gear and allowed Cousteau to explore places that had never been seen before. In 1972, he explored the Great Blue Hole, a cylindrical formation in Belize which began forming over 70 million years ago. The great Blue Hole has a depth of roughly 125 m. If there is 9132700 m^3 of water in the Great Blue Hole, find its radius. Round your answer to the nearest tenth. (Volume of cylinder = $\pi r^2 h$).

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Not motivated at all (1)------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

There is a lot of writing.
+ I didn't really understand it.

TASK 13: CURRENCY CONVERSION TASK

Claudia lives in Canada. She is planning a holiday to Norway. She exchanges 2000 CAD into Norwegian kroners at a rate of 1 CAD = 6.99 CAD.

1. Calculate how many Norwegian Kroners she receives.
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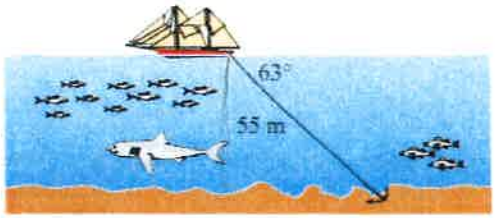
Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

It seems like a long calculation process.

TASK 14: WHERE THE ANCHOR LIES

A boat has an anchor rope length of 55 m. The boat drifts with the ocean current so that the rope makes an angle of 63 degrees with the surface of the water. Find the depth of the water at the position where the anchor lies at the bottom.



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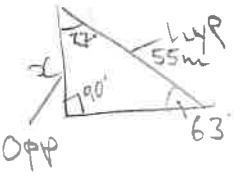
Not motivated at all (1) ------- (2) -------(3) -------(4)-------(5) Very motivated

Write a short explanation below why you felt that way.

I enjoy working with trigonometry.

Solution 1: 14 : where the anchor lies.



$63 + 90 = 153$

$180 - 153 = 27.$

$\sin\theta = \frac{Opp}{hyp}$ → $\sin 63° = \frac{x}{55}$ → $\sin(63°) \times 55 = x$

$x = 49\,m$

Solution 2: 7 ∴ Divisible by 7.

3374 → 337
- 8
329

↳ 329

= 32
- 18
14

14 is a multiple of 7,

So, 3374 is divisible by 7.

(4)

TASK RATING QUESTIONNAIRE

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TASK NUMBER 1: UNIT MAKES DIFFERENCE

In 1983, an Air Canada flight ran out of fuel halfway through its journey due to a mix-up between pounds and kilograms. The plane needed 22300 kg of fuel for the journey. There were 7682 litres of fuel already in the tanks.

a. One litre of jet fuel has a mass of 0.803 kg. Calculate how much fuel should have been loaded. Give your answer in litres.
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Not motivated at all (1) -------(2)-------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I am not really a fan of weight questions etc. I find them a bit confusing.

TASK 2: THE MAGIC SQUARES

Show that each square is a magic square by showing that the rows, columns and the diagonals all have the same sum.

2x-2y	-x+3y	2x-y
x + y	x	x-y
y	3x-3y	2y

3y-2x	-x-5y	6x+2y
9x-y	x	y-7x
-4x-2y	3x+5y	4x-3y

TASK 2 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

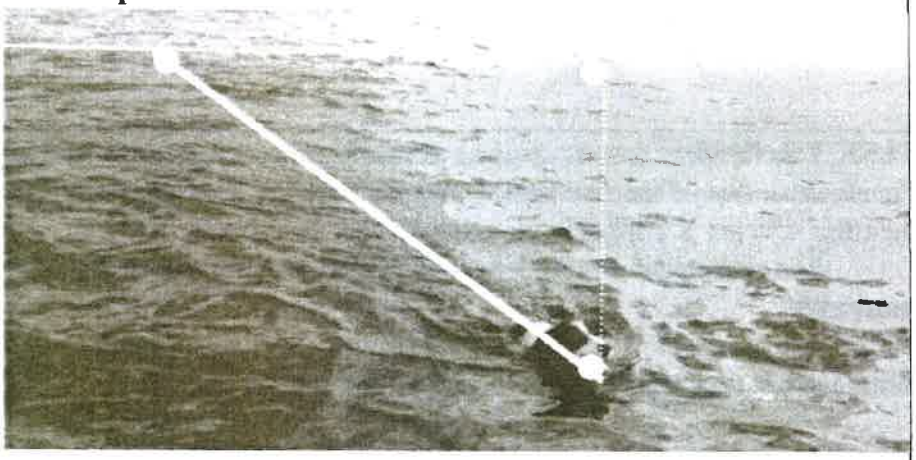
Not motivated at all (1) ------- (2) -------(3) -------[(4)]-------(5) Very motivated

Write a short explanation below why you felt that way.

It is different than other questions I am used to so it sounded interesting. ~~But it is also~~ But it also seems a bit repetitive so it is not a 5.

TASK 3: APACHE THE BORDER COLLIE

Apache the border Collie



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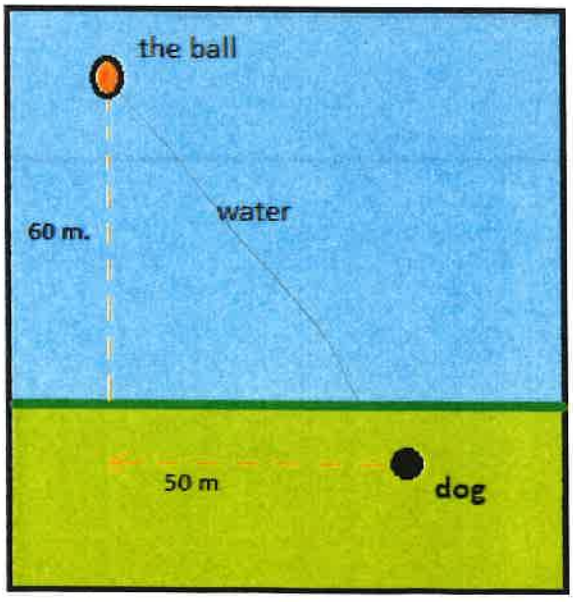
The situation is like this: The Labradors jump immediately in the water and swim straight to the ball. Apache runs for about 50 m along the bank and then jumps to swim to the ball. Why would Apache run 50 m and then have the shortest distance for swimming? Is Apache really smart?

Please note that one meter of swimming takes four meters of running in time.)



Please explain your solution.

TASK 3 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

The text was confusing however the diagram helped a lot, I liked the diagram, I also like pythagorean theorem, so

TASK 4: A4 PUZZLE

Take two sheets of A4 size paper. Roll one into a short cylinder and the other into a tall cylinder. Does one hold more than the other?

Please explain your answer and show your work.

TASK 4 Reflection: Just by reading this task, do you feel motivated to solve it?

Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3)-------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I don't really have that much feeling towards it, like it doesn't seem that motivating but not not motivated.

TASK 5: PERCENTAGES

Find the unknowns: X, Y, Z.

S.No	Name of the item	Marked Price	Selling Price	Discount
i)	Book	225 kr	X	8%
ii)	LED TV	Y	11970 kr	5%
iii)	Digital clock	750 kr	615 kr	Z

Show your work here.

i. $100 - 8 = 92 \rightarrow 225(0.92) \rightarrow 207$

ii. $100 + 5 = 105 \rightarrow 11970(1.05) \rightarrow 12568.5$

iii. $\frac{615}{750} = 0.82 \times 100 = 82\% \rightarrow 100 - 82 = 18\%$ discount

TASK 5 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) -------(2)-------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I don't like percentages that much. I could do it it is just not that fun in my opinion.

TASK 6: LOGICAL REASONING

Your friend says she passes a field every day on the way to school, and each day, without exception, she sees **a farmer wearing a straw hat feeding a carrot to a brown horse.** Look at the following general statements and rank them in order from most likely to be true to least likely to be true.

- *The horse never eats anything but carrots.*
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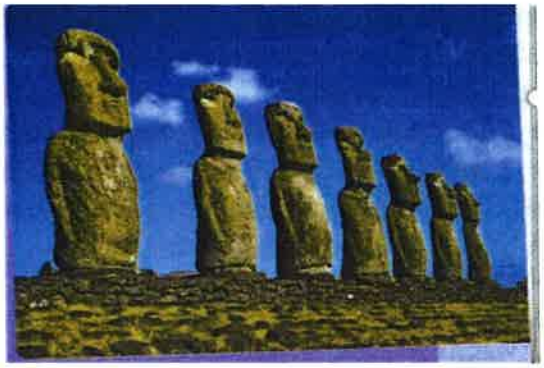
Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

There are too few numbers. I like doing math with numbers this seems easy and not that fun.

TASK 7: DIVISIBLE BY 7

Is **3843** evenly divisible by 7? To see if a number is evenly divisible by 7, remove the units digit of the number, double the removed digit and subtract the doubled amount from the remaining number. If the result is evenly divisible by 7, then the original number is also divisible by 7. The method may need to be repeated several times.



384 3 remove the units digit, 3, leaving 384:

384
-6 subtract the doubled number 3

378 remove the units digit, 8, leaving 37:

37
-16 subtract the doubled number 8

21 This is a multiple of 7, so 3843 is evenly divisible by 7.

This is a specific example that works with the method described.
Use the above method to check whether 3374 is evenly divisible by 7

TASK 7 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3)-------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

This method does seem interesting to use, but it seems like a long method.

TASK 8: LOGICAL REASONING

Stuart has a 330 mL bottle of orange juice. He thinks he can pour it all into his glass, which is a cylinder with diameter 7 cm and height 8 cm. Stuart's friend Patrick thinks the glass will overflow. Answer the following questions.

a. Will Stuart's glass overflow?

b. If the glass was full, what volume of fluid would it contain.

Show your work here.

TASK 8 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) ------- (3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

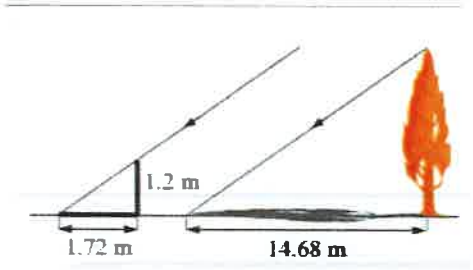
I like the picture, but the task itself is straight forward. I am quite neutral towards it. It is easy to understand which I think is good.

TASK 9: LOGICAL REASONING

Dean needs to accurately find the height of a tree in his garden. Local Council regulations prohibit the growth of garden trees beyond 20 m. They argue that in storm conditions falling branches and uprooted large trees are dangers to houses and lives. As Dean cannot climb the tree, he decides to use shadows to help solve the problem. On a windless sunny day, he stands a 1.2 m stick vertically on the ground. The length of the stick's shadow is 1.72 m and at the same time, the tree's shadow measures 14.68 m.

Using the diagram to estimate:

- The height of the tree
- The angle of elevation of the sun (the angle that the sun's rays make with the horizontal ground



TASK 9 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4)-------(5) Very motivated

Write a short explanation below why you felt that way.

This I believe is trigonometry and I liked that unit and thought it was fun. I like that you have to think a little bit before figuring out what to do but it is not so confusing that you won't be able to figure out what to do.

TASK 10: HEARTBEAT

The average person's heart beats 70 times per minute. It can be shown that the average person's heart beats 2.57 billion times in a lifetime.

a. According to this information, how long is the average life span?
b. What assumptions have to be made to solve this problem? How do they affect your answer to part **a?**

Show your work and explain.

TASK 10 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

The task sounds interesting but I am stuck on how to solve it. And the way I have thought is long and not appealing.

TASK 11: PALEONTOLOGY

Archaeologists use a coordinate grid system when excavating a site. This allows them to easily record the location of artefacts at a site, which simplifies future excavations. If the coordinates (in cm) of the top and bottom of the arm bone of this dinosaur skeleton are (6.2, 22.3) and (9.1, 11.8), find the length of the arm bone, rounded to the nearest tenth of a centimetre. (Assume that the arm bone is perfectly straight).

TASK 11 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4)-------(5) Very motivated

Write a short explanation below why you felt that way.

For this task you would have to draw and I think that is fun, It is also a bit easy, some tasks are funner when they are challenging but not too challenging and this one is a bit too easy.

TASK 12: GREAT BLUE HOLE TASK

When faced with the problem of trying to breathe underwater, ocean explorer, Jacques Cousteau, designed an underwater breathing apparatus called the Aqualung. It was the precursor of today's scuba gear and allowed Cousteau to explore places that had never been seen before. In 1972, he explored the Great Blue Hole, a cylindrical formation in Belize which began forming over 70 million years ago. The great Blue Hole has a depth of roughly 125 m. If there is 9132700 m^3 of water in the Great Blue Hole, find its radius. Round your answer to the nearest tenth. (Volume of cylinder = $\pi r^2 h$).

TASK 12 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) ------- (3) ------- (4) ------- (5) Very motivated

Write a short explanation below why you felt that way.

The picture makes the task more intriguing.

TASK 13: CURRENCY CONVERSION TASK

Claudia lives in Canada. She is planning a holiday to Norway. She exchanges 2000 CAD into Norwegian kroners at a rate of 1 CAD = 6.99 CAD.

1. Calculate how many Norwegian Kroners she receives.
2. Before she even leaves Canada, Claudia becomes ill and has to cancel her holiday. She sells the Norwegian Kroners back to the bank at a rate of 1 NOK = 0.12 CAD. Calculate how many Canadian Dollars she receives.
3. Determine how much money the bank makes from the two transactions.
4. Calculate Claudia's loss as percentage of her original 2000 CAD.

TASK 13 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

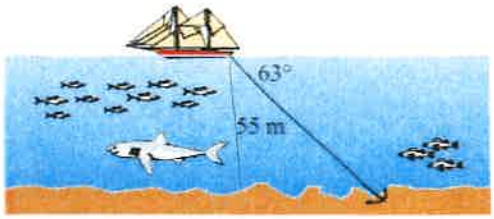
Not motivated at all **(1)** **------- (2) -------(3) -------(4) -------(5) Very motivated**

Write a short explanation below why you felt that way.

This Task is confusing.

TASK 14: WHERE THE ANCHOR LIES

A boat has an anchor rope length of 55 m. The boat drifts with the ocean current so that the rope makes an angle of 63 degrees with the surface of the water. Find the depth of the water at the position where the anchor lies at the bottom.



TASK 14 Reflection: Just by reading this task, do you feel motivated to solve it?
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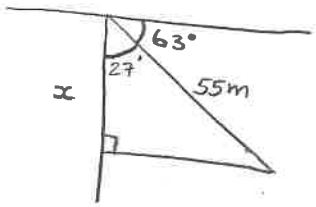
Not motivated at all (1) ------- (2) -------(3) -------(4)-------(5) Very motivated

Write a short explanation below why you felt that way.

It seems intresting and I think the diagram makes it easier to solve. Again I like trigonometry.

Solution 1: Task 19



$90 - 63 = 27°$

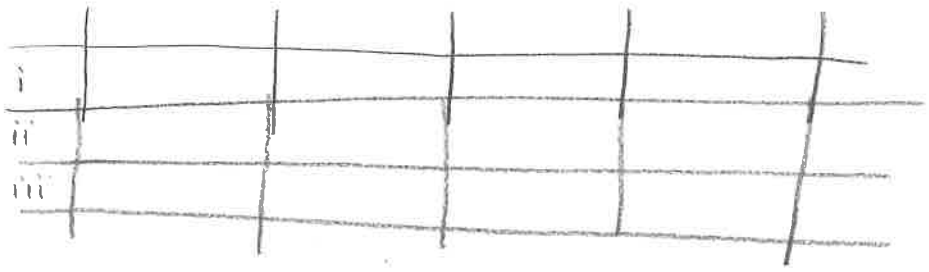
$\cos 27 = \frac{x}{55}$

$0.891 = \frac{x}{55}$

$0.891 \times 55 = x$

$x = 49.005\ m$

Solution 2: Task 5 — solved on the question thing



i. $100 - 8 = 92$

$225(0.92) = 207$ kr

ii. $100 + 5 = 105$

$11970(1.05) = 12568.5$ kr

iii. $\frac{615}{750} = 0.82$

$100 \times 0.82 = 82$

$100 - 82 = 12\%$

(5)

TASK RATING QUESTIONNAIRE

PART A: Please read and try to understand the following mathematical tasks. There are 14 of them below. After reading the task, rate the task on the degree to which you find it motivating or engaging. Then explain the reasons for why you thought it was so in the space provided. There is no right or wrong answer on this, it is important to indicate just how you feel about them.

TASK NUMBER 1: UNIT MAKES DIFFERENCE

In 1983, an Air Canada flight ran out of fuel halfway through its journey due to a mix-up between pounds and kilograms. The plane needed 22300 kg of fuel for the journey. There were 7682 litres of fuel already in the tanks.

a. One litre of jet fuel has a mass of 0.803 kg. Calculate how much fuel should have been loaded. Give your answer in litres.
b. Instead of 0.803 kg per litre, a conversion of 1.77 was used. (One litre of jet fuel has a mass of 1.77 pounds). Calculate how much fuel was actually loaded. Give your answer in litres.
c. Find how many litres short of fuel the plane was.

TASK 1 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3)-------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Some things were a bit confusing and hard to understand, but it looked fun and interesting.

TASK 2: THE MAGIC SQUARES

Show that each square is a magic square by showing that the rows, columns and the diagonals all have the same sum.

2x-2y	-x+3y	2x-y
x + y	x	x-y
y	3x-3y	2y

3y-2x	-x-5y	6x+2y
9x-y	x	y-7x
-4x-2y	3x+5y	4x-3y

TASK 2 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

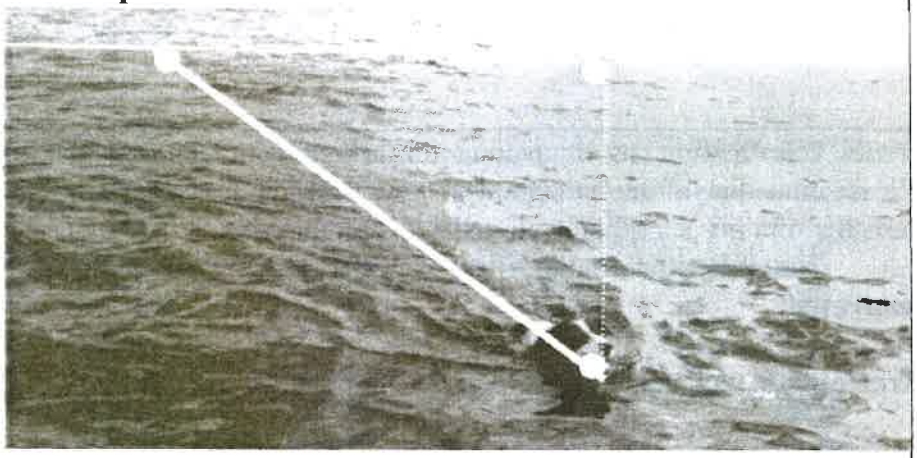
Not motivated at all (1) ------- (2) -------(3) -------(4)-------(5) Very motivated

Write a short explanation below why you felt that way.

I could see the logic in the task, and it seemed fairly fun and interesting.

TASK 3: APACHE THE BORDER COLLIE

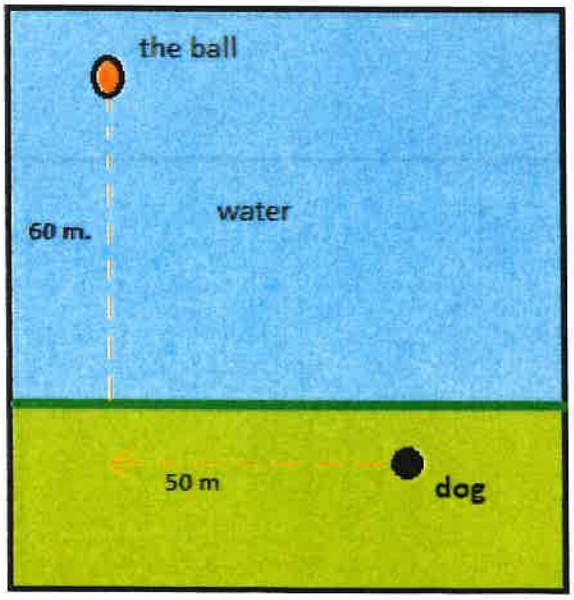
Apache the border Collie



In 2001, Ian Forbes from Edinburgh wrote, in the journal *MicroMath*:

I have a 2-year-old dog, a Border collie named Apache and after a year of avoiding deep water she recently met three Labradors at the local lake. These dogs love to swim and I named them the "submarine brigade" because of their ability to dive straight in and swim after the ball. After meeting them, Apache quickly took to swimming, but being a dog with 'brains,' she discovered that she could beat the rest by running along the bank and then diving in.
The situation is like this: The Labradors jump immediately in the water and swim straight to the ball. Apache runs for about 50 m along the bank and then jumps to swim to the ball. Why would Apache run 50 m and then have the shortest distance for swimming? Is Apache really smart?

Please note that one meter of swimming takes four meters of running in time.)



Please explain your solution.

TASK 3 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Dogs. You gotta love dogs with brains and logic!

TASK 4: A4 PUZZLE

Take two sheets of A4 size paper. Roll one into a short cylinder and the other into a tall cylinder. Does one hold more than the other?

Please explain your answer and show your work.

TASK 4 Reflection: Just by reading this task, do you feel motivated to solve it?

Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I am not very motivated because the task is too easy.

TASK 5: PERCENTAGES

Find the unknowns: X, Y, Z.

S.No	Name of the item	Marked Price	Selling Price	Discount
i)	Book	225 kr	X	8%
ii)	LED TV	Y	11970 kr	5%
iii)	Digital clock	750 kr	615 kr	Z

Show your work here.

i.

ii.

iii.

TASK 5 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

It makes me think, but still too easy.

TASK 6: LOGICAL REASONING

Your friend says she passes a field every day on the way to school, and each day, without exception, she sees **a farmer wearing a straw hat feeding a carrot to a brown horse**. Look at the following general statements and rank them in order from most likely to be true to least likely to be true.

1 — 7
least likely — most likely

- *The horse never eats anything but carrots.* 2
- *The farmer feeds the horse only on school days.* 1
- *The farmer is the only person who feeds the house.* 5
- *Your friend never walks to school.* 3
- *The farmer always wears a hat.* 6
- *The horse is not a racing horse.* 4
- *Your friend travels to school at the same time every day.* 7

TASK 6 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I am very fond of logic tasks, so I therefore want to solve this task.

TASK 7: DIVISIBLE BY 7

Is **3843** evenly divisible by 7? To see if a number is evenly divisible by 7, remove the units digit of the number, double the removed digit and subtract the doubled amount from the remaining number. If the result is evenly divisible by 7, then the original number is also divisible by 7. The method may need to be repeated several times.

384**3** remove the units digit, 3, leaving 384:

384
-6 subtract the doubled number 3

378 remove the units digit, 8, leaving 37:

37
-16 subtract the doubled number 8

21 This is a multiple of 7, so 3843 is evenly divisible by 7.

This is a specific example that works with the method described.
Use the above method to check whether 3374 is evenly divisible by 7

3374
337
- 8
=329

32
-18
=14 is a multiple of 7, therefore 3374 is evenly divisible by 7.

TASK 7 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) ------(5) Very motivated

Write a short explanation below why you felt that way.

I am told how to do it, therefore I am motivated to try it myself.

TASK 8: LOGICAL REASONING

Stuart has a 330 mL bottle of orange juice. He thinks he can pour it all into his glass, which is a cylinder with diameter 7 cm and height 8 cm. Stuart's friend Patrick thinks the glass will overflow. Answer the following questions.

a. Will Stuart's glass overflow?

b. If the glass was full, what volume of fluid would it contain.

Show your work here.

TASK 8 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

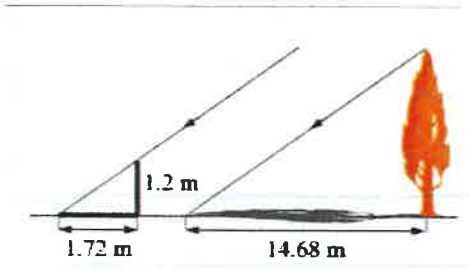
I'm no good at volume, man.

TASK 9: LOGICAL REASONING

Dean needs to accurately find the height of a tree in his garden. Local Council regulations prohibit the growth of garden trees beyond 20 m. They argue that in storm conditions falling branches and uprooted large trees are dangers to houses and lives. As Dean cannot climb the tree, he decides to use shadows to help solve the problem. On a windless sunny day, he stands a 1.2 m stick vertically on the ground. The length of the stick's shadow is 1.72 m and at the same time, the tree's shadow measures 14.68 m.

Using the diagram to estimate:

- The height of the tree
- The angle of elevation of the sun (the angle that the sun's rays make with the horizontal ground



TASK 9 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4)-------(5) Very motivated

Write a short explanation below why you felt that way.

It is familiar. Therefore I would do it because it's old news.

TASK 10: HEARTBEAT

The average person's heart beats 70 times per minute. It can be shown that the average person's heart beats 2.57 billion times in a lifetime.

a. According to this information, how long is the average life span?
b. What assumptions have to be made to solve this problem? How do they affect your answer to part **a?**

Show your work and explain.

TASK 10 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Logic, using past knowledge to solve a problem. Assumptions. All good and motivating things

TASK 11: PALEONTOLOGY

Archaeologists use a coordinate grid system when excavating a site. This allows them to easily record the location of artefacts at a site, which simplifies future excavations. If the coordinates (in cm) of the top and bottom of the arm bone of this dinosaur skeleton are (6.2, 22.3) and (9.1, 11.8), find the length of the arm bone, rounded to the nearest tenth of a centimetre. (Assume that the arm bone is perfectly straight).

TASK 11 Reflection: Just by reading this task, do you feel motivated to solve it?
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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Uninteresting task.

TASK 12: GREAT BLUE HOLE TASK

When faced with the problem of trying to breathe underwater, ocean explorer, Jacques Cousteau, designed an underwater breathing apparatus called the Aqualung. It was the precursor of today's scuba gear and allowed Cousteau to explore places that had never been seen before. In 1972, he explored the Great Blue Hole, a cylindrical formation in Belize which began forming over 70 million years ago. The great Blue Hole has a depth of roughly 125 m. If there is 9132700 m^3 of water in the Great Blue Hole, find its radius. Round your answer to the nearest tenth. (Volume of cylinder = $\pi r^2 h$).

$3.14 \times r^2 \times 125 = 9132700$

$r^2 = 9132700 - 3.14 \times 125$

$r^2 = 9132307.5$

$\sqrt{r} = \sqrt{3021.970797}$

$r \approx 3020$ m

TASK 12 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Gives me everything I need to understand it nicely. Story is motivating/interests me and makes me want to do the task.

TASK 13: CURRENCY CONVERSION TASK

Claudia lives in Canada. She is planning a holiday to Norway. She exchanges 2000 CAD into Norwegian kroners at a rate of 1 CAD = 6.99 ~~CAD.~~ NOK

1. Calculate how many Norwegian Kroners she receives. → 13,980 kr
2. Before she even leaves Canada, Claudia becomes ill and has to cancel her holiday. She sells the Norwegian Kroners back to the bank at a rate of 1 NOK = 0.12 CAD. Calculate how many Canadian Dollars she receives. → 1677.6
3. Determine how much money the bank makes from the two transactions. → 322.4 (CAD)
4. Calculate Claudia's loss as percentage of her original 2000 CAD. → 16.12 %

TASK 13 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

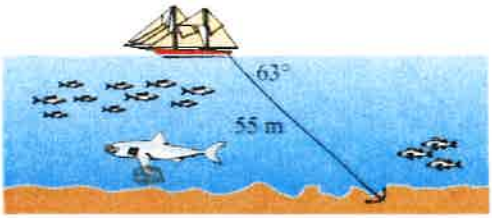
Not motivated at all (1) ------- (2) -------(3) -------(4)-------(5) Very motivated

Write a short explanation below why you felt that way.

Easy to calculate, so fairly motivating

TASK 14: WHERE THE ANCHOR LIES

A boat has an anchor rope length of 55 m. The boat drifts with the ocean current so that the rope makes an angle of 63 degrees with the surface of the water. Find the depth of the water at the position where the anchor lies at the bottom.



TASK 14 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

The shark looks like it's on drugs, so not motivating but glasses on him and a book in his fin.

Solution 1:

Solution 2:

(6)

TASK RATING QUESTIONNAIRE

PART A: Please read and try to understand the following mathematical tasks. There are 14 of them below. After reading the task, rate the task on the degree to which you find it motivating or engaging. Then explain the reasons for why you thought it was so in the space provided. There is no right or wrong answer on this, it is important to indicate just how you feel about them.

TASK NUMBER 1: UNIT MAKES DIFFERENCE

In 1983, an Air Canada flight ran out of fuel halfway through its journey due to a mix-up between pounds and kilograms. The plane needed 22300 kg of fuel for the journey. There were 7682 litres of fuel already in the tanks.

a. One litre of jet fuel has a mass of 0.803 kg. Calculate how much fuel should have been loaded. Give your answer in litres.
b. Instead of 0.803 kg per litre, a conversion of 1.77 was used. (One litre of jet fuel has a mass of 1.77 pounds). Calculate how much fuel was actually loaded. Give your answer in litres.
c. Find how many litres short of fuel the plane was.

TASK 1 Reflection: Just by reading this task, do you feel motivated to solve it?
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Not motivated at all (1) ------- ((2)) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

It is a confusing unit to me

TASK 2: THE MAGIC SQUARES

Show that each square is a magic square by showing that the rows, columns and the diagonals all have the same sum.

2x-2y	-x+3y	2x-y
x + y	x	x-y
y	3x-3y	2y

3y-2x	-x-5y	6x+2y
9x-y	x	y-7x
-4x-2y	3x+5y	4x-3y

TASK 2 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

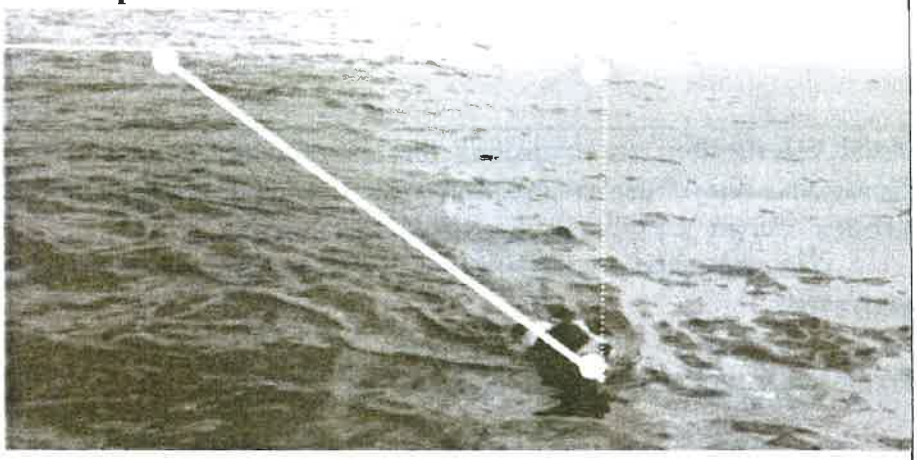
Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Don't really understand the task

TASK 3: APACHE THE BORDER COLLIE

Apache the border Collie



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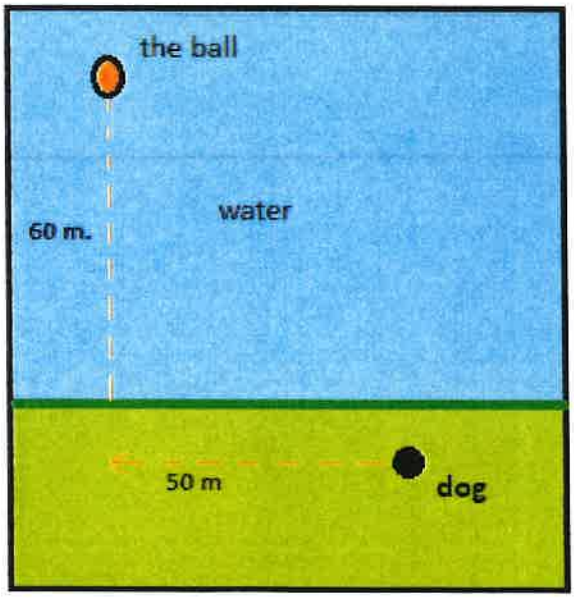
The situation is like this: The Labradors jump immediately in the water and swim straight to the ball. Apache runs for about 50 m along the bank and then jumps to swim to the ball. Why would Apache run 50 m and then have the shortest distance for swimming? Is Apache really smart?

Please note that one meter of swimming takes four meters of running in time.)



Please explain your solution.

TASK 3 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Well explained.

Seems easy to answer

TASK 4: A4 PUZZLE

Take two sheets of A4 size paper. Roll one into a short cylinder and the other into a tall cylinder. Does one hold more than the other?

Please explain your answer and show your work.

TASK 4 Reflection: Just by reading this task, do you feel motivated to solve it?

Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(④) -------(5) Very motivated

Write a short explanation below why you felt that way.

Easy problem. but confusing picture
why is there that picture?

TASK 5: PERCENTAGES

Find the unknowns: X, Y, Z.

S.No	Name of the item	Marked Price	Selling Price	Discount
i)	Book	225 kr	X	8%
ii)	LED TV	Y	11970 kr	5%
iii)	Digital clock	750 kr	615 kr	Z

Show your work here.

i.

ii.

iii.

TASK 5 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------((4)) -------(5) Very motivated

Write a short explanation below why you felt that way.

Well explained

TASK 6: LOGICAL REASONING

Your friend says she passes a field every day on the way to school, and each day, without exception, she sees **a farmer wearing a straw hat feeding a carrot to a brown horse.** Look at the following general statements and rank them in order from most likely to be true to least likely to be true.

- *The horse never eats anything but carrots.*
- *The farmer feeds the horse only on school days.*
- *The farmer is the only person who feeds the house.*
- *Your friend never walks to school.*
- *The farmer always wears a hat.*
- *The horse is not a racing horse.*
- *Your friend travels to school at the same time every day.*

TASK 6 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

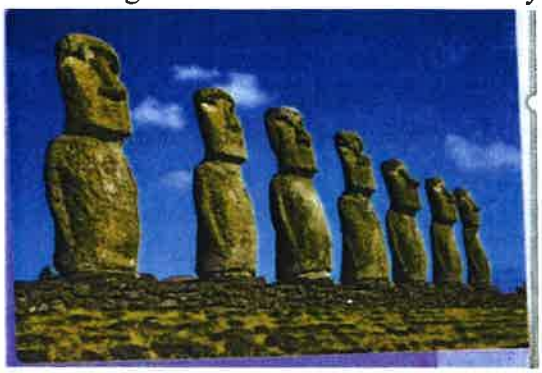
Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Easy . but needs a bit more of information to be able to answer.

TASK 7: DIVISIBLE BY 7

Is **3843** evenly divisible by 7? To see if a number is evenly divisible by 7, remove the units digit of the number, double the removed digit and subtract the doubled amount from the remaining number. If the result is evenly divisible by 7, then the original number is also divisible by 7. The method may need to be repeated several times.



384 3 remove the units digit, 3, leaving 384:

384
-6 subtract the doubled number 3

378 remove the units digit, 8, leaving 37:

37
-16 subtract the doubled number 8

21 This is a multiple of 7, so 3843 is evenly divisible by 7.

This is a specific example that works with the method described.
Use the above method to check whether 3374 is evenly divisible by 7

TASK 7 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------((5)) Very motivated

Write a short explanation below why you felt that way.

Explains you how to do it

TASK 8: LOGICAL REASONING

Stuart has a 330 mL bottle of orange juice. He thinks he can pour it all into his glass, which is a cylinder with diameter 7 cm and height 8 cm. Stuart's friend Patrick thinks the glass will overflow. Answer the following questions.

a. Will Stuart's glass overflow?

b. If the glass was full, what volume of fluid would it contain.

Show your work here.

TASK 8 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(⑤) Very motivated

Write a short explanation below why you felt that way.

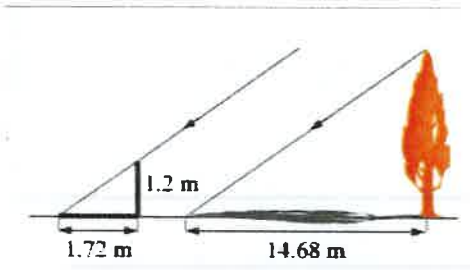
explained well
has a picture to follow

TASK 9: LOGICAL REASONING

Dean needs to accurately find the height of a tree in his garden. Local Council regulations prohibit the growth of garden trees beyond 20 m. They argue that in storm conditions falling branches and uprooted large trees are dangers to houses and lives. As Dean cannot climb the tree, he decides to use shadows to help solve the problem. On a windless sunny day, he stands a 1.2 m stick vertically on the ground. The length of the stick's shadow is 1.72 m and at the same time, the tree's shadow measures 14.68 m.

Using the diagram to estimate:

- The height of the tree
- The angle of elevation of the sun (the angle that the sun's rays make with the horizontal ground



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Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Easy kind of problem
Gives enough information.

TASK 10: HEARTBEAT

The average person's heart beats 70 times per minute. It can be shown that the average person's heart beats 2.57 billion times in a lifetime.

a. According to this information, how long is the average life span?
b. What assumptions have to be made to solve this problem? How do they affect your answer to part **a?**

Show your work and explain.

TASK 10 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(③) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

need to make assumptions, answer might not be correct

TASK 11: PALEONTOLOGY

Archaeologists use a coordinate grid system when excavating a site. This allows them to easily record the location of artefacts at a site, which simplifies future excavations. If the coordinates (in cm) of the top and bottom of the arm bone of this dinosaur skeleton are (6.2, 22.3) and (9.1, 11.8), find the length of the arm bone, rounded to the nearest tenth of a centimetre. (Assume that the arm bone is perfectly straight).

TASK 11 Reflection: Just by reading this task, do you feel motivated to solve it?
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Not motivated at all (1) ------- (2) -------(3) -------(④) -------(5) Very motivated

Write a short explanation below why you felt that way.

Easy to answer but confused why there are two different numbers.

TASK 12: GREAT BLUE HOLE TASK

When faced with the problem of trying to breathe underwater, ocean explorer, Jacques Cousteau, designed an underwater breathing apparatus called the Aqualung. It was the precursor of today's scuba gear and allowed Cousteau to explore places that had never been seen before. In 1972, he explored the Great Blue Hole, a cylindrical formation in Belize which began forming over 70 million years ago. The great Blue Hole has a depth of roughly 125 m. If there is 9132700 m^3 of water in the Great Blue Hole, find its radius. Round your answer to the nearest tenth. (Volume of cylinder = $\pi r^2 h$).

TASK 12 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- ((2)) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

have to convert high numbers

TASK 13: CURRENCY CONVERSION TASK

Claudia lives in Canada. She is planning a holiday to Norway. She exchanges 2000 CAD into Norwegian kroners at a rate of 1 CAD = 6.99 CAD.

1. Calculate how many Norwegian Kroners she receives.
2. Before she even leaves Canada, Claudia becomes ill and has to cancel her holiday. She sells the Norwegian Kroners back to the bank at a rate of 1 NOK = 0.12 CAD. Calculate how many Canadian Dollars she receives.
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4. Calculate Claudia's loss as percentage of her original 2000 CAD.

TASK 13 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

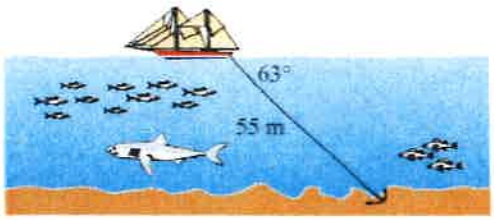
Not motivated at all (1) ------- (2) -------(③) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

have to convert a lot of numbers

TASK 14: WHERE THE ANCHOR LIES

A boat has an anchor rope length of 55 m. The boat drifts with the ocean current so that the rope makes an angle of 63 degrees with the surface of the water. Find the depth of the water at the position where the anchor lies at the bottom.



TASK 14 Reflection: Just by reading this task, do you feel motivated to solve it?
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Not motivated at all (1) ------- (2) -------(3) -------(4) -------((5)) Very motivated

Write a short explanation below why you felt that way.

Gives you a diagram explaining it

Solution 1: Task 7

3374 divisible by 7?

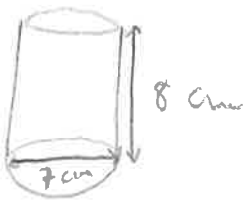
337
- 8 $4 \times 2 = 8$
329

32
- 18 $9 \times 2 = 18$
14

14 is divisible by 7, so 3374 is divisible by 7.

Solution 2: Task 8

$V = \pi r^2 h$



$7 \div 3.5 = r$

$V = \pi\ 3.5^2 \times 8$

$V = \pi\ 12.25 \times 8$

$V = 307.88\ ml$

$330 - 307.88 = 22.12$ it will overflow

(7)

TASK RATING QUESTIONNAIRE

PART A: Please read and try to understand the following mathematical tasks. There are 14 of them below. After reading the task, rate the task on the degree to which you find it motivating or engaging. Then explain the reasons for why you thought it was so in the space provided. There is no right or wrong answer on this, it is important to indicate just how you feel about them.

TASK NUMBER 1: UNIT MAKES DIFFERENCE

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c. Find how many litres short of fuel the plane was.

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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

3. It is not that easy but it is not hard either.

TASK 2: THE MAGIC SQUARES

Show that each square is a magic square by showing that the rows, columns and the diagonals all have the same sum.

2x-2y	-x+3y	2x-y
x + y	x	x-y
y	3x-3y	2y

3y-2x	-x-5y	6x+2y
9x-y	x	y-7x
-4x-2y	3x+5y	4x-3y

TASK 2 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

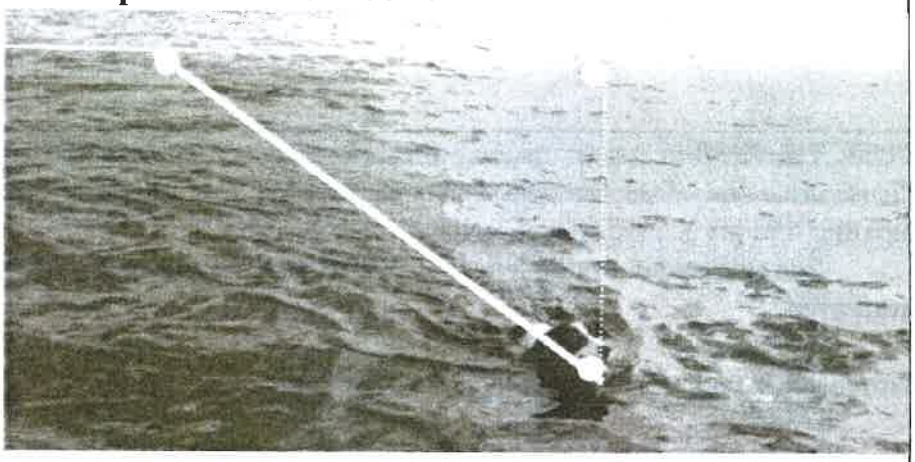
Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

1. I don't understand this task.

TASK 3: APACHE THE BORDER COLLIE

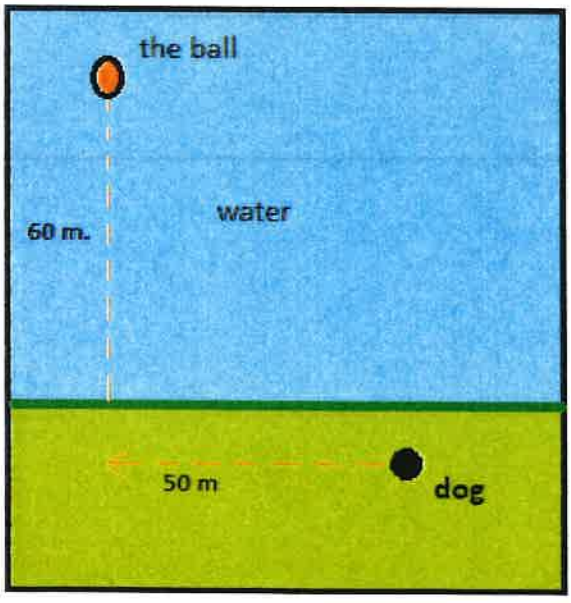
Apache the border Collie



In 2001, Ian Forbes from Edinburgh wrote, in the journal *MicroMath*:

I have a 2-year-old dog, a Border collie named Apache and after a year of avoiding deep water she recently met three Labradors at the local lake. These dogs love to swim and I named them the "submarine brigade" because of their ability to dive straight in and swim after the ball. After meeting them, Apache quickly took to swimming, but being a dog with 'brains,' she discovered that she could beat the rest by running along the bank and then diving in.
The situation is like this: The Labradors jump immediately in the water and swim straight to the ball. Apache runs for about 50 m along the bank and then jumps to swim to the ball. Why would Apache run 50 m and then have the shortest distance for swimming? Is Apache really smart?

Please note that one meter of swimming takes four meters of running in time.)



Please explain your solution.

TASK 3 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

5. It is easy to understand.

TASK 4: A4 PUZZLE

Take two sheets of A4 size paper. Roll one into a short cylinder and the other into a tall cylinder. Does one hold more than the other?

Please explain your answer and show your work.

TASK 4 Reflection: Just by reading this task, do you feel motivated to solve it?

Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

4. It is simple to understand.

TASK 5: PERCENTAGES

Find the unknowns: X, Y, Z.

S.No	Name of the item	Marked Price	Selling Price	Discount
i)	Book	225 kr	X	8%
ii)	LED TV	Y	11970 kr	5%
iii)	Digital clock	750 kr	615 kr	Z

Show your work here.

i.

ii.

iii.

TASK 5 Reflection: Just by reading this task, do you feel motivated to solve it?
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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

5. It is easy because it has linear equation.

TASK 6: LOGICAL REASONING

Your friend says she passes a field every day on the way to school, and each day, without exception, she sees **a farmer wearing a straw hat feeding a carrot to a brown horse**. Look at the following general statements and rank them in order from most likely to be true to least likely to be true.

- *The horse never eats anything but carrots.*
- *The farmer feeds the horse only on school days.*
- *The farmer is the only person who feeds the house.*
- *Your friend never walks to school.*
- *The farmer always wears a hat.*
- *The horse is not a racing horse.*
- *Your friend travels to school at the same time every day.*

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Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

5. This is very easy as it only needs common sense to it.

TASK 7: DIVISIBLE BY 7

Is **3843** evenly divisible by 7? To see if a number is evenly divisible by 7, remove the units digit of the number, double the removed digit and subtract the doubled amount from the remaining number. If the result is evenly divisible by 7, then the original number is also divisible by 7. The method may need to be repeated several times.

384**3** remove the units digit, 3, leaving 384:

384
-6 subtract the doubled number 3

---

378 remove the units digit, 8, leaving 37:

37
-16 subtract the doubled number 8

---

21 This is a multiple of 7, so 3843 is evenly divisible by 7.

This is a specific example that works with the method described.
Use the above method to check whether 3374 is evenly divisible by 7

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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

5. This is a very easy task as the method is already given.

TASK 8: LOGICAL REASONING

Stuart has a 330 mL bottle of orange juice. He thinks he can pour it all into his glass, which is a cylinder with diameter 7 cm and height 8 cm. Stuart's friend Patrick thinks the glass will overflow. Answer the following questions.

a. Will Stuart's glass overflow?

b. If the glass was full, what volume of fluid would it contain.

Show your work here.

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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

4. It is easy if you know the formula.

TASK 9: LOGICAL REASONING

Dean needs to accurately find the height of a tree in his garden. Local Council regulations prohibit the growth of garden trees beyond 20 m. They argue that in storm conditions falling branches and uprooted large trees are dangers to houses and lives. As Dean cannot climb the tree, he decides to use shadows to help solve the problem. On a windless sunny day, he stands a 1.2 m stick vertically on the ground. The length of the stick's shadow is 1.72 m and at the same time, the tree's shadow measures 14.68 m.

Using the diagram to estimate:

- The height of the tree
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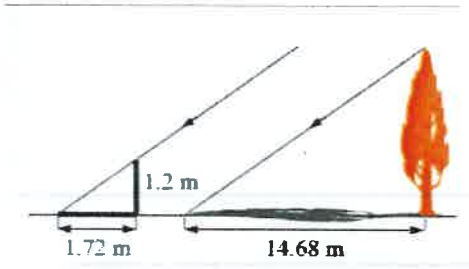

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Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

3. This is easy but time consuming.

TASK 10: HEARTBEAT

The average person's heart beats 70 times per minute. It can be shown that the average person's heart beats 2.57 billion times in a lifetime.

a. According to this information, how long is the average life span?
b. What assumptions have to be made to solve this problem? How do they affect your answer to part **a?**

Show your work and explain.

TASK 10 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

4. This is easy if you have a calculator.

TASK 11: PALEONTOLOGY

Archaeologists use a coordinate grid system when excavating a site. This allows them to easily record the location of artefacts at a site, which simplifies future excavations. If the coordinates (in cm) of the top and bottom of the arm bone of this dinosaur skeleton are (6.2, 22.3) and (9.1, 11.8), find the length of the arm bone, rounded to the nearest tenth of a centimetre. (Assume that the arm bone is perfectly straight).

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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

5. This is easy if you know the distance formula.

TASK 12: GREAT BLUE HOLE TASK

When faced with the problem of trying to breathe underwater, ocean explorer, Jacques Cousteau, designed an underwater breathing apparatus called the Aqualung. It was the precursor of today's scuba gear and allowed Cousteau to explore places that had never been seen before. In 1972, he explored the Great Blue Hole, a cylindrical formation in Belize which began forming over 70 million years ago. The great Blue Hole has a depth of roughly 125 m. If there is 9132700 m^3 of water in the Great Blue Hole, find its radius. Round your answer to the nearest tenth. (Volume of cylinder = $\pi r^2 h$).

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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

3. This is time consuming.

TASK 13: CURRENCY CONVERSION TASK

Claudia lives in Canada. She is planning a holiday to Norway. She exchanges 2000 CAD into Norwegian kroners at a rate of 1 CAD = 6.99 CAD.

1. Calculate how many Norwegian Kroners she receives.
2. Before she even leaves Canada, Claudia becomes ill and has to cancel her holiday. She sells the Norwegian Kroners back to the bank at a rate of 1 NOK = 0.12 CAD. Calculate how many Canadian Dollars she receives.
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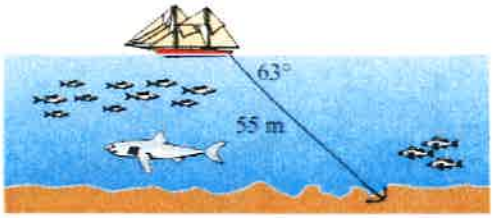
Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

4. This is easy but slightly time consuming.

TASK 14: WHERE THE ANCHOR LIES

A boat has an anchor rope length of 55 m. The boat drifts with the ocean current so that the rope makes an angle of 63 degrees with the surface of the water. Find the depth of the water at the position where the anchor lies at the bottom.



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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

3. Only one of the sides are given making it time consuming.

Solution 1:

Task 5.

Ans:- 1) Marked price − Discount = Selling Price.

$\therefore 225 - \frac{8}{100} = x.$

$\Rightarrow 225 - 8 = x \times 100$

$\Rightarrow 100x = 217.$

$\Rightarrow x = \frac{217}{100} = 2.17$ kr.

Selling price = 225 − 2.17 = 222.83 kr.

2) Selling Price + Discount = Marked Price

$\therefore 11970 + \frac{5}{100} = x$

$\Rightarrow 11975 = 100x \Rightarrow x = \frac{11975}{100} = 119.75$ kr.

Marked price = 11975 + 119.75 = 12094.75 kr.

3) Marked price − Selling Price = Discount.

750 − 615 = Discount.

$\Rightarrow 135.$

$\therefore \frac{135}{750} \times 100 = 18\%.$

Ans:- Discount = 18%.

Solution 2:

Task 3

If we see it as a triangle then we have 60 m as perpendicular, 50 m as base and let us consider x as hypotenuse.

If we use pythagarus theoram:

$$P^2 + B^2 = H^2$$

$$\therefore (60)^2 + (50)^2 = H^2$$

$$3600 + 2500 = H^2$$

$$\Rightarrow 6100 = H^2$$

$$\Rightarrow \sqrt{6100} = H$$

$$\Rightarrow H = 78\text{m (Approximately)}.$$

Dog's time to the ball = $50 + 60 \times 4 = 50 + 240 = 290$ m of time.

Labrador's time to the ball = $78 \times 4 = 312$ m of time.

Ans:- Apache is smart as it can reach faster to the ball from the labrador.

8

TASK RATING QUESTIONNAIRE

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In 1983, an Air Canada flight ran out of fuel halfway through its journey due to a mix-up between pounds and kilograms. The plane needed 22300 kg of fuel for the journey. There were 7682 litres of fuel already in the tanks.

a. One litre of jet fuel has a mass of 0.803 kg. Calculate how much fuel should have been loaded. Give your answer in litres.
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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

The text is to long.
the photo looks to confusing.

TASK 2: THE MAGIC SQUARES

Show that each square is a magic square by showing that the rows, columns and the diagonals all have the same sum.

2x-2y	-x+3y	2x-y
x + y	x	x-y
y	3x-3y	2y

3y-2x	-x-5y	6x+2y
9x-y	x	y-7x
-4x-2y	3x+5y	4x-3y

TASK 2 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

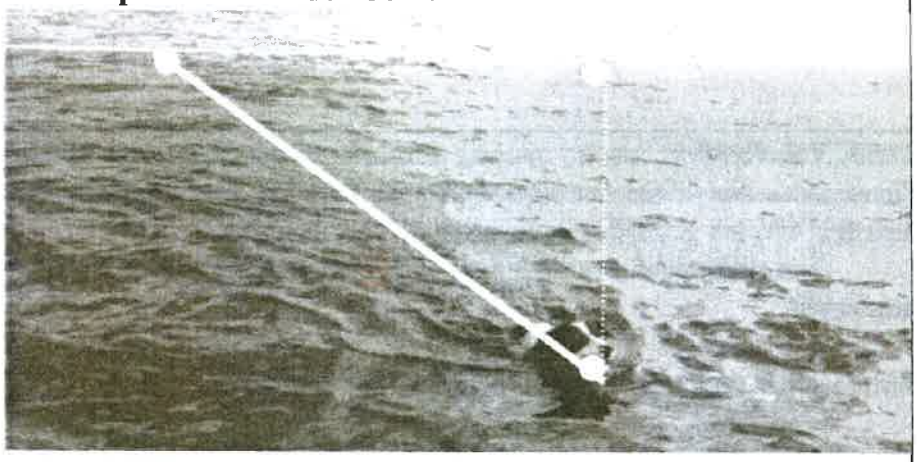
Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

It looks confusing with all those boxes and numbers including symbols and letters.

TASK 3: APACHE THE BORDER COLLIE

Apache the border Collie



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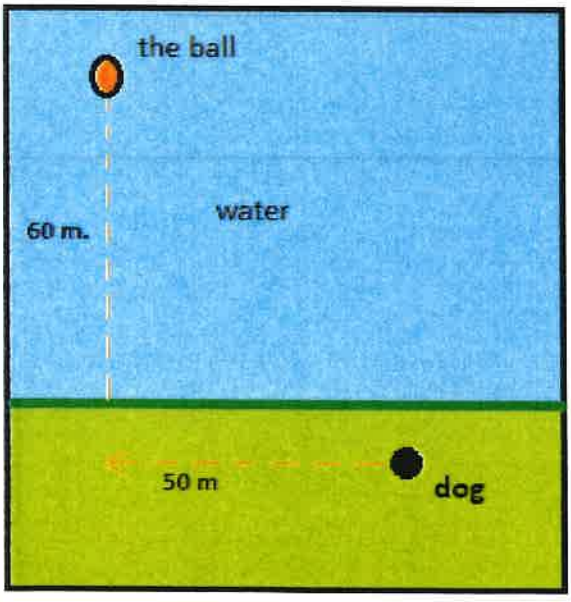
The situation is like this: The Labradors jump immediately in the water and swim straight to the ball. Apache runs for about 50 m along the bank and then jumps to swim to the ball. Why would Apache run 50 m and then have the shortest distance for swimming? Is Apache really smart?

Please note that one meter of swimming takes four meters of running in time.)



Please explain your solution.

TASK 3 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

The text overcomplecates the task and the photos look like they dont make the task make no sense. the task question is even more confusing then the photos make it.

TASK 4: A4 PUZZLE

Take two sheets of A4 size paper. Roll one into a short cylinder and the other into a tall cylinder. Does one hold more than the other?

Please explain your answer and show your work.

no they hold the same amount

TASK 4 Reflection: Just by reading this task, do you feel motivated to solve it?

Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

it starts off fine untill it starts with the a4 paper.

the question "Does one hold more then the other?" makes it very confusing.

TASK 5: PERCENTAGES

Find the unknowns: X, Y, Z.

S.No	Name of the item	Marked Price	Selling Price	Discount
i)	Book	225 kr	X	8%
ii)	LED TV	Y	11970 kr	5%
iii)	Digital clock	750 kr	615 kr	Z

Show your work here.

i.

ii.

iii.

TASK 5 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

it looks over complecated.

TASK 6: LOGICAL REASONING

Your friend says she passes a field every day on the way to school, and each day, without exception, she sees **a farmer wearing a straw hat feeding a carrot to a brown horse**. Look at the following general statements and rank them in order from most likely to be true to least likely to be true.

- *The horse never eats anything but carrots.* (not likely)
- *The farmer feeds the horse only on school days.* (likely)
- *The farmer is the only person who feeds the house.* (most likely)
- *Your friend never walks to school.* (not likely)
- *The farmer always wears a hat.* (likely)
- *The horse is not a racing horse.* (most likely)
- *Your friend travels to school at the same time every day.* (most likely)

TASK 6 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

It was a simple but also hard question.

TASK 7: DIVISIBLE BY 7

Is **3843** evenly divisible by 7? To see if a number is evenly divisible by 7, remove the units digit of the number, double the removed digit and subtract the doubled amount from the remaining number. If the result is evenly divisible by 7, then the original number is also divisible by 7. The method may need to be repeated several times.

3843 remove the units digit, 3, leaving 384:

384
-6 subtract the doubled number 3

378 remove the units digit, 8, leaving 37:

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21 This is a multiple of 7, so 3843 is evenly divisible by 7.

This is a specific example that works with the method described.
Use the above method to check whether 3374 is evenly divisible by 7

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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

The equation and fractions make it a little bit complecated.
and confusing.

TASK 8: LOGICAL REASONING

Stuart has a 330 mL bottle of orange juice. He thinks he can pour it all into his glass, which is a cylinder with diameter 7 cm and height 8 cm. Stuart's friend Patrick thinks the glass will overflow. Answer the following questions.

a. Will Stuart's glass overflow?

b. If the glass was full, what volume of fluid would it contain.

Show your work here.

TASK 8 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

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Write a short explanation below why you felt that way.

The question is a little bit complecated and confusing.

TASK 9: LOGICAL REASONING

Dean needs to accurately find the height of a tree in his garden. Local Council regulations prohibit the growth of garden trees beyond 20 m. They argue that in storm conditions falling branches and uprooted large trees are dangers to houses and lives. As Dean cannot climb the tree, he decides to use shadows to help solve the problem. On a windless sunny day, he stands a 1.2 m stick vertically on the ground. The length of the stick's shadow is 1.72 m and at the same time, the tree's shadow measures 14.68 m.

Using the diagram to estimate:

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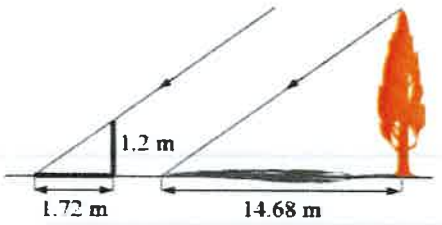

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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

The text is to long and confusing

TASK 10: HEARTBEAT

The average person's heart beats 70 times per minute. It can be shown that the average person's heart beats 2.57 billion times in a lifetime.

a. According to this information, how long is the average life span?
b. What assumptions have to be made to solve this problem? How do they affect your answer to part **a?**

Show your work and explain.

TASK 10 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

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The question is a tiny bit confusing.

TASK 11: PALEONTOLOGY

Archaeologists use a coordinate grid system when excavating a site. This allows them to easily record the location of artefacts at a site, which simplifies future excavations. If the coordinates (in cm) of the top and bottom of the arm bone of this dinosaur skeleton are (6.2, 22.3) and (9.1, 11.8), find the length of the arm bone, rounded to the nearest tenth of a centimetre. (Assume that the arm bone is perfectly straight).

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When faced with the problem of trying to breathe underwater, ocean explorer, Jacques Cousteau, designed an underwater breathing apparatus called the Aqualung. It was the precursor of today's scuba gear and allowed Cousteau to explore places that had never been seen before. In 1972, he explored the Great Blue Hole, a cylindrical formation in Belize which began forming over 70 million years ago. The great Blue Hole has a depth of roughly 125 m. If there is 9132700 m^3 of water in the Great Blue Hole, find its radius. Round your answer to the nearest tenth. (Volume of cylinder = $\pi r^2 h$).

TASK 12 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

There is a little bit to much text

TASK 13: CURRENCY CONVERSION TASK

Claudia lives in Canada. She is planning a holiday to Norway. She exchanges 2000 CAD into Norwegian kroners at a rate of 1 CAD = 6.99 CAD.

1. Calculate how many Norwegian Kroners she receives.
2. Before she even leaves Canada, Claudia becomes ill and has to cancel her holiday. She sells the Norwegian Kroners back to the bank at a rate of 1 NOK = 0.12 CAD. Calculate how many Canadian Dollars she receives.
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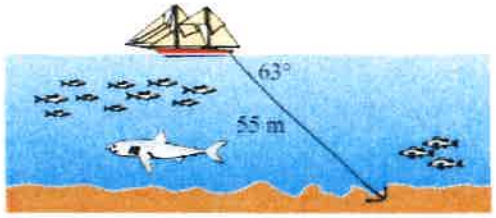
Write a short explanation below why you felt that way.

it made sense at the start but then it got a bit over complecated at the end.

TASK 14: WHERE THE ANCHOR LIES

A boat has an anchor rope length of 55 m. The boat drifts with the ocean current so that the rope makes an angle of 63 degrees with the surface of the water. Find the depth of the water at the position where the anchor lies at the bottom.



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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

The question is simple so it maks sense.

Solution 1:

Solution 2:

9 I deserve a 10

TASK RATING QUESTIONNAIRE

PART A: Please read and try to understand the following mathematical tasks. There are 14 of them below. After reading the task, rate the task on the degree to which you find it motivating or engaging. Then explain the reasons for why you thought it was so in the space provided. There is no right or wrong answer on this, it is important to indicate just how you feel about them.

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Write a short explanation below why you felt that way.

It's alot of writing and it's abc tasks

TASK 2: THE MAGIC SQUARES

Show that each square is a magic square by showing that the rows, columns and the diagonals all have the same sum.

2x-2y	-x+3y	2x-y
x + y	x	x-y
y	3x-3y	2y

3y-2x	-x-5y	6x+2y
9x-y	x	y-7x
-4x-2y	3x+5y	4x-3y

TASK 2 Reflection: Just by reading this task, do you feel motivated to solve it?
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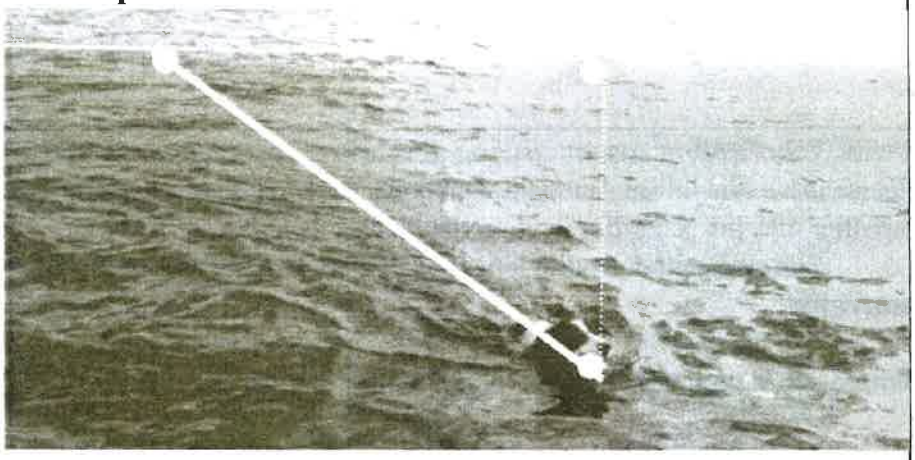
Not motivated at all (1) ------- (2) -------(③) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I've never done this before. I don't get it

TASK 3: APACHE THE BORDER COLLIE

Apache the border Collie



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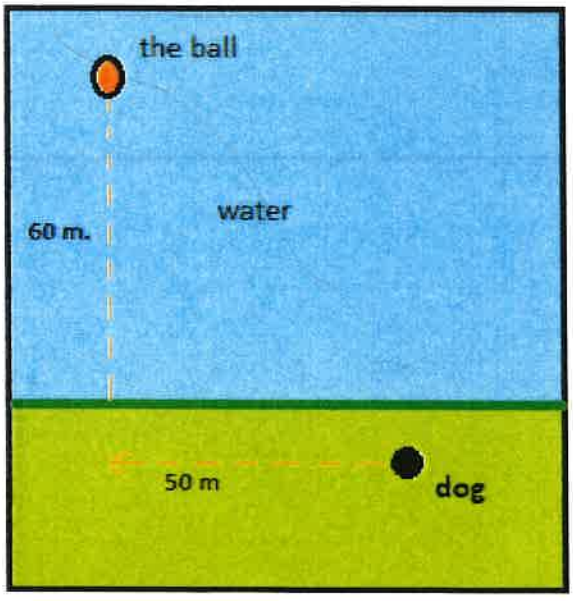

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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

3,5

Write a short explanation below why you felt that way.

I like it it's pythagoras but i don't remember how to do it and I don't like math.

TASK 4: A4 PUZZLE

Take two sheets of A4 size paper. Roll one into a short cylinder and the other into a tall cylinder. Does one hold more than the other?

Please explain your answer and show your work.

TASK 4 Reflection: Just by reading this task, do you feel motivated to solve it?

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Not motivated at all (1) ------- ((2)) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I wasn't here when ~~we're~~ the people in my class had this and my teacher refused to teach it cause he said "you've had about this in your old school" (I didn't).

TASK 5: PERCENTAGES

Find the unknowns: X, Y, Z.

S.No	Name of the item	Marked Price	Selling Price	Discount
i)	Book	225 kr	X	8%
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iii)	Digital clock	750 kr	615 kr	Z

Show your work here.

i.

ii.

iii.

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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I never had persentages, my teacher don't believe me !!

TASK 6: LOGICAL REASONING

Your friend says she passes a field every day on the way to school, and each day, without exception, she sees **a farmer wearing a straw hat feeding a carrot to a brown horse**. Look at the following general statements and rank them in order from most likely to be true to least likely to be true.

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- *The horse is not a racing horse.* 6
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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(⑤) Very motivated

Write a short explanation below why you felt that way.

This is probably the only thing I can do.

TASK 7: DIVISIBLE BY 7

Is **3843** evenly divisible by 7? To see if a number is evenly divisible by 7, remove the units digit of the number, double the removed digit and subtract the doubled amount from the remaining number. If the result is evenly divisible by 7, then the original number is also divisible by 7. The method may need to be repeated several times.

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This is a specific example that works with the method described.
Use the above method to check whether 3374 is evenly divisible by 7

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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

It's numbers in it !!

TASK 8: LOGICAL REASONING

Stuart has a 330 mL bottle of orange juice. He thinks he can pour it all into his glass, which is a cylinder with diameter 7 cm and height 8 cm. Stuart's friend Patrick thinks the glass will overflow. Answer the following questions.

a. Will Stuart's glass overflow?

b. If the glass was full, what volume of fluid would it contain.

Show your work here.

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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I don't remember this

TASK 9: LOGICAL REASONING

Dean needs to accurately find the height of a tree in his garden. Local Council regulations prohibit the growth of garden trees beyond 20 m. They argue that in storm conditions falling branches and uprooted large trees are dangers to houses and lives. As Dean cannot climb the tree, he decides to use shadows to help solve the problem. On a windless sunny day, he stands a 1.2 m stick vertically on the ground. The length of the stick's shadow is 1.72 m and at the same time, the tree's shadow measures 14.68 m.

Using the diagram to estimate:

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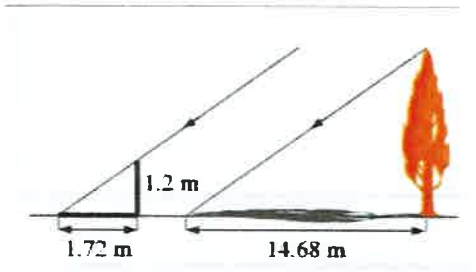

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Not motivated at all (1) ------- (2) -------(③) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

pythagoras is kinda gross

TASK 10: HEARTBEAT

The average person's heart beats 70 times per minute. It can be shown that the average person's heart beats 2.57 billion times in a lifetime.

a. According to this information, how long is the average life span?
b. What assumptions have to be made to solve this problem? How do they affect your answer to part **a?**

Show your work and explain.

TASK 10 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (②) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I don't like word questions

TASK 11: PALEONTOLOGY

Archaeologists use a coordinate grid system when excavating a site. This allows them to easily record the location of artefacts at a site, which simplifies future excavations. If the coordinates (in cm) of the top and bottom of the arm bone of this dinosaur skeleton are (6.2, 22.3) and (9.1, 11.8), find the length of the arm bone, rounded to the nearest tenth of a centimetre. (Assume that the arm bone is perfectly straight).

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Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (①) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

It's like science and Math and I don't like either

TASK 12: GREAT BLUE HOLE TASK

When faced with the problem of trying to breathe underwater, ocean explorer, Jacques Cousteau, designed an underwater breathing apparatus called the Aqualung. It was the precursor of today's scuba gear and allowed Cousteau to explore places that had never been seen before. In 1972, he explored the Great Blue Hole, a cylindrical formation in Belize which began forming over 70 million years ago. The great Blue Hole has a depth of roughly 125 m. If there is 9132700 m^3 of water in the Great Blue Hole, find its radius. Round your answer to the nearest tenth. (Volume of cylinder = $\pi r^2 h$).

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Write a short explanation below why you felt that way.

I don't need the backstory

TASK 13: CURRENCY CONVERSION TASK

Claudia lives in Canada. She is planning a holiday to Norway. She exchanges 2000 CAD into Norwegian kroners at a rate of 1 CAD = 6.99 CAD.

1. Calculate how many Norwegian Kroners she receives.
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Words

TASK 14: WHERE THE ANCHOR LIES

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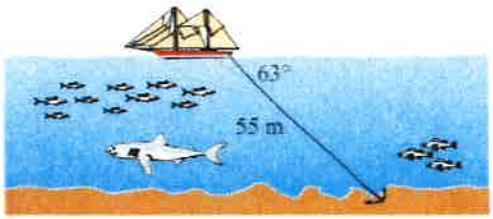

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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I don't know how to do this

Solution 1: Task 6

probability order:

7
5
3
1
2
6
4

Solution 2: Task 7

3374

$33\not{7}^{10}7$

$-\quad 8$

$=\ 329$

$\not{3}^{10}2$

$-\ 18$

$=\ 14$

14 is a multiple of 7 so I guess 3374 is dividable by 7.

(10)

TASK RATING QUESTIONNAIRE

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Write a short explanation below why you felt that way.

There are a lot of numbers, but the picture makes it more motivating and fun.

TASK 2: THE MAGIC SQUARES

Show that each square is a magic square by showing that the rows, columns and the diagonals all have the same sum.

2x-2y	-x+3y	2x-y
x + y	x	x-y
y	3x-3y	2y

3y-2x	-x-5y	6x+2y
9x-y	x	y-7x
-4x-2y	3x+5y	4x-3y

TASK 2 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

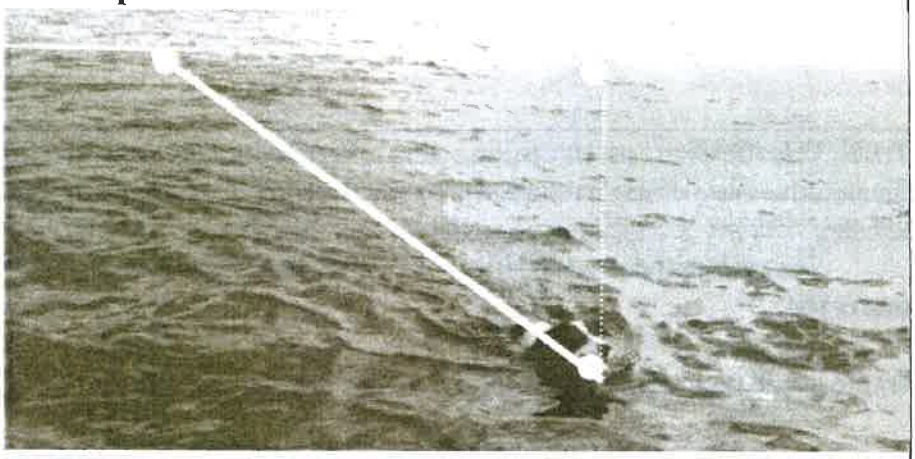
Not motivated at all (1) -------(2)-------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

All the numbers make it look hard and complicated, but the colours help a bit.

TASK 3: APACHE THE BORDER COLLIE

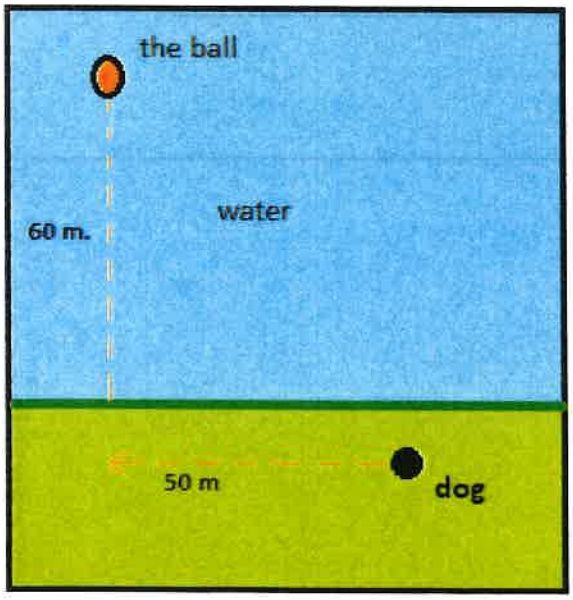
Apache the border Collie



In 2001, Ian Forbes from Edinburgh wrote, in the journal *MicroMath*:

I have a 2-year-old dog, a Border collie named Apache and after a year of avoiding deep water she recently met three Labradors at the local lake. These dogs love to swim and I named them the "submarine brigade" because of their ability to dive straight in and swim after the ball. After meeting them, Apache quickly took to swimming, but being a dog with 'brains,' she discovered that she could beat the rest by running along the bank and then diving in.
The situation is like this: The Labradors jump immediately in the water and swim straight to the ball. Apache runs for about 50 m along the bank and then jumps to swim to the ball. Why would Apache run 50 m and then have the shortest distance for swimming? Is Apache really smart?

Please note that one meter of swimming takes four meters of running in time.)



Yes, Apache is smart because she's swimming directly to the ball, while the others have to swim to the side, + running is faster

Please explain your solution.

TASK 3 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4)-------(5) Very motivated

Write a short explanation below why you felt that way.

I felt that this was OK to solve because it included a diagram with colours, and good informative writing.

TASK 4: A4 PUZZLE

Take two sheets of A4 size paper. Roll one into a short cylinder and the other into a tall cylinder. Does one hold more than the other?

Please explain your answer and show your work.

TASK 4 Reflection: Just by reading this task, do you feel motivated to solve it?

Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4)-------(5) Very motivated

Write a short explanation below why you felt that way.

Motivating and looks fun because of the colourful Picture that has been included.

TASK 5: PERCENTAGES

Find the unknowns: X, Y, Z.

S.No	Name of the item	Marked Price	Selling Price	Discount
i)	Book	225 kr	X	8%
ii)	LED TV	Y	11970 kr	5%
iii)	Digital clock	750 kr	615 kr	Z

Show your work here.

i.

ii.

iii.

TASK 5 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4)-------(5) Very motivated

Write a short explanation below why you felt that way.

This is motivating because it includes real life situations with money, which I find interesting.

TASK 6: LOGICAL REASONING

Your friend says she passes a field every day on the way to school, and each day, without exception, she sees **a farmer wearing a straw hat feeding a carrot to a brown horse.** Look at the following general statements and rank them in order from most likely to be true to least likely to be true.

- *The horse never eats anything but carrots.* = 4
- *The farmer feeds the horse only on school days.* = 5
- *The farmer is the only person who feeds the house.* = 7
- *Your friend never walks to school.* = 6
- *The farmer always wears a hat.* = 2
- *The horse is not a racing horse.* = 3
- *Your friend travels to school at the same time every day.* = 1

1 = Most likely to be true 7 = least likely to be true

TASK 6 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

This motivated me because it didn't include a lot of math and wasn't boring. It was fun to solve this.

TASK 7: DIVISIBLE BY 7

Is **3843** evenly divisible by 7? To see if a number is evenly divisible by 7, remove the units digit of the number, double the removed digit and subtract the doubled amount from the remaining number. If the result is evenly divisible by 7, then the original number is also divisible by 7. The method may need to be repeated several times.

3843 remove the units digit, 3, leaving 384:

384
-6 subtract the doubled number 3

378 remove the units digit, 8, leaving 37:

37
-16 subtract the doubled number 8

21 This is a multiple of 7, so 3843 is evenly divisible by 7.

This is a specific example that works with the method described.
Use the above method to check whether 3374 is evenly divisible by 7

3374

337
- 8
328

=32
-18
=14

3374 is evenly divisible by 7!

TASK 7 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

This was fun and motivating because it came with an instruction on how you did it.

TASK 8: LOGICAL REASONING

Stuart has a 330 mL bottle of orange juice. He thinks he can pour it all into his glass, which is a cylinder with diameter 7 cm and height 8 cm. Stuart's friend Patrick thinks the glass will overflow. Answer the following questions.

a. Will Stuart's glass overflow?

b. If the glass was full, what volume of fluid would it contain.

Show your work here.

TASK 8 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) -------(2)-------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

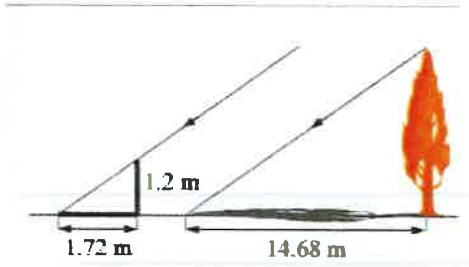
This wasn't very motivating because it included a "real life" situation that seemed a bit unrealistic.

TASK 9: LOGICAL REASONING

Dean needs to accurately find the height of a tree in his garden. Local Council regulations prohibit the growth of garden trees beyond 20 m. They argue that in storm conditions falling branches and uprooted large trees are dangers to houses and lives. As Dean cannot climb the tree, he decides to use shadows to help solve the problem. On a windless sunny day, he stands a 1.2 m stick vertically on the ground. The length of the stick's shadow is 1.72 m and at the same time, the tree's shadow measures 14.68 m.

Using the diagram to estimate:

- The height of the tree
- The angle of elevation of the sun (the angle that the sun's rays make with the horizontal ground



TASK 9 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) -------(2)-------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

this wasn't motivating because it included a diagram that made it look hard.

TASK 10: HEARTBEAT

The average person's heart beats 70 times per minute. It can be shown that the average person's heart beats 2.57 billion times in a lifetime.

a. According to this information, how long is the average life span?
b. What assumptions have to be made to solve this problem? How do they affect your answer to part **a?**

Show your work and explain.

TASK 10 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4)-------(5) Very motivated

Write a short explanation below why you felt that way.

This was motivating as you get numbers and you're supposed to figure out something important.

TASK 11: PALEONTOLOGY

Archaeologists use a coordinate grid system when excavating a site. This allows them to easily record the location of artefacts at a site, which simplifies future excavations. If the coordinates (in cm) of the top and bottom of the arm bone of this dinosaur skeleton are (6.2, 22.3) and (9.1, 11.8), find the length of the arm bone, rounded to the nearest tenth of a centimetre. (Assume that the arm bone is perfectly straight).

TASK 11 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

This is motivating to me as it includes coordinates, and I like working with coordinates.

TASK 12: GREAT BLUE HOLE TASK

When faced with the problem of trying to breathe underwater, ocean explorer, Jacques Cousteau, designed an underwater breathing apparatus called the Aqualung. It was the precursor of today's scuba gear and allowed Cousteau to explore places that had never been seen before. In 1972, he explored the Great Blue Hole, a cylindrical formation in Belize which began forming over 70 million years ago. The great Blue Hole has a depth of roughly 125 m. If there is 9132700 m^3 of water in the Great Blue Hole, find its radius. Round your answer to the nearest tenth. (Volume of cylinder = $\pi r^2 h$).

TASK 12 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3)-------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

It was motivating when looking at the Photo but then all the numbers mate it look a bit complicated.

TASK 13: CURRENCY CONVERSION TASK

Claudia lives in Canada. She is planning a holiday to Norway. She exchanges 2000 CAD into Norwegian kroners at a rate of 1 CAD = 6.99 CAD.

1. Calculate how many Norwegian Kroners she receives.
2. Before she even leaves Canada, Claudia becomes ill and has to cancel her holiday. She sells the Norwegian Kroners back to the bank at a rate of 1 NOK = 0.12 CAD. Calculate how many Canadian Dollars she receives.
3. Determine how much money the bank makes from the two transactions.
4. Calculate Claudia's loss as percentage of her original 2000 CAD.

TASK 13 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

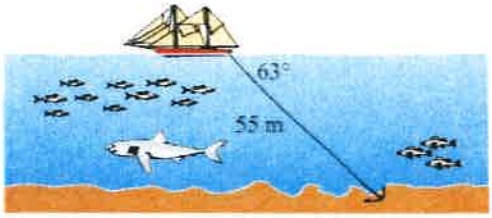
Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

This motivates me because I love everything that has to do with economy and conversion.

TASK 14: WHERE THE ANCHOR LIES

A boat has an anchor rope length of 55 m. The boat drifts with the ocean current so that the rope makes an angle of 63 degrees with the surface of the water. Find the depth of the water at the position where the anchor lies at the bottom.



TASK 14 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

This motivates me because I love the ocean and boat driving, and this seems important to me. The picture makes it a bit unrealistic, but its fine.

Solution 1:

Solution 2:

(11)

TASK RATING QUESTIONNAIRE

PART A: Please read and try to understand the following mathematical tasks. There are 14 of them below. After reading the task, rate the task on the degree to which you find it motivating or engaging. Then explain the reasons for why you thought it was so in the space provided. There is no right or wrong answer on this, it is important to indicate just how you feel about them.

TASK NUMBER 1: UNIT MAKES DIFFERENCE

In 1983, an Air Canada flight ran out of fuel halfway through its journey due to a mix-up between pounds and kilograms. The plane needed 22300 kg of fuel for the journey. There were 7682 litres of fuel already in the tanks.

a. One litre of jet fuel has a mass of 0.803 kg. Calculate how much fuel should have been loaded. Give your answer in litres.
b. Instead of 0.803 kg per litre, a conversion of 1.77 was used. (One litre of jet fuel has a mass of 1.77 pounds). Calculate how much fuel was actually loaded. Give your answer in litres.
c. Find how many litres short of fuel the plane was.

TASK 1 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(③) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

theme is good - too much text

TASK 2: THE MAGIC SQUARES

Show that each square is a magic square by showing that the rows, columns and the diagonals all have the same sum.

2x-2y	-x+3y	2x-y
x + y	x	x-y
y	3x-3y	2y

3y-2x	-x-5y	6x+2y
9x-y	x	y-7x
-4x-2y	3x+5y	4x-3y

TASK 2 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

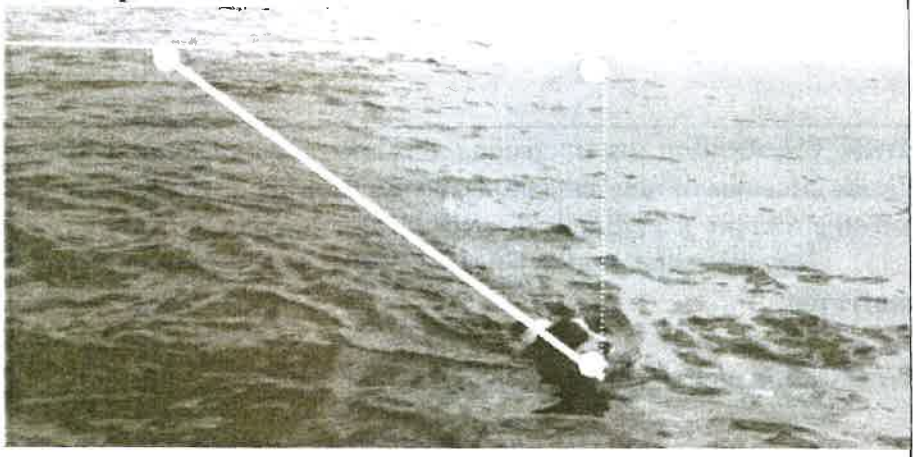
Not motivated at all (1) ------- (2) -------(3) -------(④) -------(5) Very motivated

Write a short explanation below why you felt that way.

Need more explanation.

TASK 3: APACHE THE BORDER COLLIE

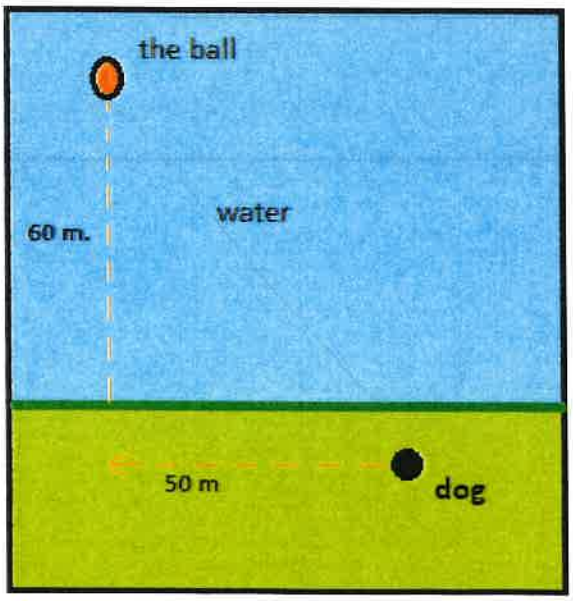
Apache the border Collie



In 2001, Ian Forbes from Edinburgh wrote, in the journal *MicroMath*:

I have a 2-year-old dog, a Border collie named Apache and after a year of avoiding deep water she recently met three Labradors at the local lake. These dogs love to swim and I named them the "submarine brigade" because of their ability to dive straight in and swim after the ball. After meeting them, Apache quickly took to swimming, but being a dog with 'brains,' she discovered that she could beat the rest by running along the bank and then diving in.
The situation is like this: The Labradors jump immediately in the water and swim straight to the ball. Apache runs for about 50 m along the bank and then jumps to swim to the ball. Why would Apache run 50 m and then have the shortest distance for swimming? Is Apache really smart?

Please note that one meter of swimming takes four meters of running in time.)



Please explain your solution.

TASK 3 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

too much unneccesary text. not enough explanation. Good pictures

TASK 4: A4 PUZZLE

Take two sheets of A4 size paper. Roll one into a short cylinder and the other into a tall cylinder. Does one hold more than the other?

Please explain your answer and show your work.

TASK 4 Reflection: Just by reading this task, do you feel motivated to solve it?

Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(④) -------(5) Very motivated

Write a short explanation below why you felt that way.

Boring picture. Enough explanation.

TASK 5: PERCENTAGES

Find the unknowns: X, Y, Z.

S.No	Name of the item	Marked Price	Selling Price	Discount
i)	Book	225 kr	X	8%
ii)	LED TV	Y	11970 kr	5%
iii)	Digital clock	750 kr	615 kr	Z

Show your work here.

i.

ii.

iii.

TASK 5 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

need more explanation, more fun with picture

TASK 6: LOGICAL REASONING

Your friend says she passes a field every day on the way to school, and each day, without exception, she sees **a farmer wearing a straw hat feeding a carrot to a brown horse**. Look at the following general statements and rank them in order from most likely to be true to least likely to be true.

- *The horse never eats anything but carrots.*
- *The farmer feeds the horse only on school days.*
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Not motivated at all (1) ------- (2) -------(3) -------(④) -------(5) Very motivated

Write a short explanation below why you felt that way.

Explained good. too easy. good theme

TASK 7: DIVISIBLE BY 7

Is **3843** evenly divisible by 7? To see if a number is evenly divisible by 7, remove the units digit of the number, double the removed digit and subtract the doubled amount from the remaining number. If the result is evenly divisible by 7, then the original number is also divisible by 7. The method may need to be repeated several times.

3843 remove the units digit, 3, leaving 384:

384
-6 subtract the doubled number 3

378 remove the units digit, 8, leaving 37:

37
-16 subtract the doubled number 8

21 This is a multiple of 7, so 3843 is evenly divisible by 7.

This is a specific example that works with the method described.
Use the above method to check whether 3374 is evenly divisible by 7

TASK 7 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(④) -------(5) Very motivated

Write a short explanation below why you felt that way.

picture not relevant. weirdly explained. Easy.

TASK 8: LOGICAL REASONING

Stuart has a 330 mL bottle of orange juice. He thinks he can pour it all into his glass, which is a cylinder with diameter 7 cm and height 8 cm. Stuart's friend Patrick thinks the glass will overflow. Answer the following questions.

a. Will Stuart's glass overflow?

b. If the glass was full, what volume of fluid would it contain.

Show your work here.

TASK 8 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(⑤) Very motivated

Write a short explanation below why you felt that way.

good pic . Easy explanation

TASK 9: LOGICAL REASONING

Dean needs to accurately find the height of a tree in his garden. Local Council regulations prohibit the growth of garden trees beyond 20 m. They argue that in storm conditions falling branches and uprooted large trees are dangers to houses and lives. As Dean cannot climb the tree, he decides to use shadows to help solve the problem. On a windless sunny day, he stands a 1.2 m stick vertically on the ground. The length of the stick's shadow is 1.72 m and at the same time, the tree's shadow measures 14.68 m.

Using the diagram to estimate:

- The height of the tree
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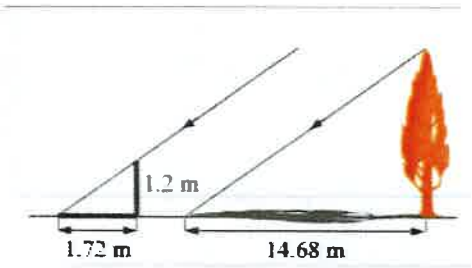

TASK 9 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

(mostly cos i can't do the task

Write a short explanation below why you felt that way.

good picture, too much text

TASK 10: HEARTBEAT

The average person's heart beats 70 times per minute. It can be shown that the average person's heart beats 2.57 billion times in a lifetime.

a. According to this information, how long is the average life span?
b. What assumptions have to be made to solve this problem? How do they affect your answer to part **a?**

Show your work and explain.

TASK 10 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Easy explained. good theme : not too much text

TASK 11: PALEONTOLOGY

Archaeologists use a coordinate grid system when excavating a site. This allows them to easily record the location of artefacts at a site, which simplifies future excavations. If the coordinates (in cm) of the top and bottom of the arm bone of this dinosaur skeleton are (6.2, 22.3) and (9.1, 11.8), find the length of the arm bone, rounded to the nearest tenth of a centimetre. (Assume that the arm bone is perfectly straight).

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Not motivated at all (1) ------- (2) -------(3) -------(④) -------(5) Very motivated

Write a short explanation below why you felt that way.

Don't really understand. Fun task.
Fun theme - good pic

TASK 12: GREAT BLUE HOLE TASK

When faced with the problem of trying to breathe underwater, ocean explorer, Jacques Cousteau, designed an underwater breathing apparatus called the Aqualung. It was the precursor of today's scuba gear and allowed Cousteau to explore places that had never been seen before. In 1972, he explored the Great Blue Hole, a cylindrical formation in Belize which began forming over 70 million years ago. The great Blue Hole has a depth of roughly 125 m. If there is 9132700 m^3 of water in the Great Blue Hole, find its radius. Round your answer to the nearest tenth. (Volume of cylinder = $\pi r^2 h$).

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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

good pic. like story. good explanation

TASK 13: CURRENCY CONVERSION TASK

Claudia lives in Canada. She is planning a holiday to Norway. She exchanges 2000 CAD into Norwegian kroners at a rate of 1 CAD = 6.99 CAD. ~ NOK?

1. Calculate how many Norwegian Kroners she receives.
2. Before she even leaves Canada, Claudia becomes ill and has to cancel her holiday. She sells the Norwegian Kroners back to the bank at a rate of 1 NOK = 0.12 CAD. Calculate how many Canadian Dollars she receives.
3. Determine how much money the bank makes from the two transactions.
4. Calculate Claudia's loss as percentage of her original 2000 CAD.

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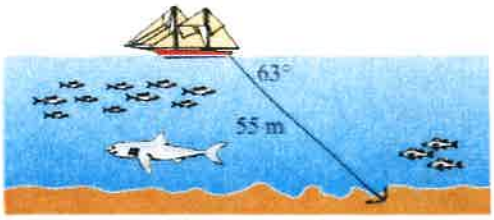
Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

like theme. enough explanation.

TASK 14: WHERE THE ANCHOR LIES

A boat has an anchor rope length of 55 m. The boat drifts with the ocean current so that the rope makes an angle of 63 degrees with the surface of the water. Find the depth of the water at the position where the anchor lies at the bottom.



TASK 14 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

if i could do it

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

mostly because i can't do it

Write a short explanation below why you felt that way.

good pic. enough explanation.

Solution 1:

Task 2

1

$2x-2y$	$-x+3y$	$2x-y$
$x+y$	x	$x-y$
y	$3x-3y$	$2y$

2

$3y-2x$	$x-5y$	$6x+2y$
$9x-y$	x	$y-7x$
$-4x-2y$	$3x+5y$	$4x-3y$

1) $2x-2y+-x+3y+2x-y = 3x$

$x+y+x+3x-y = 3x$

$y+3x-3y+2y = 3x$

$2x-2y+x+y+y = 3x$

$-x+3y+x+3x-3y = 3x$

$2x-y+3x-y+2y = 3x$

$2x-2y+x+2y = 3x$

$2x-y+x+y = 3x$

2) $3y-2x+-x-5y+6x+2y = 3x$

$9x-y+x+y-7x = 3x$

$-4x-2y+3x+5y+4x-3y = 3x$

$3y-2x+9x-y+-4x-2y = 3x$

$-x-5y+x+3x+5y = 3x$

$6x+2y+y-7x+4x-3y = 3x$

$3y-2x+x+4x-3y = 3x$

$6x+2y+x+-4x-2y = 3x$

Solution 2:

13

a) $2000 \times 6.99 = 13980$ nok

b) $13980 \times 0.12 = 1677.6$ CAD

c) the bank makes 322.4 CAD

d) $322.4 / 2000 = 0.1612 \rightarrow 16\%$

(12)

TASK RATING QUESTIONNAIRE

PART A: Please read and try to understand the following mathematical tasks. There are 14 of them below. After reading the task, rate the task on the degree to which you find it motivating or engaging. Then explain the reasons for why you thought it was so in the space provided. There is no right or wrong answer on this, it is important to indicate just how you feel about them.

TASK NUMBER 1: UNIT MAKES DIFFERENCE

In 1983, an Air Canada flight ran out of fuel halfway through its journey due to a mix-up between pounds and kilograms. The plane needed 22300 kg of fuel for the journey. There were 7682 litres of fuel already in the tanks.

a. One litre of jet fuel has a mass of 0.803 kg. Calculate how much fuel should have been loaded. Give your answer in litres.
b. Instead of 0.803 kg per litre, a conversion of 1.77 was used. (One litre of jet fuel has a mass of 1.77 pounds). Calculate how much fuel was actually loaded. Give your answer in litres.
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TASK 1 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

The text is too long, thats why it is not motivating

TASK 2: THE MAGIC SQUARES

Show that each square is a magic square by showing that the rows, columns and the diagonals all have the same sum.

2x-2y	-x+3y	2x-y
x + y	x	x-y
y	3x-3y	2y

3y-2x	-x-5y	6x+2y
9x-y	x	y-7x
-4x-2y	3x+5y	4x-3y

TASK 2 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

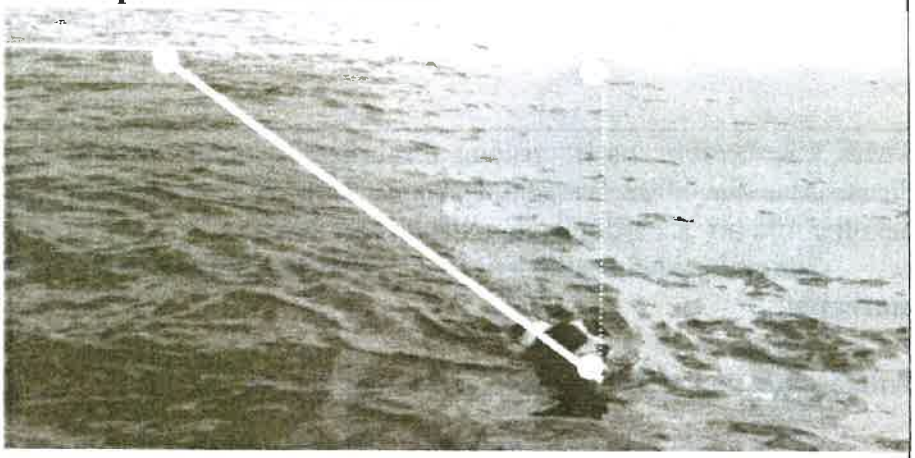
Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

it looks very confusing, and there is not enough explination

TASK 3: APACHE THE BORDER COLLIE

Apache the border Collie



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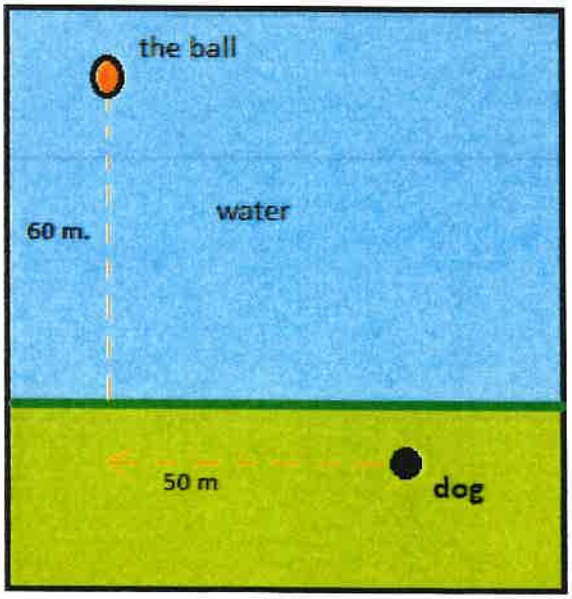
I have a 2-year-old dog, a Border collie named Apache and after a year of avoiding deep water she recently met three Labradors at the local lake. These dogs love to swim and I named them the "submarine brigade" because of their ability to dive straight in and swim after the ball. After meeting them, Apache quickly took to swimming, but being a dog with 'brains,' she discovered that she could beat the rest by running along the bank and then diving in.
The situation is like this: The Labradors jump immediately in the water and swim straight to the ball. Apache runs for about 50 m along the bank and then jumps to swim to the ball. Why would Apache run 50 m and then have the shortest distance for swimming? Is Apache really smart?

Please note that one meter of swimming takes four meters of running in time.)



yes, he is smart. he does not need to swim as long as the other dogs, so he is faster.

Please explain your solution.

TASK 3 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

The text is very long, but the Pictare is very clear

TASK 4: A4 PUZZLE

Take two sheets of A4 size paper. Roll one into a short cylinder and the other into a tall cylinder. Does one hold more than the other?

Please explain your answer and show your work.

no, it is still the same volume, just the shape is different

TASK 4 Reflection: Just by reading this task, do you feel motivated to solve it?

Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Short text

TASK 5: PERCENTAGES

Find the unknowns: X, Y, Z.

S.No	Name of the item	Marked Price	Selling Price	Discount
i)	Book	225 kr	X	8%
ii)	LED TV	Y	11970 kr	5%
iii)	Digital clock	750 kr	615 kr	Z

Show your work here.

i.

ii.

iii.

TASK 5 Reflection: Just by reading this task, do you feel motivated to solve it?
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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

it looks clear

TASK 6: LOGICAL REASONING

Your friend says she passes a field every day on the way to school, and each day, without exception, she sees **a farmer wearing a straw hat feeding a carrot to a brown horse**. Look at the following general statements and rank them in order from most likely to be true to least likely to be true.

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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

too much text.

TASK 7: DIVISIBLE BY 7

Is **3843** evenly divisible by 7? To see if a number is evenly divisible by 7, remove the units digit of the number, double the removed digit and subtract the doubled amount from the remaining number. If the result is evenly divisible by 7, then the original number is also divisible by 7. The method may need to be repeated several times.

3843 remove the units digit, 3, leaving 384:

384
-6 subtract the doubled number 3

378 remove the units digit, 8, leaving 37:

37
-16 subtract the doubled number 8

21 This is a multiple of 7, so 3843 is evenly divisible by 7.

This is a specific example that works with the method described.
Use the above method to check whether 3374 is evenly divisible by 7

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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

it looks hard, so you'll think hard.

TASK 8: LOGICAL REASONING

Stuart has a 330 mL bottle of orange juice. He thinks he can pour it all into his glass, which is a cylinder with diameter 7 cm and height 8 cm. Stuart's friend Patrick thinks the glass will overflow. Answer the following questions.

a. Will Stuart's glass overflow?

b. If the glass was full, what volume of fluid would it contain.

Show your work here.

TASK 8 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Short text

Fun Picture

TASK 9: LOGICAL REASONING

Dean needs to accurately find the height of a tree in his garden. Local Council regulations prohibit the growth of garden trees beyond 20 m. They argue that in storm conditions falling branches and uprooted large trees are dangers to houses and lives. As Dean cannot climb the tree, he decides to use shadows to help solve the problem. On a windless sunny day, he stands a 1.2 m stick vertically on the ground. The length of the stick's shadow is 1.72 m and at the same time, the tree's shadow measures 14.68 m.

Using the diagram to estimate:

- The height of the tree
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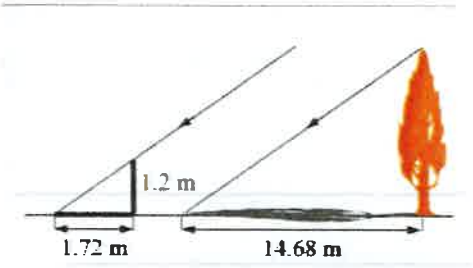

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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

The text is long, and the Picture is not clear, it looks hard

TASK 10: HEARTBEAT

The average person's heart beats 70 times per minute. It can be shown that the average person's heart beats 2.57 billion times in a lifetime.

a. According to this information, how long is the average life span?
b. What assumptions have to be made to solve this problem? How do they affect your answer to part **a?**

Show your work and explain.

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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Short text but no Picture which makes it boring

TASK 11: PALEONTOLOGY

Archaeologists use a coordinate grid system when excavating a site. This allows them to easily record the location of artefacts at a site, which simplifies future excavations. If the coordinates (in cm) of the top and bottom of the arm bone of this dinosaur skeleton are (6.2, 22.3) and (9.1, 11.8), find the length of the arm bone, rounded to the nearest tenth of a centimetre. (Assume that the arm bone is perfectly straight).

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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Ecit too long, Small Paragraphs would be better

TASK 12: GREAT BLUE HOLE TASK

When faced with the problem of trying to breathe underwater, ocean explorer, Jacques Cousteau, designed an underwater breathing apparatus called the Aqualung. It was the precursor of today's scuba gear and allowed Cousteau to explore places that had never been seen before. In 1972, he explored the Great Blue Hole, a cylindrical formation in Belize which began forming over 70 million years ago. The great Blue Hole has a depth of roughly 125 m. If there is 9132700 m^3 of water in the Great Blue Hole, find its radius. Round your answer to the nearest tenth. (Volume of cylinder = $\pi r^2 h$).

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Write a short explanation below why you felt that way.

Long text

TASK 13: CURRENCY CONVERSION TASK

Claudia lives in Canada. She is planning a holiday to Norway. She exchanges 2000 CAD into Norwegian kroners at a rate of 1 CAD = 6.99 CAD.

1. Calculate how many Norwegian Kroners she receives.
2. Before she even leaves Canada, Claudia becomes ill and has to cancel her holiday. She sells the Norwegian Kroners back to the bank at a rate of 1 NOK = 0.12 CAD. Calculate how many Canadian Dollars she receives.
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4. Calculate Claudia's loss as percentage of her original 2000 CAD.

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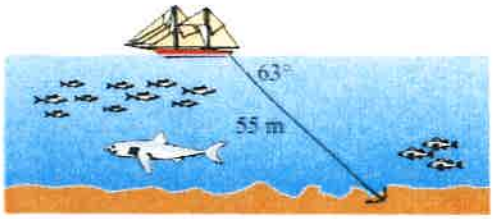
Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

long text, lots of numbers

TASK 14: WHERE THE ANCHOR LIES

A boat has an anchor rope length of 55 m. The boat drifts with the ocean current so that the rope makes an angle of 63 degrees with the surface of the water. Find the depth of the water at the position where the anchor lies at the bottom.



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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

looks fun, short task, Clear Picture

Solution 1:

Solution 2:

13

TASK RATING QUESTIONNAIRE

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Write a short explanation below why you felt that way.

It's not a bad question, but I don't feel an urge to do it. It was also a bit confusing and I had to read it multiple times

TASK 2: THE MAGIC SQUARES

Show that each square is a magic square by showing that the rows, columns and the diagonals all have the same sum.

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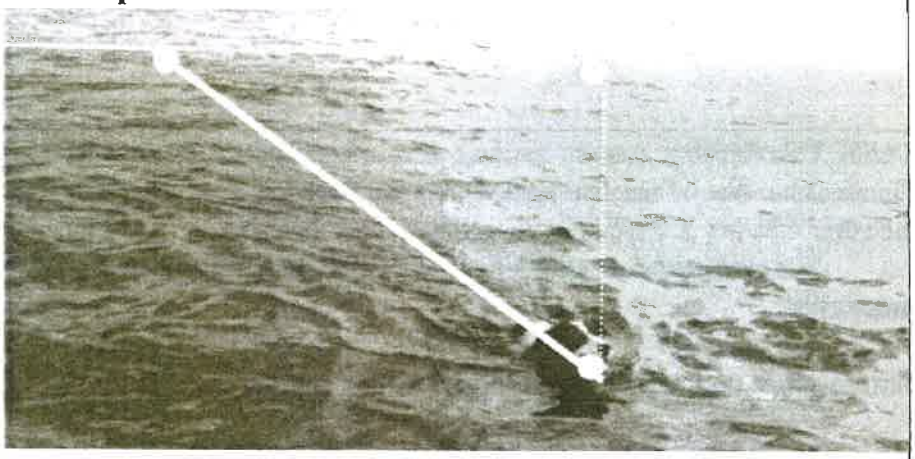
Not motivated at all (1) ------- (2) -------(3) -------((4))-------(5) Very motivated

Write a short explanation below why you felt that way.

Good question, not too much text which makes it less confusing.

TASK 3: APACHE THE BORDER COLLIE

Apache the border Collie



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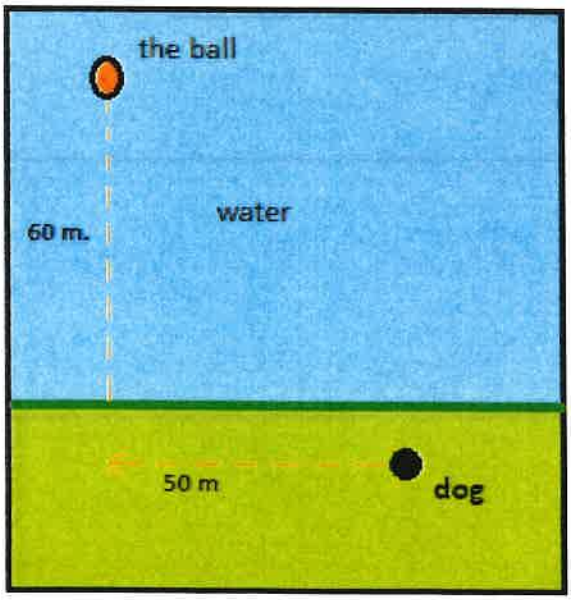

Please explain your solution.

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Write a short explanation below why you felt that way.

I understood that I needed to use pythagoras, but there was a lot of text and the diagram at the end was a bit confusing because of the space between line A and B

TASK 4: A4 PUZZLE

Take two sheets of A4 size paper. Roll one into a short cylinder and the other into a tall cylinder. Does one hold more than the other?

Please explain your answer and show your work.

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Write a short explanation below why you felt that way.

easy to understand, good picture

TASK 5: PERCENTAGES

Find the unknowns: X, Y, Z.

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ii)	LED TV	Y	11970 kr	5%
iii)	Digital clock	750 kr	615 kr	Z

Show your work here.

i.

ii.

iii.

TASK 5 Reflection: Just by reading this task, do you feel motivated to solve it?
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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I understood it right away.

TASK 6: LOGICAL REASONING

Your friend says she passes a field every day on the way to school, and each day, without exception, she sees **a farmer wearing a straw hat feeding a carrot to a brown horse**. Look at the following general statements and rank them in order from most likely to be true to least likely to be true.

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Write a short explanation below why you felt that way.

I felt very encouraged to find which one was most true for some reason.

TASK 7: DIVISIBLE BY 7

Is **3843** evenly divisible by 7? To see if a number is evenly divisible by 7, remove the units digit of the number, double the removed digit and subtract the doubled amount from the remaining number. If the result is evenly divisible by 7, then the original number is also divisible by 7. The method may need to be repeated several times.

384**3** remove the units digit, 3, leaving 384:

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This is a specific example that works with the method described.
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Write a short explanation below why you felt that way.

i was very confused when reading it, but it was a little fascinating and interesting

TASK 8: LOGICAL REASONING

Stuart has a 330 mL bottle of orange juice. He thinks he can pour it all into his glass, which is a cylinder with diameter 7 cm and height 8 cm. Stuart's friend Patrick thinks the glass will overflow. Answer the following questions.

a. Will Stuart's glass overflow?

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Show your work here.

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Not motivated at all (1) ------- (2) -------(3) -------(4) -------((5)) Very motivated

Write a short explanation below why you felt that way.

You immediately know what you have to do in order to solve the question

TASK 9: LOGICAL REASONING

Dean needs to accurately find the height of a tree in his garden. Local Council regulations prohibit the growth of garden trees beyond 20 m. They argue that in storm conditions falling branches and uprooted large trees are dangers to houses and lives. As Dean cannot climb the tree, he decides to use shadows to help solve the problem. On a windless sunny day, he stands a 1.2 m stick vertically on the ground. The length of the stick's shadow is 1.72 m and at the same time, the tree's shadow measures 14.68 m.

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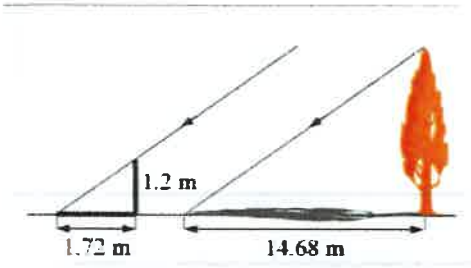

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Not motivated at all (1) ------- (2) -------(3) -------((4)) -------(5) Very motivated

Write a short explanation below why you felt that way.

If I remembered trigonometry, I would be very motivated to solve it

TASK 10: HEARTBEAT

The average person's heart beats 70 times per minute. It can be shown that the average person's heart beats 2.57 billion times in a lifetime.

a. According to this information, how long is the average life span?
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Write a short explanation below why you felt that way.

I love these types of questions

TASK 11: PALEONTOLOGY

Archaeologists use a coordinate grid system when excavating a site. This allows them to easily record the location of artefacts at a site, which simplifies future excavations. If the coordinates (in cm) of the top and bottom of the arm bone of this dinosaur skeleton are (6.2, 22.3) and (9.1, 11.8), find the length of the arm bone, rounded to the nearest tenth of a centimetre. (Assume that the arm bone is perfectly straight).

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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I was a bit confused when there was decimals in the coordinates, but when I looked at them closer I understood it.

TASK 12: GREAT BLUE HOLE TASK

When faced with the problem of trying to breathe underwater, ocean explorer, Jacques Cousteau, designed an underwater breathing apparatus called the Aqualung. It was the precursor of today's scuba gear and allowed Cousteau to explore places that had never been seen before. In 1972, he explored the Great Blue Hole, a cylindrical formation in Belize which began forming over 70 million years ago. The great Blue Hole has a depth of roughly 125 m. If there is 9132700 m^3 of water in the Great Blue Hole, find its radius. Round your answer to the nearest tenth. (Volume of cylinder = $\pi r^2 h$).

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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Although there was alot of text, it had my atention and the picture helps visionize the question alot.

TASK 13: CURRENCY CONVERSION TASK

Claudia lives in Canada. She is planning a holiday to Norway. She exchanges 2000 CAD into Norwegian kroners at a rate of 1 CAD = 6.99 CAD.

1. Calculate how many Norwegian Kroners she receives.
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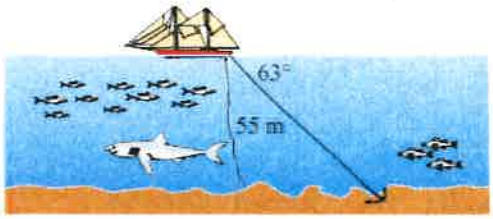
Write a short explanation below why you felt that way.

easy to understand

TASK 14: WHERE THE ANCHOR LIES

A boat has an anchor rope length of 55 m. The boat drifts with the ocean current so that the rope makes an angle of 63 degrees with the surface of the water. Find the depth of the water at the position where the anchor lies at the bottom.



TASK 14 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4)-------(5) Very motivated

Write a short explanation below why you felt that way.

The picture is good and helps understand the question

Solution 1: 6

1. your friend travels to school same time every day
2. The farmer always wears a hat
3. The farmer is the only one that feeds the horse
4. The horse never eats anything but carrots
5. The horse is not a racing horse
6. The farmer feeds the horse only on school days
7. your friend never walkes to school

Solution 2: 8

330mL

$7 \times 8 \times x = 330$

~~$330 - 56 = x$~~

~~$x = 274$~~

$\frac{330}{56} = x$

$x = 5.89$

$7 \times 8 \times 5.89 = 330$

The glass will not overflow.

14

TASK RATING QUESTIONNAIRE

PART A: Please read and try to understand the following mathematical tasks. There are 14 of them below. After reading the task, rate the task on the degree to which you find it motivating or engaging. Then explain the reasons for why you thought it was so in the space provided. There is no right or wrong answer on this, it is important to indicate just how you feel about them.

TASK NUMBER 1: UNIT MAKES DIFFERENCE

In 1983, an Air Canada flight ran out of fuel halfway through its journey due to a mix-up between pounds and kilograms. The plane needed 22300 kg of fuel for the journey. There were 7682 litres of fuel already in the tanks.

a. One litre of jet fuel has a mass of 0.803 kg. Calculate how much fuel should have been loaded. Give your answer in litres.
b. Instead of 0.803 kg per litre, a conversion of 1.77 was used. (One litre of jet fuel has a mass of 1.77 pounds). Calculate how much fuel was actually loaded. Give your answer in litres.
c. Find how many litres short of fuel the plane was.

TASK 1 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Something that I would see in a normal test, its good. Good explanation.

TASK 2: THE MAGIC SQUARES

Show that each square is a magic square by showing that the rows, columns and the diagonals all have the same sum.

2x-2y	-x+3y	2x-y
x + y	x	x-y
y	3x-3y	2y

3y-2x	-x-5y	6x+2y
9x-y	x	y-7x
-4x-2y	3x+5y	4x-3y

$2x-2y+x+y+y = 3x$

TASK 2 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

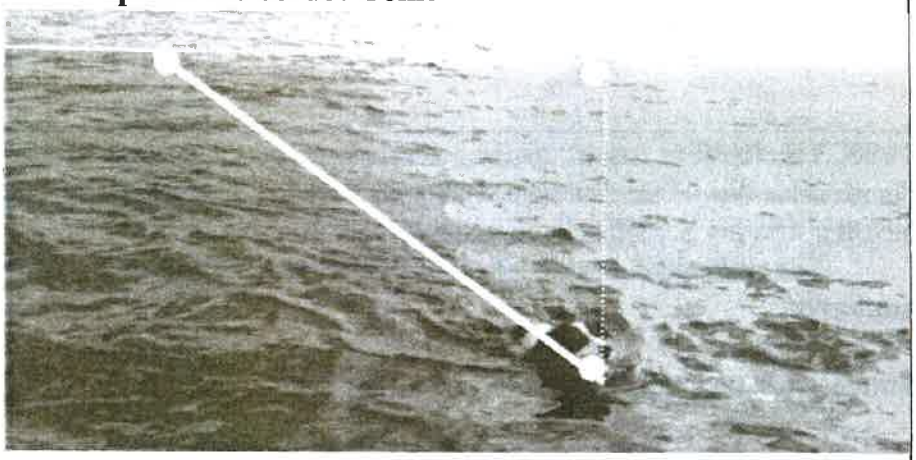
Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

easy to understand
clear
nice light colors

TASK 3: APACHE THE BORDER COLLIE

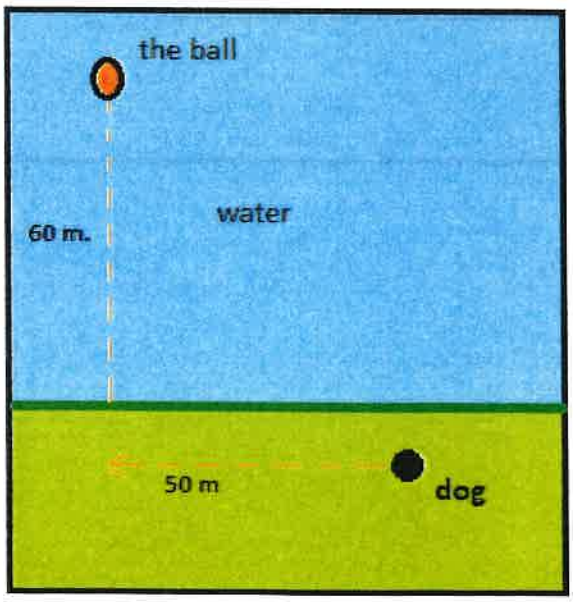
Apache the border Collie



In 2001, Ian Forbes from Edinburgh wrote, in the journal *MicroMath*:

I have a 2-year-old dog, a Border collie named Apache and after a year of avoiding deep water she recently met three Labradors at the local lake. These dogs love to swim and I named them the "submarine brigade" because of their ability to dive straight in and swim after the ball. After meeting them, Apache quickly took to swimming, but being a dog with 'brains,' she discovered that she could beat the rest by running along the bank and then diving in.
The situation is like this: The Labradors jump immediately in the water and swim straight to the ball. Apache runs for about 50 m along the bank and then jumps to swim to the ball. Why would Apache run 50 m and then have the shortest distance for swimming? Is Apache really smart?

Please note that one meter of swimming takes four meters of running in time.)



Please explain your solution.

TASK 3 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Don't like the first image
to much text
A bit boring

TASK 4: A4 PUZZLE

Take two sheets of A4 size paper. Roll one into a short cylinder and the other into a tall cylinder. Does one hold more than the other? one holds more then the other

Please explain your answer and show your work.

$V = \pi r^2 h$

$V = 3.14 \times 105^2 \times 297$

$V = 3.14 \times 11025 \times 297$

$V = 34618.5 \times 297$

$V = 10281694.5$

$V = 3.14 \times 210 \times 148.5$

$V = 3.14 \times$

$V = 659.4 \times 148.5$

$V = 97920.9$

TASK 4 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

nice image
good expnation
maybe have a bit more detail

TASK 5: PERCENTAGES

Find the unknowns: X, Y, Z.

S.No	Name of the item	Marked Price	Selling Price	Discount
i)	Book	225 kr	X 207	8%
ii)	LED TV	Y 239400	11970 kr	5%
iii)	Digital clock	750 kr	615 kr	Z 18 %

Show your work here.

i. $\frac{225 \times 8}{100} = 18$

ii. $\frac{11970 \times 100}{5} = 239400$

iii. 18

225 - 100%
x - 8

750 - 100%
615 - ?

x - 100%
11970 - 5%

61500

TASK 5 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

TASK 6: LOGICAL REASONING

Your friend says she passes a field every day on the way to school, and each day, without exception, she sees **a farmer wearing a straw hat feeding a carrot to a brown horse**. Look at the following general statements and rank them in order from most likely to be true to least likely to be true.

4 • *The horse never eats anything but carrots.*
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7 • *The farmer is the only person who feeds the house.*
4 • *Your friend never walks to school.*
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TASK 7: DIVISIBLE BY 7

Is **3843** evenly divisible by 7? To see if a number is evenly divisible by 7, remove the units digit of the number, double the removed digit and subtract the doubled amount from the remaining number. If the result is evenly divisible by 7, then the original number is also divisible by 7. The method may need to be repeated several times.

3843 remove the units digit, 3, leaving 384:

384
-6 subtract the doubled number 3

378 remove the units digit, 8, leaving 37:

37
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This is a specific example that works with the method described.
Use the above method to check whether 3374 is evenly divisible by 7

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Dont understand
ho need to have this question

TASK 8: LOGICAL REASONING

Stuart has a 330 mL bottle of orange juice. He thinks he can pour it all into his glass, which is a cylinder with diameter 7 cm and height 8 cm. Stuart's friend Patrick thinks the glass will overflow. Answer the following questions.

a. Will Stuart's glass overflow?

b. If the glass was full, what volume of fluid would it contain.

V =

Show your work here.

TASK 8 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

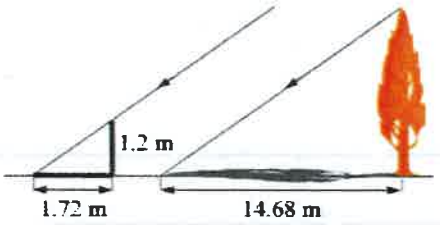
Nice colore

TASK 9: LOGICAL REASONING

Dean needs to accurately find the height of a tree in his garden. Local Council regulations prohibit the growth of garden trees beyond 20 m. They argue that in storm conditions falling branches and uprooted large trees are dangers to houses and lives. As Dean cannot climb the tree, he decides to use shadows to help solve the problem. On a windless sunny day, he stands a 1.2 m stick vertically on the ground. The length of the stick's shadow is 1.72 m and at the same time, the tree's shadow measures 14.68 m.

Using the diagram to estimate:

- The height of the tree
- The angle of elevation of the sun (the angle that the sun's rays make with the horizontal ground



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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

To much text

TASK 10: HEARTBEAT

The average person's heart beats 70 times per minute. It can be shown that the average person's heart beats 2.57 billion times in a lifetime.

a. According to this information, how long is the average life span?
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Show your work and explain.

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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

No image

TASK 11: PALEONTOLOGY

Archaeologists use a coordinate grid system when excavating a site. This allows them to easily record the location of artefacts at a site, which simplifies future excavations. If the coordinates (in cm) of the top and bottom of the arm bone of this dinosaur skeleton are (6.2, 22.3) and (9.1, 11.8), find the length of the arm bone, rounded to the nearest tenth of a centimetre. (Assume that the arm bone is perfectly straight).

TASK 11 Reflection: Just by reading this task, do you feel motivated to solve it?
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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

TASK 12: GREAT BLUE HOLE TASK

When faced with the problem of trying to breathe underwater, ocean explorer, Jacques Cousteau, designed an underwater breathing apparatus called the Aqualung. It was the precursor of today's scuba gear and allowed Cousteau to explore places that had never been seen before. In 1972, he explored the Great Blue Hole, a cylindrical formation in Belize which began forming over 70 million years ago. The great Blue Hole has a depth of roughly 125 m. If there is 9132700 m^3 of water in the Great Blue Hole, find its radius. Round your answer to the nearest tenth. (Volume of cylinder = $\pi r^2 h$).

TASK 12 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

TASK 13: CURRENCY CONVERSION TASK

Claudia lives in Canada. She is planning a holiday to Norway. She exchanges 2000 CAD into Norwegian kroners at a rate of 1 CAD = 6.99 CAD.

1. Calculate how many Norwegian Kroners she receives.
2. Before she even leaves Canada, Claudia becomes ill and has to cancel her holiday. She sells the Norwegian Kroners back to the bank at a rate of 1 NOK = 0.12 CAD. Calculate how many Canadian Dollars she receives.
3. Determine how much money the bank makes from the two transactions.
4. Calculate Claudia's loss as percentage of her original 2000 CAD.

TASK 13 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

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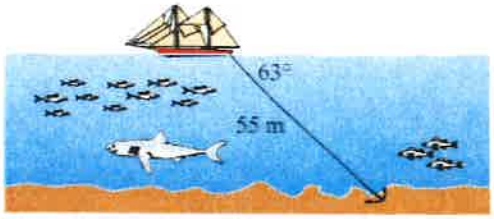

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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Solution 1:

Solution 2:

(15)

TASK RATING QUESTIONNAIRE

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Write a short explanation below why you felt that way.

this can be solved. but am not so motivated because of to much detail, numbers and text

TASK 2: THE MAGIC SQUARES

Show that each square is a magic square by showing that the rows, columns and the diagonals all have the same sum.

2x-2y	-x+3y	2x-y
x + y	x	x-y
y	3x-3y	2y

3y-2x	-x-5y	6x+2y
9x-y	x	y-7x
-4x-2y	3x+5y	4x-3y

TASK 2 Reflection: Just by reading this task, do you feel motivated to solve it?
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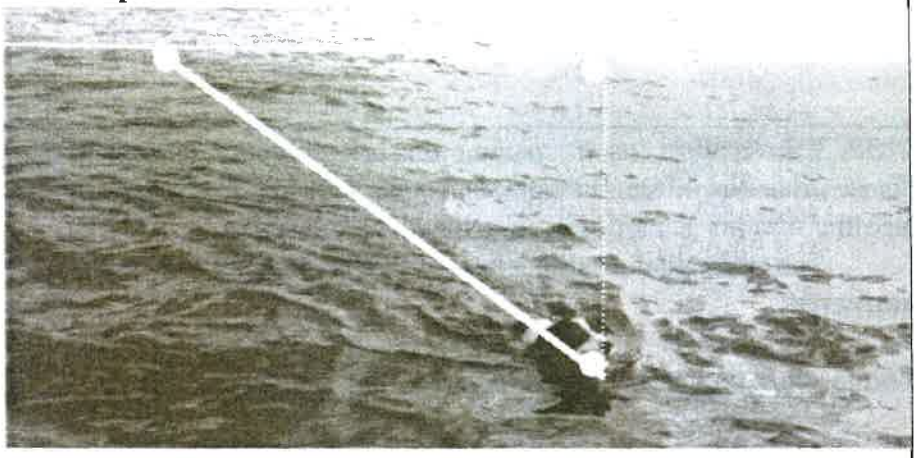
Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Not much text, easy to understand.
Good pictures.

TASK 3: APACHE THE BORDER COLLIE

Apache the border Collie



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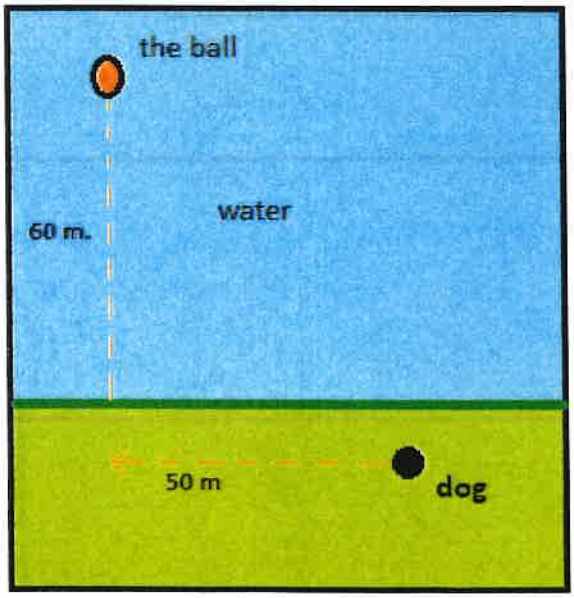
Please note that one meter of swimming takes four meters of running in time.)



Please explain your solution.

TASK 3 Reflection: Just by reading this task, do you feel motivated to solve it?
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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

explanation : good
picture : good
Note! : good

TASK 4: A4 PUZZLE

Take two sheets of A4 size paper. Roll one into a short cylinder and the other into a tall cylinder. Does one hold more than the other?

Please explain your answer and show your work.

TASK 4 Reflection: Just by reading this task, do you feel motivated to solve it?

Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) ------- (5) **Very motivated**

Write a short explanation below why you felt that way.

~~I don't understand the task~~

understandable, good picture, short explanation

book = 225

TASK 5: PERCENTAGES

Find the unknowns: X, Y, Z.

S.No	Name of the item	Marked Price	Selling Price	Discount
i)	Book	225 kr	X	8%
ii)	LED TV	Y	11970 kr	5%
iii)	Digital clock	750 kr	615 kr	Z

Show your work here.

i. 207

ii. 239400

iii. 18

TASK 5 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

love theese types of equations! easy to understand, easy to solve. Good explenation, add short explenation

225 · 8 = — : 100 =

225 · 8 : 100 = 18

11970 · 100 : 5 = 239400

225
-418

$\frac{750 - 615}{750}$ € = 0.18 · 100 = 18

TASK 6: LOGICAL REASONING

Your friend says she passes a field every day on the way to school, and each day, without exception, she sees **a farmer wearing a straw hat feeding a carrot to a brown horse**. Look at the following general statements and rank them in order from most likely to be true to least likely to be true.

- 3 *The horse never eats anything but carrots.*
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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Its ok, took some time to solve.
personaly I think there is to much
text

TASK 7: DIVISIBLE BY 7

Is **3843** evenly divisible by 7? To see if a number is evenly divisible by 7, remove the units digit of the number, double the removed digit and subtract the doubled amount from the remaining number. If the result is evenly divisible by 7, then the original number is also divisible by 7. The method may need to be repeated several times.

3843 remove the units digit, 3, leaving 384:

384
-6 subtract the doubled number 3

378 remove the units digit, 8, leaving 37:

37
-16 subtract the doubled number 8

21 This is a multiple of 7, so 3843 is evenly divisible by 7.

This is a specific example that works with the method described.
Use the above method to check whether 3374 is evenly divisible by 7

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Not motivated at all (1) ------- (2) -------(3)-------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

dont like this kind of task
much text, number
overall a big task

TASK 8: LOGICAL REASONING

Stuart has a 330 mL bottle of orange juice. He thinks he can pour it all into his glass, which is a cylinder with diameter 7 cm and height 8 cm. Stuart's friend Patrick thinks the glass will overflow. Answer the following questions.

a. Will Stuart's glass overflow?

b. If the glass was full, what volume of fluid would it contain.

Show your work here.

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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

haven't learned about volume yet, and cylinder. But i understand the task, with some more ~~knowl~~ge knowlage, I could solve

TASK 9: LOGICAL REASONING

Dean needs to accurately find the height of a tree in his garden. Local Council regulations prohibit the growth of garden trees beyond 20 m. They argue that in storm conditions falling branches and uprooted large trees are dangers to houses and lives. As Dean cannot climb the tree, he decides to use shadows to help solve the problem. On a windless sunny day, he stands a 1.2 m stick vertically on the ground. The length of the stick's shadow is 1.72 m and at the same time, the tree's shadow measures 14.68 m.

Using the diagram to estimate:

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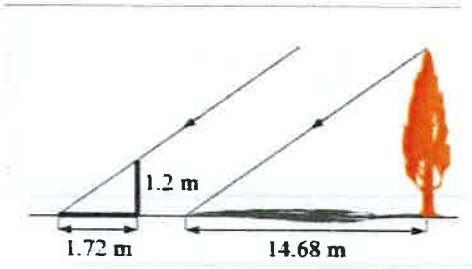

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Write a short explanation below why you felt that way.

didnt understand

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a. According to this information, how long is the average life span?
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Show your work and explain.

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I feel not to solve this, to high numbers.

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Archaeologists use a coordinate grid system when excavating a site. This allows them to easily record the location of artefacts at a site, which simplifies future excavations. If the coordinates (in cm) of the top and bottom of the arm bone of this dinosaur skeleton are (6.2, 22.3) and (9.1, 11.8), find the length of the arm bone, rounded to the nearest tenth of a centimetre. (Assume that the arm bone is perfectly straight).

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Write a short explanation below why you felt that way.

TASK 12: GREAT BLUE HOLE TASK

When faced with the problem of trying to breathe underwater, ocean explorer, Jacques Cousteau, designed an underwater breathing apparatus called the Aqualung. It was the precursor of today's scuba gear and allowed Cousteau to explore places that had never been seen before. In 1972, he explored the Great Blue Hole, a cylindrical formation in Belize which began forming over 70 million years ago. The great Blue Hole has a depth of roughly 125 m. If there is 9132700 m^3 of water in the Great Blue Hole, find its radius. Round your answer to the nearest tenth. (Volume of cylinder = $\pi r^2 h$).

TASK 12 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

TASK 13: CURRENCY CONVERSION TASK

Claudia lives in Canada. She is planning a holiday to Norway. She exchanges 2000 CAD into Norwegian kroners at a rate of 1 CAD = 6.99 CAD.

1. Calculate how many Norwegian Kroners she receives.
2. Before she even leaves Canada, Claudia becomes ill and has to cancel her holiday. She sells the Norwegian Kroners back to the bank at a rate of 1 NOK = 0.12 CAD. Calculate how many Canadian Dollars she receives.
3. Determine how much money the bank makes from the two transactions.
4. Calculate Claudia's loss as percentage of her original 2000 CAD.

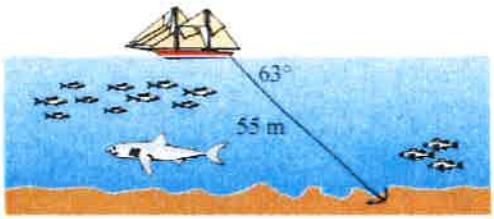
TASK 13 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

TASK 14: WHERE THE ANCHOR LIES

A boat has an anchor rope length of 55 m. The boat drifts with the ocean current so that the rope makes an angle of 63 degrees with the surface of the water. Find the depth of the water at the position where the anchor lies at the bottom.



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Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Solution 1:

Solution 2:

16

TASK RATING QUESTIONNAIRE

PART A: Please read and try to understand the following mathematical tasks. There are 14 of them below. After reading the task, rate the task on the degree to which you find it motivating or engaging. Then explain the reasons for why you thought it was so in the space provided. There is no right or wrong answer on this, it is important to indicate just how you feel about them.

TASK NUMBER 1: UNIT MAKES DIFFERENCE

In 1983, an Air Canada flight ran out of fuel halfway through its journey due to a mix-up between pounds and kilograms. The plane needed 22300 kg of fuel for the journey. There were 7682 litres of fuel already in the tanks.

a. One litre of jet fuel has a mass of 0.803 kg. Calculate how much fuel should have been loaded. Give your answer in litres.
b. Instead of 0.803 kg per litre, a conversion of 1.77 was used. (One litre of jet fuel has a mass of 1.77 pounds). Calculate how much fuel was actually loaded. Give your answer in litres.
c. Find how many litres short of fuel the plane was.

TASK 1 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

2

I don't know how to calculate this

TASK 2: THE MAGIC SQUARES

Show that each square is a magic square by showing that the rows, columns and the diagonals all have the same sum.

2x-2y	-x+3y	2x-y
x + y	x	x-y
y	3x-3y	2y

3y-2x	-x-5y	6x+2y
9x-y	x	y-7x
-4x-2y	3x+5y	4x-3y

TASK 2 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

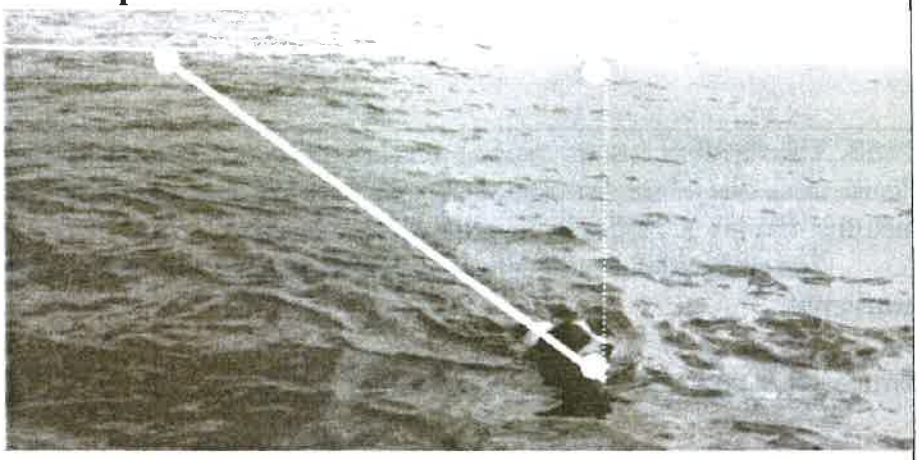
Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

2 i don't feel motivated when solving Algebra

TASK 3: APACHE THE BORDER COLLIE

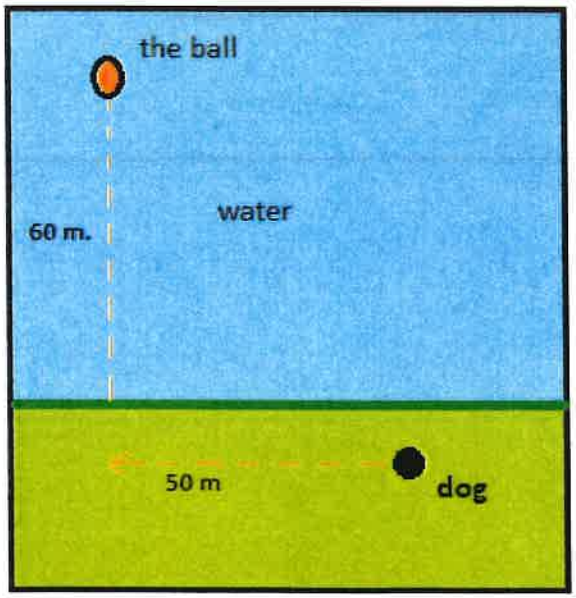
Apache the border Collie



In 2001, Ian Forbes from Edinburgh wrote, in the journal *MicroMath*:

I have a 2-year-old dog, a Border collie named Apache and after a year of avoiding deep water she recently met three Labradors at the local lake. These dogs love to swim and I named them the "submarine brigade" because of their ability to dive straight in and swim after the ball. After meeting them, Apache quickly took to swimming, but being a dog with 'brains,' she discovered that she could beat the rest by running along the bank and then diving in.
The situation is like this: The Labradors jump immediately in the water and swim straight to the ball. Apache runs for about 50 m along the bank and then jumps to swim to the ball. Why would Apache run 50 m and then have the shortest distance for swimming? Is Apache really smart?

Please note that one meter of swimming takes four meters of running in time.)



Please explain your solution.

TASK 3 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

2 i don't remember this

TASK 4: A4 PUZZLE

Take two sheets of A4 size paper. Roll one into a short cylinder and the other into a tall cylinder. Does one hold more than the other?

Please explain your answer and show your work.

The short cylinder holds up more because its wider and it doesn't have to ~~withstand~~ put up with that much weight

TASK 4 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

(3) I like solving pratical questions

TASK 5: PERCENTAGES

Find the unknowns: X, Y, Z.

S.No	**Name of the item**	**Marked Price**	**Selling Price**	**Discount**
i)	Book	225 kr	X 90kr	8%
ii)	LED TV	Y	11970 kr	5%
iii)	Digital clock	750 kr	615 kr	Z

Show your work here.

i.

ii.

iii.

225

225

225 -
135
90

750 -
615
135

TASK 5 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I not sure how to do this

TASK 6: LOGICAL REASONING

Your friend says she passes a field every day on the way to school, and each day, without exception, she sees **a farmer wearing a straw hat feeding a carrot to a brown horse**. Look at the following general statements and rank them in order from most likely to be true to least likely to be true.

2 • *The horse never eats anything but carrots.*
5 • *The farmer feeds the horse only on school days.*
4 • *The farmer is the only person who feeds the house.*
4 • *Your friend never walks to school.*
1 • *The farmer always wears a hat.*
6 • *The horse is not a racing horse.*
3 • *Your friend travels to school at the same time every day.*

TASK 6 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

4 i like logical Reasoning

TASK 7: DIVISIBLE BY 7

Is **3843** evenly divisible by 7? To see if a number is evenly divisible by 7, remove the units digit of the number, double the removed digit and subtract the doubled amount from the remaining number. If the result is evenly divisible by 7, then the original number is also divisible by 7. The method may need to be repeated several times.

3843 remove the units digit, 3, leaving 384:

384
-6 subtract the doubled number 3

378 remove the units digit, 8, leaving 37:

37
-16 subtract the doubled number 8

21 This is a multiple of 7, so 3843 is evenly divisible by 7.

This is a specific example that works with the method described.
Use the above method to check whether 3374 is evenly divisible by 7

TASK 7 Reflection: Just by reading this task, do you feel motivated to solve it?
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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

1 its a long calculation

TASK 8: LOGICAL REASONING

Stuart has a 330 mL bottle of orange juice. He thinks he can pour it all into his glass, which is a cylinder with diameter 7 cm and height 8 cm. Stuart's friend Patrick thinks the glass will overflow. Answer the following questions.

a. Will Stuart's glass overflow? Yes

b. If the glass was full, what volume of fluid would it contain.

Show your work here.

TASK 8 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

3 No reasoning

TASK 9: LOGICAL REASONING

Dean needs to accurately find the height of a tree in his garden. Local Council regulations prohibit the growth of garden trees beyond 20 m. They argue that in storm conditions falling branches and uprooted large trees are dangers to houses and lives. As Dean cannot climb the tree, he decides to use shadows to help solve the problem. On a windless sunny day, he stands a 1.2 m stick vertically on the ground. The length of the stick's shadow is 1.72 m and at the same time, the tree's shadow measures 14.68 m.

Using the diagram to estimate:

- The height of the tree
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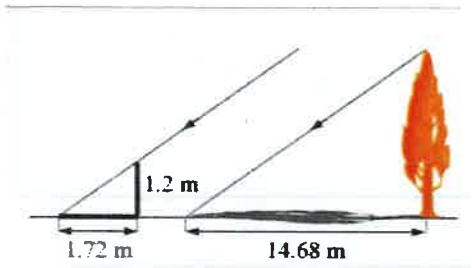

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TASK 10: HEARTBEAT

The average person's heart beats 70 times per minute. It can be shown that the average person's heart beats 2.57 billion times in a lifetime.

a. According to this information, how long is the average life span?
b. What assumptions have to be made to solve this problem? How do they affect your answer to part **a?**

Show your work and explain.

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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I too long

TASK 11: PALEONTOLOGY

Archaeologists use a coordinate grid system when excavating a site. This allows them to easily record the location of artefacts at a site, which simplifies future excavations. If the coordinates (in cm) of the top and bottom of the arm bone of this dinosaur skeleton are (6.2, 22.3) and (9.1, 11.8), find the length of the arm bone, rounded to the nearest tenth of a centimetre. (Assume that the arm bone is perfectly straight).

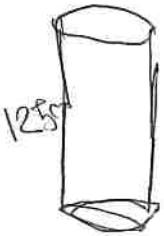
TASK 11 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

TASK 12: GREAT BLUE HOLE TASK

When faced with the problem of trying to breathe underwater, ocean explorer, Jacques Cousteau, designed an underwater breathing apparatus called the Aqualung. It was the precursor of today's scuba gear and allowed Cousteau to explore places that had never been seen before. In 1972, he explored the Great Blue Hole, a cylindrical formation in Belize which began forming over 70 million years ago. The great Blue Hole has a depth of roughly 125 m. If there is 9132700 m^3 of water in the Great Blue Hole, find its radius. Round your answer to the nearest tenth. (Volume of cylinder = $\pi r^2 h$).



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2 i forgot how you do this

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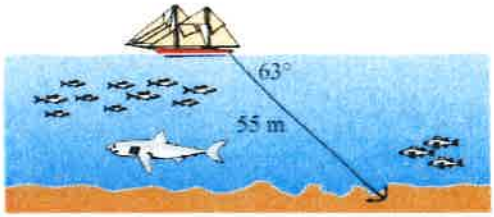
Write a short explanation below why you felt that way.

2 ; dont really know why

TASK 14: WHERE THE ANCHOR LIES

A boat has an anchor rope length of 55 m. The boat drifts with the ocean current so that the rope makes an angle of 63 degrees with the surface of the water. Find the depth of the water at the position where the anchor lies at the bottom.



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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

2 i don't even remember the formula

Solution 1:

Solution 2:

17

TASK RATING QUESTIONNAIRE

PART A: Please read and try to understand the following mathematical tasks. There are 14 of them below. After reading the task, rate the task on the degree to which you find it motivating or engaging. Then explain the reasons for why you thought it was so in the space provided. There is no right or wrong answer on this, it is important to indicate just how you feel about them.

TASK NUMBER 1: UNIT MAKES DIFFERENCE

In 1983, an Air Canada flight ran out of fuel halfway through its journey due to a mix-up between pounds and kilograms. The plane needed 22300 kg of fuel for the journey. There were 7682 litres of fuel already in the tanks.

a. One litre of jet fuel has a mass of 0.803 kg. Calculate how much fuel should have been loaded. Give your answer in litres.
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Not motivated at all (1) ------- (2) -------(3)-------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I wouldn't mind doing the task if it was given to me, but I don't like the amount of conversion you have to do in order to do the task, because you have to be really focused

TASK 2: THE MAGIC SQUARES

Show that each square is a magic square by showing that the rows, columns and the diagonals all have the same sum.

2x-2y	-x+3y	2x-y
x + y	x	x-y
y	3x-3y	2y

3y-2x	-x-5y	6x+2y
9x-y	x	y-7x
-4x-2y	3x+5y	4x-3y

TASK 2 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

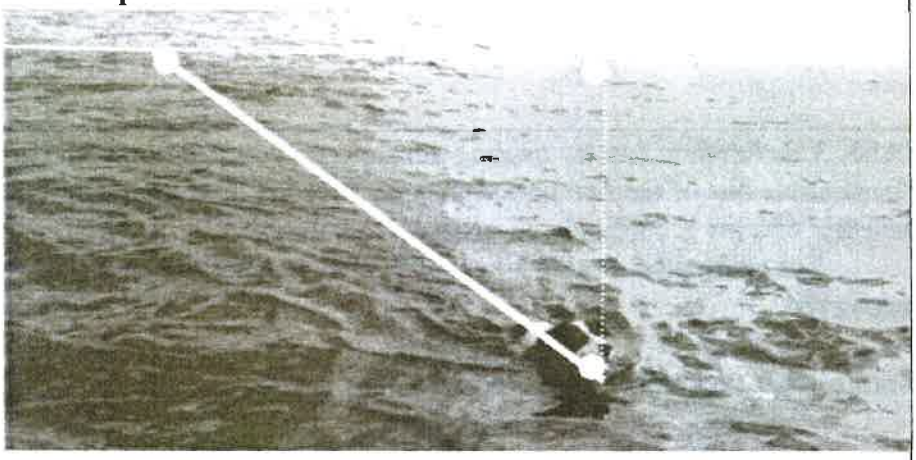
Not motivated at all (1) -------(2)-------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I don't like questions where you have to prove given information

TASK 3: APACHE THE BORDER COLLIE

Apache the border Collie



In 2001, Ian Forbes from Edinburgh wrote, in the journal *MicroMath*:

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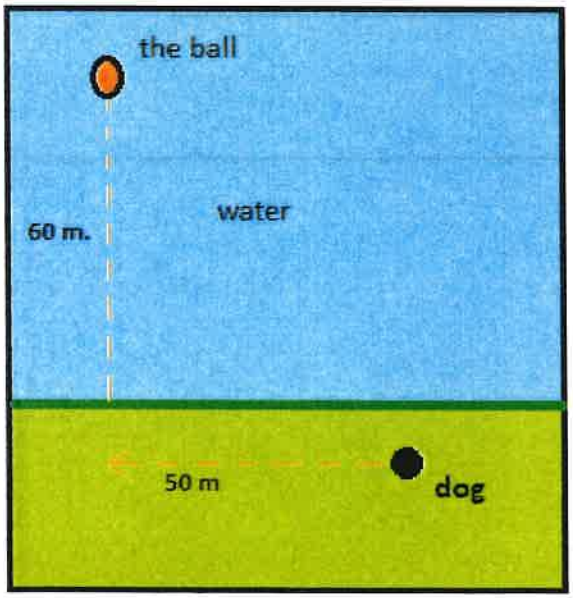
The situation is like this: The Labradors jump immediately in the water and swim straight to thc ball. Apache runs for about 50 m along the bank and then jumps to swim to the ball. Why would Apache run 50 m and then have the shortest distance for swimming? Is Apache really smart?

Please note that one meter of swimming takes four meters of running in time.)



Please explain your solution.

TASK 3 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4)-------(5) Very motivated

Write a short explanation below why you felt that way.

I thought the story was amusing

TASK 4: A4 PUZZLE

Take two sheets of A4 size paper. Roll one into a short cylinder and the other into a tall cylinder. Does one hold more than the other?

Please explain your answer and show your work.

TASK 4 Reflection: Just by reading this task, do you feel motivated to solve it?

Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3)-------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

The picture helps explain the question, but it makes it less motivating when you have to explain your answer with words.

TASK 5: PERCENTAGES

Find the unknowns: X, Y, Z.

S.No	Name of the item	Marked Price	Selling Price	Discount
i)	Book	225 kr	X	8%
ii)	LED TV	Y	11970 kr	5%
iii)	Digital clock	750 kr	615 kr	Z

Show your work here.

i.

ii.

iii.

TASK 5 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4)-------(5) Very motivated

Write a short explanation below why you felt that way.

I like the type of question, but sometimes it is challenging to remember percentages (how to work with them) because we don't use it much.

TASK 6: LOGICAL REASONING

Your friend says she passes a field every day on the way to school, and each day, without exception, she sees **a farmer wearing a straw hat feeding a carrot to a brown horse**. Look at the following general statements and rank them in order from most likely to be true to least likely to be true.

- *The horse never eats anything but carrots.*
- *The farmer feeds the horse only on school days.*
- *The farmer is the only person who feeds the house.*
- *Your friend never walks to school.*
- *The farmer always wears a hat.*
- *The horse is not a racing horse.*
- *Your friend travels to school at the same time every day.*

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Not motivated at all (1) -------(2)-------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I like questions that use a formula to aquire an answer more

TASK 7: DIVISIBLE BY 7

Is **3843** evenly divisible by 7? To see if a number is evenly divisible by 7, remove the units digit of the number, double the removed digit and subtract the doubled amount from the remaining number. If the result is evenly divisible by 7, then the original number is also divisible by 7. The method may need to be repeated several times.

3843 remove the units digit, 3, leaving 384:

384
-6 subtract the doubled number 3

378 remove the units digit, 8, leaving 37:

37
-16 subtract the doubled number 8

21 This is a multiple of 7, so 3843 is evenly divisible by 7.

This is a specific example that works with the method described.
Use the above method to check whether 3374 is evenly divisible by 7

TASK 7 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4)-------(5) Very motivated

Write a short explanation below why you felt that way.

I was not motivated when I read the text, but the numerical explaination below helped me understand it, which made it more motivating.

TASK 8: LOGICAL REASONING

Stuart has a 330 mL bottle of orange juice. He thinks he can pour it all into his glass, which is a cylinder with diameter 7 cm and height 8 cm. Stuart's friend Patrick thinks the glass will overflow. Answer the following questions.

a. Will Stuart's glass overflow?

b. If the glass was full, what volume of fluid would it contain.

Show your work here.

TASK 8 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3)-------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I think the question is a little bit silly, as it isn't realistic that two people would think about this when pouring themselves a glass of orange juice.

TASK 9: LOGICAL REASONING

Dean needs to accurately find the height of a tree in his garden. Local Council regulations prohibit the growth of garden trees beyond 20 m. They argue that in storm conditions falling branches and uprooted large trees are dangers to houses and lives. As Dean cannot climb the tree, he decides to use shadows to help solve the problem. On a windless sunny day, he stands a 1.2 m stick vertically on the ground. The length of the stick's shadow is 1.72 m and at the same time, the tree's shadow measures 14.68 m.

Using the diagram to estimate:

- The height of the tree
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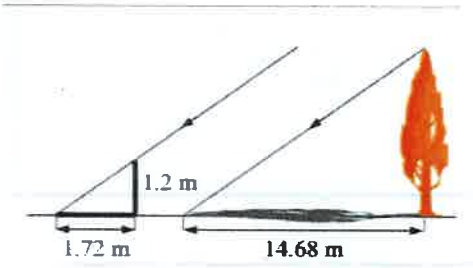

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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I would give it a try, because the picture fits with the text, so I can relate it to the question while I read it.

TASK 10: HEARTBEAT

The average person's heart beats 70 times per minute. It can be shown that the average person's heart beats 2.57 billion times in a lifetime.

a. According to this information, how long is the average life span?
b. What assumptions have to be made to solve this problem? How do they affect your answer to part **a?**

Show your work and explain.

TASK 10 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3)-------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I don't really like questions that involve time, but the story / prompt is interesting.

TASK 11: PALEONTOLOGY

Archaeologists use a coordinate grid system when excavating a site. This allows them to easily record the location of artefacts at a site, which simplifies future excavations. If the coordinates (in cm) of the top and bottom of the arm bone of this dinosaur skeleton are (6.2, 22.3) and (9.1, 11.8), find the length of the arm bone, rounded to the nearest tenth of a centimetre. (Assume that the arm bone is perfectly straight).

TASK 11 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I like this question because the story makes sense (it is actually something that happens in real life → it is realistic), and because it gives you additional facts that you might not have known before

TASK 12: GREAT BLUE HOLE TASK

When faced with the problem of trying to breathe underwater, ocean explorer, Jacques Cousteau, designed an underwater breathing apparatus called the Aqualung. It was the precursor of today's scuba gear and allowed Cousteau to explore places that had never been seen before. In 1972, he explored the Great Blue Hole, a cylindrical formation in Belize which began forming over 70 million years ago. The great Blue Hole has a depth of roughly 125 m. If there is 9132700 m^3 of water in the Great Blue Hole, find its radius. Round your answer to the nearest tenth. (Volume of cylinder = $\pi r^2 h$).

TASK 12 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I liked it because the story was interesting and because you get given the formula

TASK 13: CURRENCY CONVERSION TASK

Claudia lives in Canada. She is planning a holiday to Norway. She exchanges 2000 CAD into Norwegian kroners at a rate of 1 CAD = 6.99 CAD.

1. Calculate how many Norwegian Kroners she receives.
2. Before she even leaves Canada, Claudia becomes ill and has to cancel her holiday. She sells the Norwegian Kroners back to the bank at a rate of 1 NOK = 0.12 CAD. Calculate how many Canadian Dollars she receives.
3. Determine how much money the bank makes from the two transactions.
4. Calculate Claudia's loss as percentage of her original 2000 CAD.

TASK 13 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) -------(2)-------(3) -------(4) -------(5) Very motivated

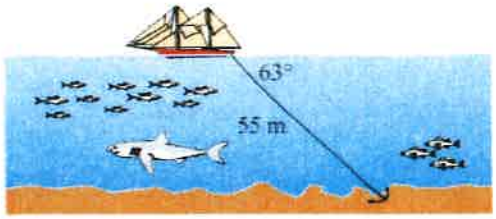
Write a short explanation below why you felt that way.

There is an error in the question so it is confusing because it says:

1 CAD = 6.99 CAD

TASK 14: WHERE THE ANCHOR LIES

A boat has an anchor rope length of 55 m. The boat drifts with the ocean current so that the rope makes an angle of 63 degrees with the surface of the water. Find the depth of the water at the position where the anchor lies at the bottom.



TASK 14 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3)-------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I think the story is kind of boring, but the task is easy enough to do.

Solution 1:

TASK 7

3374 → 337 − 8 = 329 → 32 − 18 = 14 → 14 is a multiple of 7, so 3374 is divisible by 7

Solution 2:

TASK 12

$V = 9132700\ m^3 \longrightarrow 9132700 = \pi r^2 h \longrightarrow$

$\frac{9132700}{\pi h} = r^2 \longrightarrow \frac{9132700}{125\pi} = r^2 \longrightarrow \frac{9132700}{392.699} = r^2 \longrightarrow$

$23256.2342 = r^2 \longrightarrow \sqrt{23256.2342} = r \longrightarrow$

$r \approx 152.5\ m$

18

TASK RATING QUESTIONNAIRE

PART A: Please read and try to understand the following mathematical tasks. There are 14 of them below. After reading the task, rate the task on the degree to which you find it motivating or engaging. Then explain the reasons for why you thought it was so in the space provided. There is no right or wrong answer on this, it is important to indicate just how you feel about them.

TASK NUMBER 1: UNIT MAKES DIFFERENCE

In 1983, an Air Canada flight ran out of fuel halfway through its journey due to a mix-up between pounds and kilograms. The plane needed 22300 kg of fuel for the journey. There were 7682 litres of fuel already in the tanks.

a. One litre of jet fuel has a mass of 0.803 kg. Calculate how much fuel should have been loaded. Give your answer in litres.
b. Instead of 0.803 kg per litre, a conversion of 1.77 was used. (One litre of jet fuel has a mass of 1.77 pounds). Calculate how much fuel was actually loaded. Give your answer in litres.
c. Find how many litres short of fuel the plane was.

TASK 1 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Not challenging.
Takes time.

TASK 2: THE MAGIC SQUARES

Show that each square is a magic square by showing that the rows, columns and the diagonals all have the same sum.

2x-2y	-x+3y	2x-y
x + y	x	x-y
y	3x-3y	2y

3y-2x	-x-5y	6x+2y
9x-y	x	y-7x
-4x-2y	3x+5y	4x-3y

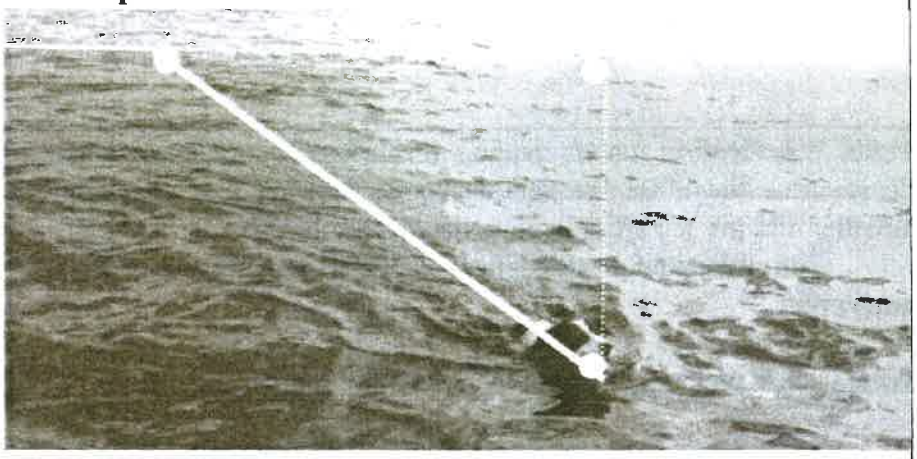
TASK 2 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

TASK 3: APACHE THE BORDER COLLIE

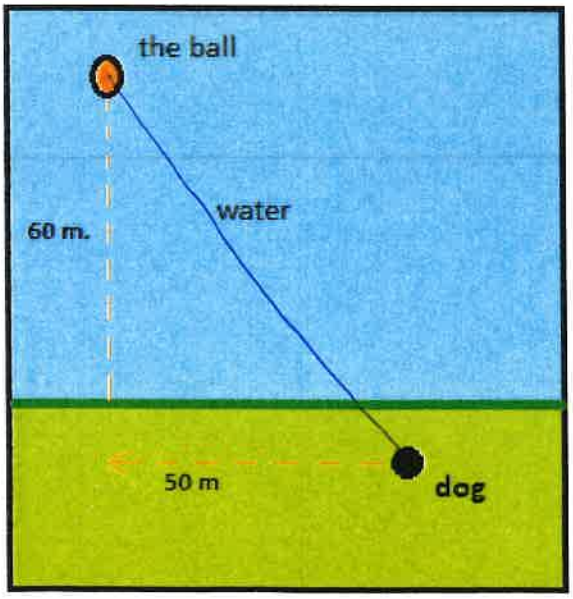
Apache the border Collie



In 2001, Ian Forbes from Edinburgh wrote, in the journal *MicroMath*:

I have a 2-year-old dog, a Border collie named Apache and after a year of avoiding deep water she recently met three Labradors at the local lake. These dogs love to swim and I named them the "submarine brigade" because of their ability to dive straight in and swim after the ball. After meeting them, Apache quickly took to swimming, but being a dog with 'brains,' she discovered that she could beat the rest by running along the bank and then diving in.
The situation is like this: The Labradors jump immediately in the water and swim straight to the ball. Apache runs for about 50 m along the bank and then jumps to swim to the ball. Why would Apache run 50 m and then have the shortest distance for swimming? Is Apache really smart?

Please note that one meter of swimming takes four meters of running in time.)



$50^2+60^2=6100$

$\sqrt{6100} \approx 78.1$

$78.1 \times 4 = 312.4$

$50+60\times4=290$

If Apache travel 1 meter per second on land, then he will spend 22.4 seconds less when running along the bank instead of swimming straight for the ball

Please explain your solution.

TASK 3 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Challenging enough.
Too much to read.

TASK 4: A4 PUZZLE

Take two sheets of A4 size paper. Roll one into a short cylinder and the other into a tall cylinder. Does one hold more than the other?

Please explain your answer and show your work.

$\pi \times \left(\frac{297}{2}\right)^2 \times 210 = 1454862.18\ mm^2$

$\pi \times \left(\frac{210}{2}\right)^2 \times 297 = 10286409.52\ mm^2$

TASK 4 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

This was alright.
Should've said what the measurements of an A4 is.

TASK 5: PERCENTAGES

Find the unknowns: X, Y, Z.

S.No	Name of the item	Marked Price	Selling Price	Discount
i)	Book	225 kr	X	8%
ii)	LED TV	Y	11970 kr	5%
iii)	Digital clock	750 kr	615 kr	Z

Show your work here.

i.

ii.

iii.

TASK 5 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Money 36ff!
This is great.

TASK 6: LOGICAL REASONING

Your friend says she passes a field every day on the way to school, and each day, without exception, she sees **a farmer wearing a straw hat feeding a carrot to a brown horse**. Look at the following general statements and rank them in order from most likely to be true to least likely to be true.

- *The horse never eats anything but carrots.*
- *The farmer feeds the horse only on school days.*
- *The farmer is the only person who feeds the house.*
- *Your friend never walks to school.*
- *The farmer always wears a hat.*
- *The horse is not a racing horse.*
- *Your friend travels to school at the same time every day.*

TASK 6 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

This one is fun.

TASK 7: DIVISIBLE BY 7

Is **3843** evenly divisible by 7? To see if a number is evenly divisible by 7, remove the units digit of the number, double the removed digit and subtract the doubled amount from the remaining number. If the result is evenly divisible by 7, then the original number is also divisible by 7. The method may need to be repeated several times.

3843 remove the units digit, 3, leaving 384:

384
-6 subtract the doubled number 3

378 remove the units digit, 8, leaving 37:

37
-16 subtract the doubled number 8

21 This is a multiple of 7, so 3843 is evenly divisible by 7.

This is a specific example that works with the method described.
Use the above method to check whether 3374 is evenly divisible by 7

TASK 7 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I don't know.
This could be fun.

TASK 8: LOGICAL REASONING

Stuart has a 330 mL bottle of orange juice. He thinks he can pour it all into his glass, which is a cylinder with diameter 7 cm and height 8 cm. Stuart's friend Patrick thinks the glass will overflow. Answer the following questions.

a. Will Stuart's glass overflow?

b. If the glass was full, what volume of fluid would it contain.

Show your work here.

TASK 8 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

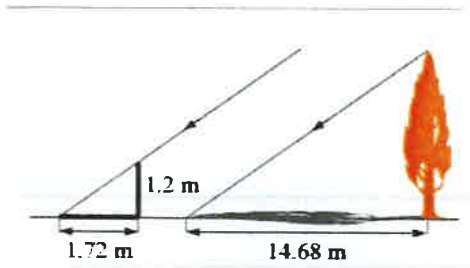
A bit boring maybe.

TASK 9: LOGICAL REASONING

Dean needs to accurately find the height of a tree in his garden. Local Council regulations prohibit the growth of garden trees beyond 20 m. They argue that in storm conditions falling branches and uprooted large trees are dangers to houses and lives. As Dean cannot climb the tree, he decides to use shadows to help solve the problem. On a windless sunny day, he stands a 1.2 m stick vertically on the ground. The length of the stick's shadow is 1.72 m and at the same time, the tree's shadow measures 14.68 m.

Using the diagram to estimate:

- The height of the tree
- The angle of elevation of the sun (the angle that the sun's rays make with the horizontal ground



TASK 9 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3)-------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

A bit much maybe

TASK 10: HEARTBEAT

The average person's heart beats 70 times per minute. It can be shown that the average person's heart beats 2.57 billion times in a lifetime.

a. According to this information, how long is the average life span?
b. What assumptions have to be made to solve this problem? How do they affect your answer to part **a?**

Show your work and explain.

TASK 10 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) -------(2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Can't say this is fun.

TASK 11: PALEONTOLOGY

Archaeologists use a coordinate grid system when excavating a site. This allows them to easily record the location of artefacts at a site, which simplifies future excavations. If the coordinates (in cm) of the top and bottom of the arm bone of this dinosaur skeleton are (6.2, 22.3) and (9.1, 11.8), find the length of the arm bone, rounded to the nearest tenth of a centimetre. (Assume that the arm bone is perfectly straight).

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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Did you try to make this motivating?

TASK 12: GREAT BLUE HOLE TASK

When faced with the problem of trying to breathe underwater, ocean explorer, Jacques Cousteau, designed an underwater breathing apparatus called the Aqualung. It was the precursor of today's scuba gear and allowed Cousteau to explore places that had never been seen before. In 1972, he explored the Great Blue Hole, a cylindrical formation in Belize which began forming over 70 million years ago. The great Blue Hole has a depth of roughly 125 m. If there is 9132700 m^3 of water in the Great Blue Hole, find its radius. Round your answer to the nearest tenth. (Volume of cylinder = $\pi r^2 h$).

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Not motivated at all (1) ------- (2) -------((3)) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

A bit interested in this one.

TASK 13: CURRENCY CONVERSION TASK

Claudia lives in Canada. She is planning a holiday to Norway. She exchanges 2000 CAD into Norwegian kroners at a rate of 1 CAD = 6.99 CAD.

1. Calculate how many Norwegian Kroners she receives.
2. Before she even leaves Canada, Claudia becomes ill and has to cancel her holiday. She sells the Norwegian Kroners back to the bank at a rate of 1 NOK = 0.12 CAD. Calculate how many Canadian Dollars she receives.
3. Determine how much money the bank makes from the two transactions.
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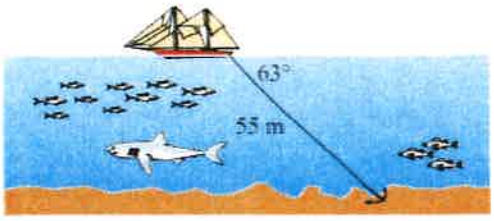
Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Nah
I don't know.

TASK 14: WHERE THE ANCHOR LIES

A boat has an anchor rope length of 55 m. The boat drifts with the ocean current so that the rope makes an angle of 63 degrees with the surface of the water. Find the depth of the water at the position where the anchor lies at the bottom.



TASK 14 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Maybe this could be motivating.

Solution 1:

Solution 2:

19

TASK RATING QUESTIONNAIRE

PART A: Please read and try to understand the following mathematical tasks. There are 14 of them below. After reading the task, rate the task on the degree to which you find it motivating or engaging. Then explain the reasons for why you thought it was so in the space provided. There is no right or wrong answer on this, it is important to indicate just how you feel about them.

TASK NUMBER 1: UNIT MAKES DIFFERENCE

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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I feel it's too much text for only one big question.

TASK 2: THE MAGIC SQUARES

Show that each square is a magic square by showing that the rows, columns and the diagonals all have the same sum.

2x-2y	-x+3y	2x-y
x + y	x	x-y
y	3x-3y	2y

3y-2x	-x-5y	6x+2y
9x-y	x	y-7x
-4x-2y	3x+5y	4x-3y

TASK 2 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

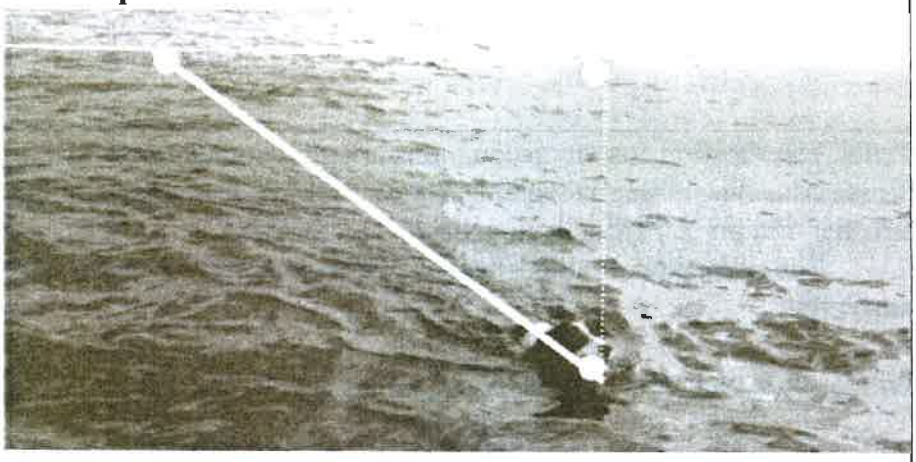
Not motivated at all (1) ------- (2) -------(3)-------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Needs to be explained a bit better and more detail.

TASK 3: APACHE THE BORDER COLLIE

Apache the border Collie



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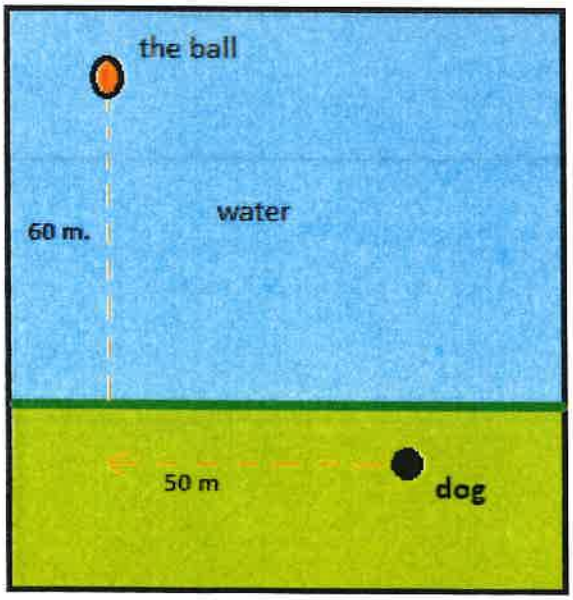
Please note that one meter of swimming takes four meters of running in time.)



Please explain your solution.

TASK 3 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Motivated but don't remember how to do it

TASK 4: A4 PUZZLE

Take two sheets of A4 size paper. Roll one into a short cylinder and the other into a tall cylinder. Does one hold more than the other?

Please explain your answer and show your work.

TASK 4 Reflection: Just by reading this task, do you feel motivated to solve it?

Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Personally I don't like doing volume and I don't remember how

TASK 5: PERCENTAGES

Find the unknowns: X, Y, Z.

S.No	Name of the item	Marked Price	Selling Price	Discount
i)	Book	225 kr	X = 207	8%
ii)	LED TV	Y = 239400	11970 kr	5%
iii)	Digital clock	750 kr	615 kr	Z

Show your work here.

i. ~~[illegible]~~ X = 207

ii. Y = 239400

iii. Z = 18%

225 x 8 ÷ 100 = 18

11940 x 100 ÷ 5 = Y

135 ÷ 750 x 100 = Z

TASK 5 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Difficult but fun to do.

TASK 6: LOGICAL REASONING

Your friend says she passes a field every day on the way to school, and each day, without exception, she sees **a farmer wearing a straw hat feeding a carrot to a brown horse**. Look at the following general statements and rank them in order from most likely to be true to least likely to be true.

1 • *The horse never eats anything but carrots.* ✓
2 • *The farmer feeds the horse only on school days.* ✓
3 • *The farmer is the only person who feeds the house.* ✓
4 • *Your friend never walks to school.*
5 • *The farmer always wears a hat.*
6 • *The horse is not a racing horse.* ✓
7 • *Your friend travels to school at the same time every day.*

TASK 6 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3)-------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

This was a 50/50

TASK 7: DIVISIBLE BY 7

Is **3843** evenly divisible by 7? To see if a number is evenly divisible by 7, remove the units digit of the number, double the removed digit and subtract the doubled amount from the remaining number. If the result is evenly divisible by 7, then the original number is also divisible by 7. The method may need to be repeated several times.

3843 remove the units digit, 3, leaving 384:

384
-6 subtract the doubled number 3

378 remove the units digit, 8, leaving 37:

37
-16 subtract the doubled number 8

21 This is a multiple of 7, so 3843 is evenly divisible by 7.

This is a specific example that works with the method described.
Use the above method to check whether 3374 is evenly divisible by 7

TASK 7 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Don't know how to do it

TASK 8: LOGICAL REASONING

Stuart has a 330 mL bottle of orange juice. He thinks he can pour it all into his glass, which is a cylinder with diameter 7 cm and height 8 cm. Stuart's friend Patrick thinks the glass will overflow. Answer the following questions.

a. Will Stuart's glass overflow?

b. If the glass was full, what volume of fluid would it contain.

Show your work here.

TASK 8 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Dont have time to do

TASK 9: LOGICAL REASONING

Dean needs to accurately find the height of a tree in his garden. Local Council regulations prohibit the growth of garden trees beyond 20 m. They argue that in storm conditions falling branches and uprooted large trees are dangers to houses and lives. As Dean cannot climb the tree, he decides to use shadows to help solve the problem. On a windless sunny day, he stands a 1.2 m stick vertically on the ground. The length of the stick's shadow is 1.72 m and at the same time, the tree's shadow measures 14.68 m.

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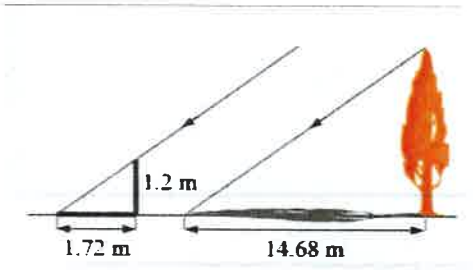
- The height of the tree
- The angle of elevation of the sun (the angle that the sun's rays make with the horizontal ground



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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

TASK 10: HEARTBEAT

The average person's heart beats 70 times per minute. It can be shown that the average person's heart beats 2.57 billion times in a lifetime.

a. According to this information, how long is the average life span?
b. What assumptions have to be made to solve this problem? How do they affect your answer to part **a?**

Show your work and explain.

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TASK 12: GREAT BLUE HOLE TASK

When faced with the problem of trying to breathe underwater, ocean explorer, Jacques Cousteau, designed an underwater breathing apparatus called the Aqualung. It was the precursor of today's scuba gear and allowed Cousteau to explore places that had never been seen before. In 1972, he explored the Great Blue Hole, a cylindrical formation in Belize which began forming over 70 million years ago. The great Blue Hole has a depth of roughly 125 m. If there is 9132700 m^3 of water in the Great Blue Hole, find its radius. Round your answer to the nearest tenth. (Volume of cylinder = $\pi r^2 h$).

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TASK 13: CURRENCY CONVERSION TASK

Claudia lives in Canada. She is planning a holiday to Norway. She exchanges 2000 CAD into Norwegian kroners at a rate of 1 CAD = 6.99 CAD.

1. Calculate how many Norwegian Kroners she receives.
2. Before she even leaves Canada, Claudia becomes ill and has to cancel her holiday. She sells the Norwegian Kroners back to the bank at a rate of 1 NOK = 0.12 CAD. Calculate how many Canadian Dollars she receives.
3. Determine how much money the bank makes from the two transactions.
4. Calculate Claudia's loss as percentage of her original 2000 CAD.

TASK 13 Reflection: Just by reading this task, do you feel motivated to solve it?
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Write a short explanation below why you felt that way.

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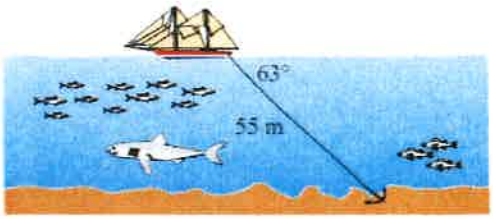
TASK 14: WHERE THE ANCHOR LIES

A boat has an anchor rope length of 55 m. The boat drifts with the ocean current so that the rope makes an angle of 63 degrees with the surface of the water. Find the depth of the water at the position where the anchor lies at the bottom.



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Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Solution 1: Task 6

Most likely

5
4
7
1: The horse only eats carrots
6: The horse is not a racing horse
2: The farmer feeds the horse only on school days
3: The farmer is the only one that feeds the house

Least likely

Solution 2:

20

TASK RATING QUESTIONNAIRE

PART A: Please read and try to understand the following mathematical tasks. There are 14 of them below. After reading the task, rate the task on the degree to which you find it motivating or engaging. Then explain the reasons for why you thought it was so in the space provided. There is no right or wrong answer on this, it is important to indicate just how you feel about them.

TASK NUMBER 1: UNIT MAKES DIFFERENCE

In 1983, an Air Canada flight ran out of fuel halfway through its journey due to a mix-up between pounds and kilograms. The plane needed 22300 kg of fuel for the journey. There were 7682 litres of fuel already in the tanks.

a. One litre of jet fuel has a mass of 0.803 kg. Calculate how much fuel should have been loaded. Give your answer in litres.
b. Instead of 0.803 kg per litre, a conversion of 1.77 was used. (One litre of jet fuel has a mass of 1.77 pounds). Calculate how much fuel was actually loaded. Give your answer in litres.
c. Find how many litres short of fuel the plane was.

TASK 1 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

This task is a bit basic and easy to solve.
It is familiar.
And picture engages

TASK 2: THE MAGIC SQUARES

Show that each square is a magic square by showing that the rows, columns and the diagonals all have the same sum.

2x-2y	-x+3y	2x-y
x + y	x	x-y
y	3x-3y	2y

3y-2x	-x-5y	6x+2y
9x-y	x	y-7x
-4x-2y	3x+5y	4x-3y

TASK 2 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

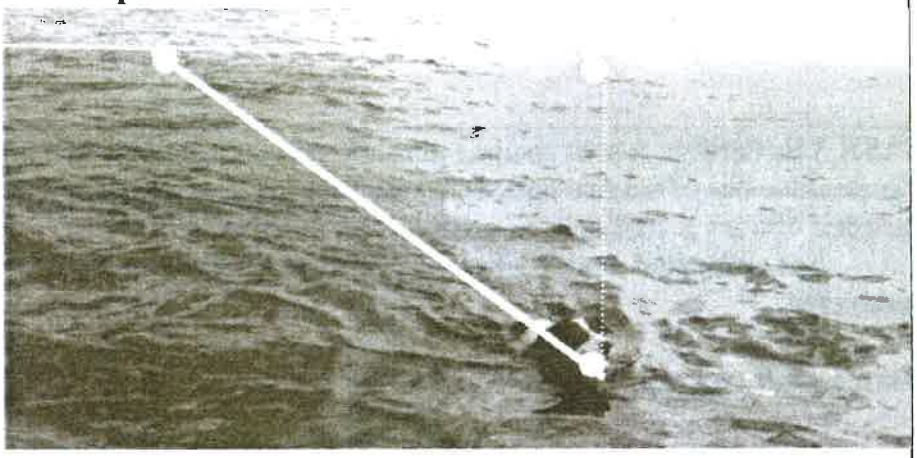
Not motivated at all (1) ------- (2) -------(3) -------(④) -------(5) Very motivated

Write a short explanation below why you felt that way.

Interesting wording, making it engaging.
"Magic square"
Little text which makes it easy and understandable

TASK 3: APACHE THE BORDER COLLIE

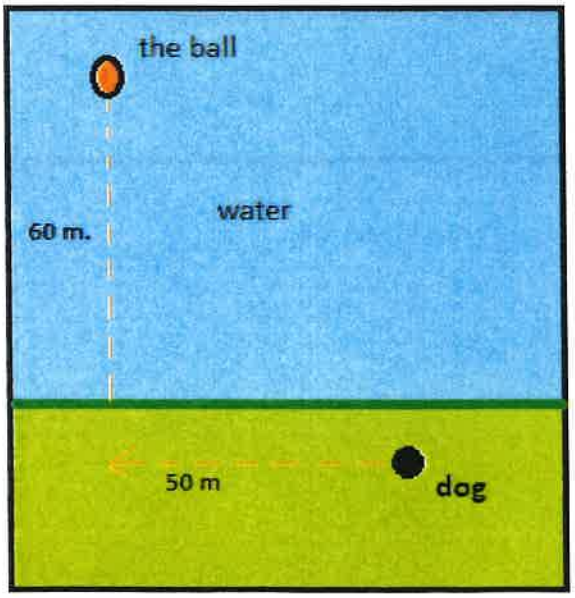
Apache the border Collie



In 2001, Ian Forbes from Edinburgh wrote, in the journal *MicroMath*:

I have a 2-year-old dog, a Border collie named Apache and after a year of avoiding deep water she recently met three Labradors at the local lake. These dogs love to swim and I named them the "submarine brigade" because of their ability to dive straight in and swim after the ball. After meeting them, Apache quickly took to swimming, but being a dog with 'brains,' she discovered that she could beat the rest by running along the bank and then diving in.
The situation is like this: The Labradors jump immediately in the water and swim straight to the ball. Apache runs for about 50 m along the bank and then jumps to swim to the ball. Why would Apache run 50 m and then have the shortest distance for swimming? Is Apache really smart?

Please note that one meter of swimming takes four meters of running in time.)



Please explain your solution.

TASK 3 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Too much text.

Nice picture for visualising.

TASK 4: A4 PUZZLE

Take two sheets of A4 size paper. Roll one into a short cylinder and the other into a tall cylinder. Does one hold more than the other?

Please explain your answer and show your work.

TASK 4 Reflection: Just by reading this task, do you feel motivated to solve it?

Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- ((2)) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Too little information, numbers?

Makes it confusing

TASK 5: PERCENTAGES

Find the unknowns: X, Y, Z.

S.No	Name of the item	Marked Price	Selling Price	Discount
i)	Book	225 kr	X	8%
ii)	LED TV	Y	11970 kr	5%
iii)	Digital clock	750 kr	615 kr	Z

Show your work here.

i.

ii.

iii.

TASK 5 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(④) -------(5) Very motivated

Write a short explanation below why you felt that way.

Good structure of table

TASK 6: LOGICAL REASONING

Your friend says she passes a field every day on the way to school, and each day, without exception, she sees **a farmer wearing a straw hat feeding a carrot to a brown horse.** Look at the following general statements and rank them in order from most likely to be true to least likely to be true.

- *The horse never eats anything but carrots.*
- *The farmer feeds the horse only on school days.*
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Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(③) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Too much text,

Little numbers.

Too many details

TASK 7: DIVISIBLE BY 7

Is **3843** evenly divisible by 7? To see if a number is evenly divisible by 7, remove the units digit of the number, double the removed digit and subtract the doubled amount from the remaining number. If the result is evenly divisible by 7, then the original number is also divisible by 7. The method may need to be repeated several times.

3843 remove the units digit, 3, leaving 384:

384
-6 subtract the doubled number 3

378 remove the units digit, 8, leaving 37:

37
-16 subtract the doubled number 8

21 This is a multiple of 7, so 3843 is evenly divisible by 7.

This is a specific example that works with the method described.
Use the above method to check whether 3374 is evenly divisible by 7

TASK 7 Reflection: Just by reading this task, do you feel motivated to solve it?
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Not motivated at all (1) ------- (2) -------(3) -------(④) -------(5) Very motivated

Write a short explanation below why you felt that way.

It gives a method and it is engaging because it makes you wonder if it always works

TASK 8: LOGICAL REASONING

Stuart has a 330 mL bottle of orange juice. He thinks he can pour it all into his glass, which is a cylinder with diameter 7 cm and height 8 cm. Stuart's friend Patrick thinks the glass will overflow. Answer the following questions.

a. Will Stuart's glass overflow?

b. If the glass was full, what volume of fluid would it contain.

Show your work here.

TASK 8 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(⑤) Very motivated

Write a short explanation below why you felt that way.

Gives clear overview of tasks

Easy to dissect the question

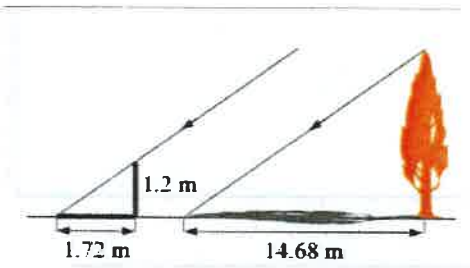
Like the picture

TASK 9: LOGICAL REASONING

Dean needs to accurately find the height of a tree in his garden. Local Council regulations prohibit the growth of garden trees beyond 20 m. They argue that in storm conditions falling branches and uprooted large trees are dangers to houses and lives. As Dean cannot climb the tree, he decides to use shadows to help solve the problem. On a windless sunny day, he stands a 1.2 m stick vertically on the ground. The length of the stick's shadow is 1.72 m and at the same time, the tree's shadow measures 14.68 m.

Using the diagram to estimate:

- The height of the tree
- The angle of elevation of the sun (the angle that the sun's rays make with the horizontal ground



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Write a short explanation below why you felt that way.

Like the diagram

Easy to follow.

TASK 10: HEARTBEAT

The average person's heart beats 70 times per minute. It can be shown that the average person's heart beats 2.57 billion times in a lifetime.

a. According to this information, how long is the average life span?
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Show your work and explain.

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Write a short explanation below why you felt that way.

Good setup of words.

Good connection between tasks

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Write a short explanation below why you felt that way.

Good structure of text, good picture

Not fond of coordinate geometry.

TASK 12: GREAT BLUE HOLE TASK

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Write a short explanation below why you felt that way.

A lot of unnecessary text, but it is engaging and includes clear numbers and formula.

Good to include picture.

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Claudia lives in Canada. She is planning a holiday to Norway. She exchanges 2000 CAD into Norwegian kroners at a rate of 1 CAD = 6.99 CAD.

1. Calculate how many Norwegian Kroners she receives.
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Good set-up of task

Don't like currency conversion tasks

TASK 14: WHERE THE ANCHOR LIES

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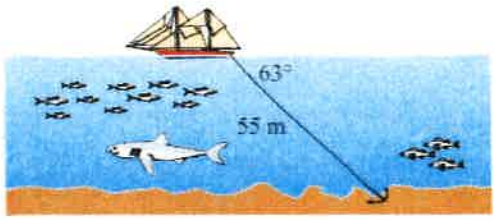

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Write a short explanation below why you felt that way.

Easy task to understand and I like Trigonometry.

Clear diagram that helps visualise task

Solution 1: Question 8

$V = \pi r^2 h$

$V = \pi r^2 h$

$V = \pi 4.5^2 \times 8$

$V = \pi \ 20.25 \times 8$

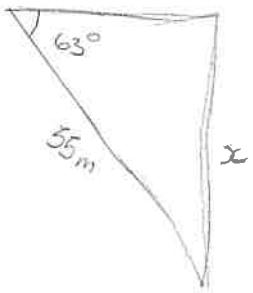
$V = 162\pi$

$V = 508.93 \text{ cm}^2$

a. Stuart's glass will not overflow because the glass holds $\approx$ 500 mL

b. If the glass was full, it would contain 508.93 mL of liquid.

Solution 2: Question 14



$$\sin(63) = \frac{x}{55}$$

$$\sin(63) \times 55 = x$$

$$x = 0.891 \times 55$$

$$x = 49.005 \text{ m.}$$

The anchor lies 49.005 meters under the surface.

21

TASK RATING QUESTIONNAIRE

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Not motivated at all (1) ------- (2) -------(3) -------(4)-------(5) Very motivated

Write a short explanation below why you felt that way.

Seems interesting but a lot of information.

TASK 2: THE MAGIC SQUARES

Show that each square is a magic square by showing that the rows, columns and the diagonals all have the same sum.

2x-2y	-x+3y	2x-y
x + y	x	x-y
y	3x-3y	2y

3y-2x	-x-5y	6x+2y
9x-y	x	y-7x
-4x-2y	3x+5y	4x-3y

TASK 2 Reflection: Just by reading this task, do you feel motivated to solve it?
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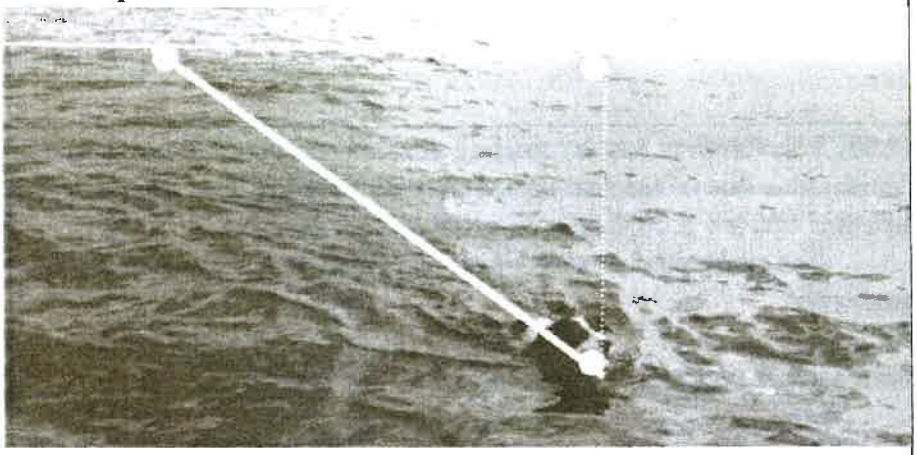
Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

This seems interesting because it makes me want to verify the statement.

TASK 3: APACHE THE BORDER COLLIE

Apache the border Collie



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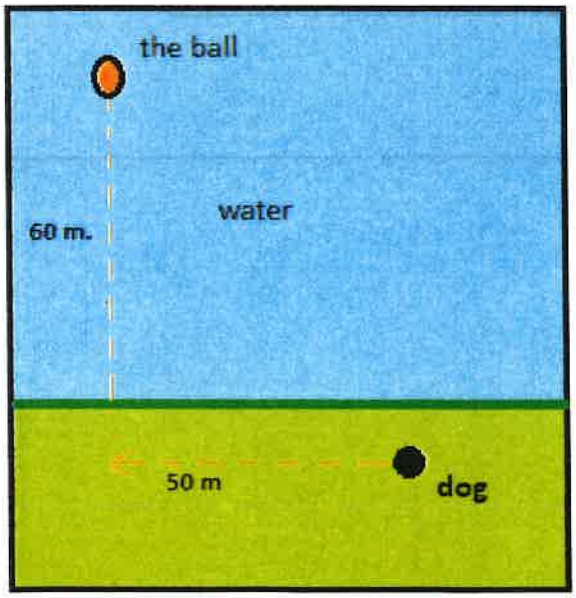
Please note that one meter of swimming takes four meters of running in time.)



Please explain your solution.

TASK 3 Reflection: Just by reading this task, do you feel motivated to solve it?
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Not motivated at all (1) ------- (2) -------(3) -------(4)-------(5) Very motivated

Write a short explanation below why you felt that way.

Well structured task but lacking slight motivation to solve it at the moment.

TASK 4: A4 PUZZLE

Take two sheets of A4 size paper. Roll one into a short cylinder and the other into a tall cylinder. Does one hold more than the other?

Please explain your answer and show your work.

TASK 4 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Seems difficult but I am motivated to figure it out.

TASK 5: PERCENTAGES

Find the unknowns: X, Y, Z.

S.No	Name of the item	Marked Price	Selling Price	Discount
i)	Book	225 kr	X 207 kr	8%
ii)	LED TV	Y 239400 kr	11970 kr	5%
iii)	Digital clock	750 kr	615 kr	Z 18 %

Show your work here.

i.

ii.

iii.

TASK 5 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3)-------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Confuses me a bit. Not very motivated to solve it.

TASK 6: LOGICAL REASONING

Your friend says she passes a field every day on the way to school, and each day, without exception, she sees **a farmer wearing a straw hat feeding a carrot to a brown horse**. Look at the following general statements and rank them in order from most likely to be true to least likely to be true.

- *The horse never eats anything but carrots.* ✓
- *The farmer feeds the horse only on school days.* ✓
- *The farmer is the only person who feeds the house.* ✓
- *Your friend never walks to school.* ✓
- *The farmer always wears a hat.* ✓
- *The horse is not a racing horse.* ✓
- *Your friend travels to school at the same time every day.* ✓

TASK 6 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

This seems to be rather easy so I would be motivated to try solve it.

TASK 7: DIVISIBLE BY 7

Is **3843** evenly divisible by 7? To see if a number is evenly divisible by 7, remove the units digit of the number, double the removed digit and subtract the doubled amount from the remaining number. If the result is evenly divisible by 7, then the original number is also divisible by 7. The method may need to be repeated several times.

3843 remove the units digit, 3, leaving 384:

384
-6 subtract the doubled number 3

378 remove the units digit, 8, leaving 37:

37
-16 subtract the doubled number 8

21 This is a multiple of 7, so 3843 is evenly divisible by 7.

This is a specific example that works with the method described.
Use the above method to check whether 3374 is evenly divisible by 7

TASK 7 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) -------(2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

This one just confuses me and im not very motivated to attempt and solve it.

TASK 8: LOGICAL REASONING

Stuart has a 330 mL bottle of orange juice. He thinks he can pour it all into his glass, which is a cylinder with diameter 7 cm and height 8 cm. Stuart's friend Patrick thinks the glass will overflow. Answer the following questions.

a. Will Stuart's glass overflow?

b. If the glass was full, what volume of fluid would it contain.

Show your work here.

TASK 8 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

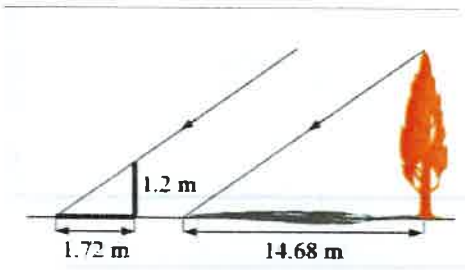
I don't really know how to solve this but I would try.

TASK 9: LOGICAL REASONING

Dean needs to accurately find the height of a tree in his garden. Local Council regulations prohibit the growth of garden trees beyond 20 m. They argue that in storm conditions falling branches and uprooted large trees are dangers to houses and lives. As Dean cannot climb the tree, he decides to use shadows to help solve the problem. On a windless sunny day, he stands a 1.2 m stick vertically on the ground. The length of the stick's shadow is 1.72 m and at the same time, the tree's shadow measures 14.68 m.

Using the diagram to estimate:

- The height of the tree
- The angle of elevation of the sun (the angle that the sun's rays make with the horizontal ground



TASK 9 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

This seems ok, I am somewhat motivated.

TASK 10: HEARTBEAT

The average person's heart beats 70 times per minute. It can be shown that the average person's heart beats 2.57 billion times in a lifetime.

a. According to this information, how long is the average life span?
b. What assumptions have to be made to solve this problem? How do they affect your answer to part **a?**

Show your work and explain.

TASK 10 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

This interests me and I am motivated to try solve it.

TASK 11: PALEONTOLOGY

Archaeologists use a coordinate grid system when excavating a site. This allows them to easily record the location of artefacts at a site, which simplifies future excavations. If the coordinates (in cm) of the top and bottom of the arm bone of this dinosaur skeleton are (6.2, 22.3) and (9.1, 11.8), find the length of the arm bone, rounded to the nearest tenth of a centimetre. (Assume that the arm bone is perfectly straight).

TASK 11 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) -------(2)-------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

I am not very motivated to solve this problem.

TASK 12: GREAT BLUE HOLE TASK

When faced with the problem of trying to breathe underwater, ocean explorer, Jacques Cousteau, designed an underwater breathing apparatus called the Aqualung. It was the precursor of today's scuba gear and allowed Cousteau to explore places that had never been seen before. In 1972, he explored the Great Blue Hole, a cylindrical formation in Belize which began forming over 70 million years ago. The great Blue Hole has a depth of roughly 125 m. If there is 9132700 m^3 of water in the Great Blue Hole, find its radius. Round your answer to the nearest tenth. (Volume of cylinder = $\pi r^2 h$).

TASK 12 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3)-------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

Although this seems interesting it confuses me a bit.

TASK 13: CURRENCY CONVERSION TASK

Claudia lives in Canada. She is planning a holiday to Norway. She exchanges 2000 CAD into Norwegian kroners at a rate of 1 CAD = 6.99 CAD.

1. Calculate how many Norwegian Kroners she receives.
2. Before she even leaves Canada, Claudia becomes ill and has to cancel her holiday. She sells the Norwegian Kroners back to the bank at a rate of 1 NOK = 0.12 CAD. Calculate how many Canadian Dollars she receives.
3. Determine how much money the bank makes from the two transactions.
4. Calculate Claudia's loss as percentage of her original 2000 CAD.

TASK 13 Reflection: Just by reading this task, do you feel motivated to solve it? Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

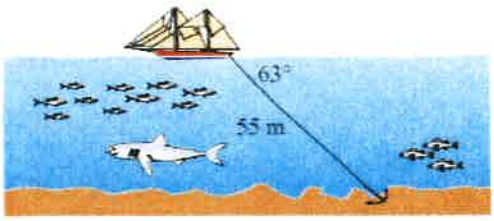
Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

This question seems logical and I am motivated to try solve it.

TASK 14: WHERE THE ANCHOR LIES

A boat has an anchor rope length of 55 m. The boat drifts with the ocean current so that the rope makes an angle of 63 degrees with the surface of the water. Find the depth of the water at the position where the anchor lies at the bottom.



TASK 14 Reflection: Just by reading this task, do you feel motivated to solve it?
Please circle one of the five options below, **1** for the least motivation, **5** for the highest and the other options accordingly, to indicate your answer.

Not motivated at all (1) ------- (2) -------(3) -------(4) -------(5) Very motivated

Write a short explanation below why you felt that way.

This question seems logical and not very hard to solve.

Task 5

Solution 1:

$Y = 11970 \times 100 \rightarrow Y = 1197000 \div 5 \rightarrow Y = 239400 kr$

$x = 225 / 100 \rightarrow x = 2.25 \times 8 = 18 \rightarrow x = 225 - 18 \rightarrow x = 202 kr$

$z = 750 - 615 \rightarrow z = 135 / 750 \rightarrow z = 0.18 \times 100 \rightarrow z = 18\ \%$

Task 6

Solution 2:

Most likely

Your friend travels to school at the same time everyday
The farmer always wears a hat
The horse is not a racing horse
The horse never eats anything but carrots
The farmer feeds the horse only on school days
Your friend never walks to school
The farmer is the only person that feeds the horse

Least likely

COLOUR CODED TASK QUESTIONNAIRES

TASK NUMBER 1: UNIT MAKES DIFFERENCE

In 1983, an Air Canada flight ran out of fuel halfway through its journey due to a mix-up between pounds and kilograms. The plane needed 22300 kg of fuel for the journey. There were 7682 litres of fuel already in the tanks.

a. One litre of jet fuel has a mass of 0.803 kg. Calculate how much fuel should have been loaded. Give your answer in litres.
b. Instead of 0.803 kg per litre, a conversion of 1.77 was used. (One litre of jet fuel has a mass of 1.77 pounds). Calculate how much fuel was actually loaded. Give your answer in litres.
c. Find how many litres short of fuel the plane was.

TASK 1

1. The question had too much back story (ST 1)
2. The question seems achievable, but there is a lot of text for the question. This is not a bad thing though. (ST4)
3. Conversion and many numbers is hard, but the image made me chose 2. (ST 5)
4. I chose 4 because I understand the task clearly and I am motivated to find out the answers. (ST 7)
5. The first question (a) confused me, but b and c were ok. The picture helped even though it didn't have any info. (ST 9)
6. Too many terms like pounds, distance, liters, calculate kilos. Makes it stressful. It does make it interesting. (ST 10)
7. Its relatively easy since you are given the fuel in pounds plus its real life. (ST 11)
8. There is a a, b and c, also because it just looks long. (ST 12)
9. I find it difficult to calculate these kind of word problems (ST 13)
10. I feel that this task was pretty motivating because it gives you a lot of information to work with, has multiple answers and has a visual. (ST 14)
11. I feel like it is in the middle of motivation scale because it can feel like it is a bit hard. (ST 15)
12. I don't know how to transfer Kg to L or L to Kg. (ST 16).
13. Takes into account something I am curious about. (ST 17)
14. I chose 2 because I know that I am very bad with different weight units. Therefore, I knew it would be difficult for me to answer this question. (ST 18)
15. Too much text. (ST 19)

16. I gave it a 4 because it is a multiple choice question with visuals. (ST 21)
17. There are a lot of numbers and a lot of info, which makes it less motivational, but it also seems interesting which is why I gave it a 3. (ST1)
18. Too much text (ST 2)
19. There were a lot of questions and it seems a long calculation process. (ST 3)
20. I am not really a fan of weight questions etc. I find them a bit confusing. (ST 4)
21. Some things were a bit confusing and hard to understand, but it looked fun and interesting. (ST 5)
22. It's a confusing unit to me. (ST 6)
23. It is not that easy, but it is not that hard either. (ST 7)
24. The text is too long. The photo looks too confusing. (ST 8)
25. It's a lot of writing and its abc task. (ST 9)
26. There are a lot of numbers, but the picture makes it more motivating and fun.(ST 10)
27. Theme is good, too much text. (ST11)
28. The text is too long, that is why it is not motivating. (ST12)
29. Its not a bad question, but I don't feel an urge to do it. It was a bit confusing and I had to read it multiple times. (ST13)
30. Something that I would see in a normal test, its good. Good explanation. (ST14)
31. This can be solved, but I am not so motivating because of too much details, numbers and text. (ST15)
32. I don't know how to calculate this. (ST16)
33. I wouldn't mind doing the task if it was given to me, but I don't like the amount of conversion you have to do in order to do the task, because you have to be really focused. (ST17)
34. Not challenging, takes time. (ST18)
35. I feel its too much text for only one big question. (ST19)
36. This task is a bit basic and easy to solve. It is familiar. And picture engages. (ST20)
37. Seems interesting, but a lot of information. (ST21)

COLOR CODED CLASSIFICATION OF STUDENT COMMENTS TO TASK 1

BLUE CLASSIFICATION: TASK COMPLEXITY: too much text, confusing story, too many things to do, a lot of numbers, much information, takes time (and not for an interesting purpose at the end, anyway) .. [n= 20, 20/37 => 54%], Negative

GREEN CLASSIFICATION: THE VISUAL IS ENGAGING: image made me choose, picture helps, engages, motivates, [n=6, 6/37=16 %] Positive

BROWN CLASSIFICATION: I FIND IT DIFFICULT: confusing, difficult to compute, hard, conversion of units hard, [n=9, 9/37 = 24 %] Negative

PURPLE CLASSIFICATION: INTERESTING CONTEXT: interesting, curious, fun, theme is good [n=6, 16 %] Positive

OVERALL RATING: 2.59

TASK 2: THE MAGIC SQUARES

Show that each square is a magic square by showing that the rows, columns and the diagonals all have the same sum.

2x-2y	-x+3y	2x-y
x + y	x	x-y
y	3x-3y	2y

3y-2x	-x-5y	6x+2y
9x-y	x	y-7x
-4x-2y	3x+5y	4x-3y

TASK 2

1. It is in between 2 and 3, but leaning more towards 3. I feel like it could be organized better and maybe an extra sentence. It was hard to understand at first, but makes sense when looking at it better. (ST4)
2. I don't understand it and I don't like algebra. (ST 5)
3. I have problems with understanding the task and therefore I don't feel motivated. . (ST 7)
4. I don't get it, dislike it (ST 10).
5. Just tiring to look at and seems more complex, than I think it would have looked like with more visuals. (ST 11)
6. It looks a little long, but still looks better than the last one. (ST 12)
7. It looks very complicated and seems difficult to complete because we have to "show." (ST 13)
8. Too many numbers, too much to work with. Think many people would find this hard to read and interpret. Generally too tiring. (ST 14)
9. It looks easy and not too hard and it can be easily understood. . (ST 15)
10. It looks confusing and does not make sense to me. (ST 16).
11. The question gives little context and information and I don't understand it. (ST 17)
12. I chose 5 because it looked like an interesting puzzle that would get me thinking. Also, it seemed kind of fun to solve. (ST 18)
13. I like that it doesn't have so much text. . (ST 19)
14. It is fine, but there is nothing that is very exciting about it. (ST 21)
15. Many numbers and variables, but explanation was clear and short making it motivational. (ST1)
16. It was a bit complicated to read, but diagram is very clear. (ST 2)
17. I have never worked with this before. (ST 3)
18. It is different than other questions. I am used to so it is interesting, it sounded interesting, but it also seems a bit repetitive, so it is not a 5. (ST 4)
19. I could see the logic in the task and it seemed fairly fun and interesting. (ST 5)
20. Don't really understand the task. (ST 6)
21. I don't understand this task. (ST 7)

22. It looks confusing with all those boxes and numbers including symbols and letters. (ST 8)
23. I have never done this before, I don't get it. (ST 9)
24. All the numbers make it look hard and complicated, but the colours help a bit. .(ST 10)
25. Need more explanation. (ST11)
26. It looks very confusing and there is not enough explanation. (ST12)
27. Good question, not too much text, which makes it less confusing. (ST13)
28. Easy to understand, clear, nice light colors. (ST14)
29. Not much text, easy to understand, good pictures. (ST15)
30. I don't feel motivated when solving algebra. (ST16)
31. I don't like questions where you have to prove given information. (ST17)
32. Challenging enough, too much to read. (ST18)
33. Needs to be explained a bit better and more detail. (ST19)
34. Interesting wording, making it engaging "magic square" Little text which makes it easy and understandable. (ST20)
35. This seems interesting because it makes me want to verify the statement. (ST21)

COLOR CODED CLASSIFICATION OF STUDENT COMMENTS TO TASK 1

BLUE CLASSIFICATION: IT IS CONFUSING: hard to understand, I don't get it, it is complicated, too many numbers to understand, needs more explanation [n=9+9 =18, 18/35 => 51%], Negative

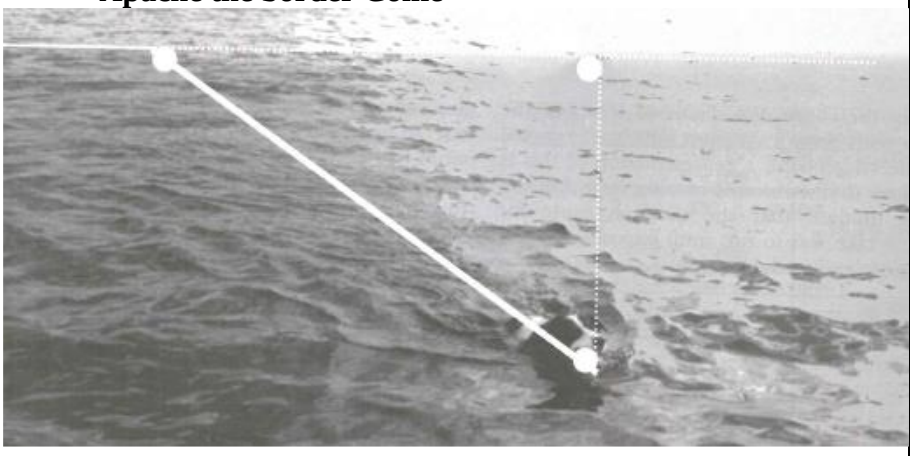
GREEN CLASSIFICATION: IT IS NOT CONFUSING: looks easy, diagram-explanation is clear, easy to understand [n= 1+6 =7, 20 %] Positive

BROWN CLASSIFICATION: IT IS INTERESTING: interesting, engaging, fun [n= 1+4 =5, 14 %] Positive

OVERALL RATING: 2.74

TASK 3: APACHE THE BORDER COLLIE

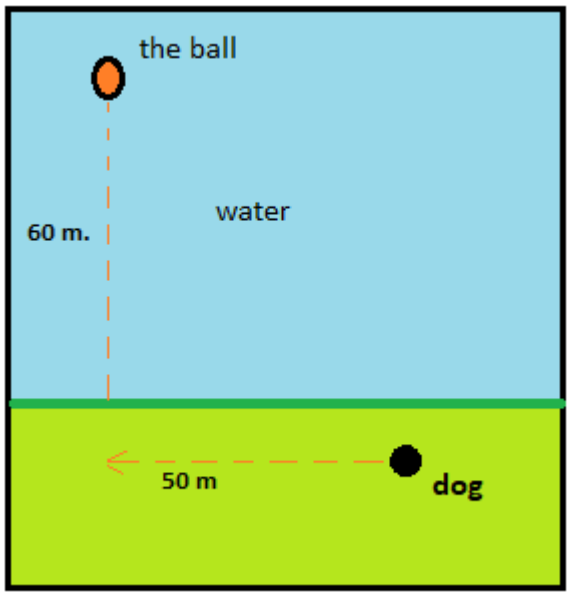
Apache the border Collie



In 2001, Ian Forbes from Edinburgh wrote, in the journal *MicroMath*:

I have a 2-year-old dog, a Border collie named Apache and after a year of avoiding deep water she recently met three Labradors at the local lake. These dogs love to swim and I named them the "submarine brigade" because of their ability to dive straight in and swim after the ball. After meeting them, Apache quickly took to swimming, but being a dog with 'brains,' she discovered that she could beat the rest by running along the bank and then diving in.
The situation is like this: The Labradors jump immediately in the water and swim straight to the ball. Apache runs for about 50 m along the bank and then jumps to swim to the ball. Why would Apache run 50 m and then have the shortest distance for swimming? Is Apache really smart?

Please note that one meter of swimming takes four meters of running in time.)



Please explain your solution.

Comments

1. Too much unuseful information and too little about the question. (ST 1)
2. The question seems interesting and also is different. For me though, I would prefer to do questions with a straightforward answer. (ST4)
3. Too much text, but naming the dog makes me want to do it. (ST 5)
4. The task seems easy and therefore I am more motivated to do it. . (ST 7)
5. I didn't understand if 4 m of running is equal to 1 m of swimming or the other way around (ST 9)
6. Too much backstory, which begins to make it nerve-racking (ST 10).
7. Super simple and can easily be explained and understood. (ST 11)
8. Looks so long and boring, too much storyline. (ST 12)
9. There is a lot of text, but it seems like an easier task. (ST 13)
10. Fun topic, easy numbers, looks more fun. (ST 14)
11. It has animals and animals are motivating for some people. You can understand this easily too. . (ST 15)
12. Looks easy and interesting. (ST 16).
13. The question is well explained and the topic is very likeable. (ST 17)
14. I chose 5 because it looked like an easy question to solve with little requirement for thinking too much (ST 18)
15. A lot text and a lot to remember, but the story kept me motivated. . (ST 19)
16. I gave it a 4 because it is more of a fun question. It has a text that gives us information that we have to find, and it has visuals. (ST 21)
17. Too much explanation/context, makes it less motivational. (ST1)
18. A lot of text, diagram is clear. (ST 2)
19. The task was not that interesting. (ST 3)
20. The text was confusing, however, the diagram helped a lot, I liked the diagram. I also like the pythagorean theorem. (ST 4)
21. Dogs. You gotta love dogs with brains and logic. (ST 5)
22. Well explained, seems easy to answer. (ST 6)
23. It is easy to understand. (ST 7)
24. The text overcomplicates the task and the photos look like they don't make the task make no sense. The task question is even more confusing than the photos make it. (ST 8)
25. I like its Pythagoras, but I don't remember now to do it and I don't like math. (ST 9)
26. I felt that this was okay to solve because it included a diagram with colours and good informative writing. .(ST 10)
27. Too much unnecessary text. Not enough explanation. Good pictures. (ST11)
28. The text is very long, but the picture is very clear. (ST12)
29. I understood that I needed to use Pythagoras, but there was a lot of text and the diagram at the end was a bit confusing because of the space between the line A and B. (ST13)
30. Don't look the first image, too much text, a bit boring. (ST14)
31. Explanation good, picture good, note good. (ST15)
32. I don't remember this. (ST16)
33. I thought the story was amusing. (ST17)

34. Motivated, but don't remember how to do it. (ST19)
35. Too much text, not picture of visualizing. (ST20)
36. Well-structured task but lacking slight motivation to solve it at the moment. (ST21)

COLOUR-CODED CLASSIFICATION OF STUDENT COMMENTS TO TASK 3

BLUE CLASSIFICATION: **LONG TEXT**: Too much text, confusing story, much information, takes time [n= 16, 16/36 => 44%], Negative

GREEN CLASSIFICATION: GOOD VISUALS: Picture engages, helps, motivates, text explains better [n= 10, 10/36 = 28 %] Positive

YELLOW CLASSIFICATION: **INTERESTING CONTEXT**: story is interesting and fun [n= 8, 8/36 =36, 22%] Positive

BROWN CLASSIFICATION: I FIND IT DIFFICULT: Hard to understand, visuals not helping, [n= 7, 7/36=19 %] Negative

PURPLE CLASSIFICATION: **I FIND IT EASY**: Easy to understand, theme is interesting [n= 7, 7/36 =36, 19%] Positive

OVERALL RATING: 3.54

TASK 4: A4 PUZZLE

Take two sheets of A4 size paper. Roll one into a short cylinder and the other into a tall cylinder. Does one hold more than the other?

Please explain your answer and show your work.

Comments

1. The question made no sense. (ST 1)
2. The question is simple and there is a correct answer. When things are done correctly, my answer is in between 4 and 5. (ST4)
3. The physical aspect seems fun, but the three lines of the text seems boring. (ST 5)
4. Difficult task, didn't understand. . (ST 7)
5. I think it is boring. (ST 9)
6. A lot of doing makes it easier to focus and think about volume. If this was in a test, I would do it but as a class task, I would skip because its too "much work." (ST 10).
7. Can be easily done. (ST 11)
8. It takes too long to do, but it is fun because it is engaging. (ST 12)
9. It is confusing and I don't know how to use math to solve the problem (ST 13)
10. This one isnt very interesting, but it is very simple, meaning I would be more motivated to do the easier or more simple ones with less calculations and complications. (ST 14)
11. This is something you have or do not have to write for and you can more a little bit. . (ST 15)
12. Sounds simple, but also hard to prove. (ST 16).
13. The question is relevant, however, it requires or seems to require a lot of calculations. (ST 17)
14. I chose 1 because it looked really difficult to answer and feels like it would probably be a waste of time because I thought that I could solve it within 15 minutes without giving up. I don't think the mathematics would be that hard, I just don't remember the formula for the volume of the cylinders. If I had my mind refreshed and was told the formula again, I think I could probably solve it. (ST 18)
15. This is fun because it is an activity task. Instead of just writing, we get to do actually do something. . (ST 19)
16. It is an active exercise that seems fun. (ST 21)
17. Good and concrete explanation given. (ST1)
18. Clear instruction, I just don't remember how to do it. (ST 2)
19. I can't be bothered to gather other materials to answer the question. (ST 3)
20. I don't really have that much feeling towards it, like it does not seem that motivating, but not that motivated. (ST 4)
21. I am not very motivated because the task is too easy. (ST 5)

22. Easy problem, but confusing picture, why is there that picture. (ST 6)
23. It is simple to understand. (ST 7)
24. It starts off fine until it starts with the A4 paper. The question does not hold more than the other, makes it very confusing. (ST 8)
25. I wasn't here when the people in my class had this and my teacher refused to teach it cause he said "you've had about this in your old school" (ST 9)
26. Motivating and looks fun because of the colourful picture that has been included. .(ST 10)
27. Boring picture. Enough explanation. (ST11)
28. Short text. (ST12)
29. Easy to understand, good picture. (ST13)
30. Nice image, good explanation, maybe have a bit more detail. (ST14)
31. Understandable, good picture, short explanation. (ST15)
32. I like solving practical questions. (ST16)
33. The picture helps explain the question, but it make it less motivating when you have to explain your answer with words. (ST17)
34. This was alright, should have said what the measurements of an A4 is. (ST18)
35. Personally, I don't like doing volume and I don't remember how. (ST19)
36. Too little information, numbers? Makes it confusing. (ST20)
37. Seems difficult, but I am motivated to figure it out. (ST21)

COLOR CODED CLASSIFICATION OF STUDENT COMMENTS TO TASK 1

GREEN CLASSIFICATION: IT IS FUN: practical, understandable, motivating and fun, [n= 10, 10/37 = 27 %] Positive

PURPLE CLASSIFICATION: **LOW COMPLEXITY**: Easy to understand, straightforward [n= 10, 10/37 = 27%] Positive

BLUE CLASSIFICATION: **IT IS CONFUSING**: difficulty understanding, [n= 6, 9/37 => 16%], Negative

BROWN CLASSIFICATION: TIME CONSUMING: Time consuming, lots of calculations, prefer less time-consuming tasks [n= 5, 5/37=14 %] Negative

YELLOW CLASSIFICATION: NICE PICTURE: Picture is helpful. [n= 6, 6/37=16%] Positive

OVERALL RATING: 3.27

TASK 5: PERCENTAGES

Find the unknowns: X, Y, Z.

S.No	Name of the item	Marked Price	Selling Price	Discount
i)	Book	225 kr	X	8%
ii)	LED TV	Y	11970 kr	5%
iii)	Digital clock	750 kr	615 kr	Z

Show your work here.

i.

ii.

iii.

Comments

1. The question is kind of hard to understand due to the way it is organized. The space is also limited to do working out. (ST4)
2. I don't understand it. (ST 5)
3. Understood half of the task, but lost motivation at iii. . (ST 7)
4. I didn't understand the context. (ST 9)
5. Loads of numbers and filling out. (ST 10).
6. Feels like the question is easy. (ST 11)
7. I understand it, but it seems too easy. (ST 12)
8. A little bit boring, but percentages is something we learned a while ago and it is motivational to do things that are in the core of your knowledge, something you know very well. (ST 14)
9. It is too complicated, and it is hard to understand. You have to think way more and you don't just want to start the last. (ST 15)
10. Confusing. (ST 16).
11. The question is very messy and confusing. It as well doesn't tell me what I need to do. (ST 17)
12. By the initial look of the task, it seemed confusing. (ST 18)
13. Hard to understand what I am supposed to do. (ST 19)
14. This one is very plain and confusing. (ST 21)
15. Looks confusing. (ST1)
16. Clear instruction, I want to do it, but forgot how. (ST 2)
17. I have forgot how to work out percentage questions. (ST 3)
18. I don't like percentages that much. I could do it, it is not just that fun in my opinion. (ST 4)
19. It makes me think, but still too easy. (ST 5)

20. Well explained. (ST 6)
21. It is easy, because it has linear equation. (ST 7)
22. It looks over complicated. (ST 8)
23. I never had percentages, my teacher don't believe me. (ST 9)
24. This is motivating because it includes real life situations with money, which I find interesting. (ST 10)
25. Need more explanation, more fun with picture. (ST11)
26. It looks clear (ST12)
27. I understood it right away. (ST13)
28. Love these types of equations, easy to understand, easy to solve, good explanation and short explanation. (ST15)
29. I am not sure how to do this. (ST16)
30. I like the type of question, but sometimes, it is challenging to remember percentages (how to work with them) because we don't use it much. (ST17)
31. Money stuff, this is great. (ST18)
32. Difficult, but fun to do. (ST19)
33. Good structure of table. (ST20)
34. Confuses me a bit. Not very motivated to solve it. (ST21)

COLOR CODED CLASSIFICATION OF STUDENT COMMENTS TO TASK 1

BLUE CLASSIFICATION: **IT IS CONFUSING**: Difficulty understanding, confusing, [n= 13, 13/34 => 38%], Negative

GREEN CLASSIFICATION: IT IS EASY AND CLEAR: Easily understandable, not complicated, clear explanation [n= 11, 11/34 = 32 %] Positive

PURPLE CLASSIFICATION: PERCENTAGES DIFFICULT: I do not remember how to do this, percentages difficult [n= 5, 5/34 => 15%], Negative

OVERALL RATING: 2.79

TASK 6: LOGICAL REASONING

Your friend says she passes a field every day on the way to school, and each day, without exception, she sees **a farmer wearing a straw hat feeding a carrot to a brown horse**. Look at the following general statements and rank them in order from most likely to be true to least likely to be true.

- *The horse never eats anything but carrots.*
- *The farmer feeds the horse only on school days.*
- *The farmer is the only person who feeds the horse..*
- *Your friend never walks to school.*
- *The farmer always wears a hat.*
- *The horse is not a racing horse.*
- *Your friend travels to school at the same time every day.*

Comments

1. The question was an opinion question, so there were no correct answer, so it felt comforting because there is not the stress that the question was wrong. (ST 1)
2. At first, it seemed tiring to do, but when looking closely at the questions and bullet points, it does not seem so hard and looks easy to do. (ST4)
3. Too many options, but the farmer and horse are fun. (ST 5)
4. I feel motivated because I understand the task and it includes items from criteria D (real life application of International Baccalaureate) . (ST 7)
5. All of them are unlikely (ST 9)
6. Simplistic and so formatted in a way to have good reasoning. (ST 10).
7. You can easily cross out the illogical answers. (ST 11)
8. Looks fun because its not really related to math, but its also boring because there are no numbers. (ST 12)
9. I feel motivated to do this task because it seems easy and no math is related (ST 13)
10. Motivational because there aren't numbers involved, it looks simple and is easy. (ST 14)
11. Again, has animals and it is easy to understand. (ST 15)
12. Easy to answer. (ST 16).
13. This question requires no mathematics to be completed, but it is easily understood. (ST 17)
14. Looks simple and easy. A bit boring because it doesn't require as much thinking as some of the other questions. (ST 18)
15. Very easy and also good explanation. . (ST 19)
16. It seems easy and fun. (ST 21)

17. Since there are no calculations needed, it looks simpler. Good amount of info, but a lot of text. (ST1)
18. The instruction was very clear. (ST 2)
19. It seems too easy and has a lot of text. (ST 3)

20. There are too few numbers like doing math with numbers, this seems easy and not that fun. (ST 4)
21. I am very fond of logic tasks, so I therefore want to solve this task. (ST 5)
22. Easy, but needs a bit more of information to be able to answer. (ST 6)
23. This is very easy as it only needs common sense to do it. (ST 7)
24. It was a simple but also hard question. (ST 8)
25. This is probably the only think I can do. (ST 9)
26. This motivated me because it didn't include a lot of math and wasn't boring. It was fun to solve this. .(ST 10)
27. Explained good, too easy, good theme. (ST11)
28. Too much text (ST12)
29. I felt very encouraged to find which one was the most true for some reason. (ST13)
30. It is okay, took sometime to solve, personally I think there is too much text. (ST15)
31. I like logical reasoning. (ST16)
32. I like questions that use a formula to acquire an answer more. (ST17)
33. This one is fun. (ST18)
34. This was a 50/50. (ST19)
35. Too much text, little number, too many details. (ST20)
36. This seems to be rather easy, so I would be motivated to try solve it. (ST21)

COLOR CODED CLASSIFICATION OF STUDENT COMMENTS TO TASK 6

GREEN CLASSIFICATION: I CAN DO IT, IT IS EASY: No numbers, fun, logic only [n= 23, 23/36 = 64 %] Positive

BROWN CLASSIFICATION: IT IS FUN: the task is fun, animal story is fun, not boring, I like logical tasks [n= 7, 7/36 = 19 %] Positive

PURPLE CLASSIFICATION: IT IS BORING: it is boring, [n= 2, 2/36 => 6%], Negative

BLUE CLASSIFICATION: **TOO MUCH TEXT**: Too much text, [n= 5, 5/36 => 14%], Negative

OVERALL RATING: 3.94

TASK 7: DIVISIBLE BY 7

Is **3843** evenly divisible by 7? To see if a number is evenly divisible by 7, remove the units digit of the number, double the removed digit and subtract the doubled amount from the remaining number. If the result is evenly divisible by 7, then the original number is also divisible by 7. The method may need to be repeated several times.

3843 remove the units digit, 3, leaving 384:

384
-6 subtract the doubled number 3

___

378 remove the units digit, 8, leaving 37:

___

37
-16 subtract the doubled number 8

_____

21 This is a multiple of 7, so 3843 is evenly divisible by 7.

_____

This is a specific example that works with the method described.
Use the above method to check whether 3374 is evenly divisible by 7

Comments

1. The question was motivating due to it having an example, so I would know what to do. (ST 1)
2. Along with a written explanation, there is also an example and it seems to be easy and a good brain activity. (ST4)
3. The formula is dumb, but the rest is motivating. (ST 5)
4. It shows u how to do it to make it clearer for us. . (ST 7)
5. Too many different numbers. (ST 9)
6. Steps with a lot of text don't go together. Looks harder than it has to. (ST 10).
7. Makes sense, but without the visual presentation, I would have no clue. (ST 11)
8. Looks long and looks stupid. (ST 12)
9. Many steps and a lot of writing. (ST 13)
10. Many steps, looks fun to work out the problem. (ST 14)
11. Seems easy and easy to understand. Like that there are examples of how to solve it. (ST 15)

12. Just use calculator. (ST 16).
13. The question is well phrased and includes an example. I also find it interesting how something works that way. (ST 17)
14. Looks like fun and not too hard to solve. (ST 18)
15. This gives the explanation on how to do it very clear. . (ST 19)
16. It would be easier to just divide it by 7 and see if the result was a whole number. (ST 21)
17. Method included, makes it motivational. (ST1)
18. Too much text. (ST 2)
19. I looked at the example on how to solve, it looked easy to follow. (ST 3)
20. This method does seem interesting to use, but it seems like a long method. (ST 4)
21. I am told how to do it, therefore I am motivated to try it myself. (ST 5)
22. Explains you how to do it. (ST 6)
23. This is very easy task as the method is already given. (ST 7)
24. The equation and fractions make it a little bit complicated and confusing. (ST 8)
25. Numbers in it. (ST 9)
26. This was fun and motivating because it came with an instruction on how you did it. .(ST 10)
27. Picture not relevant, weirdly explained. Easy. (ST11)
28. It looks hard, so you will think hard. (ST12)
29. I was very confused when reading it, but it was a little fascinating and interesting. (ST13)
30. Don't understand, no need to have this question. (ST14)
31. Don't like this kind of task. Much text, number, overall a bit task. (ST15)
32. It's a long calculation. (ST16)
33. I was not motivated when I read the text, but the numerical explanation below helped me understand it, which made me more motivating. (ST17)
34. I don't know. This could be fun. (ST18)
35. Don't know how to do it. (ST19)
36. It gives a method and it is engaging because it makes you wonder if it always works. (ST20)
37. This one just confuses me and I am not very motivated to attempt and solve it. (ST21)

COLOR CODED CLASSIFICATION OF STUDENT COMMENTS TO TASK 1

GREEN CLASSIFICATION: EXAMPLE HELPS: Sample calculation given, interesting [n= 15, 15/37 = 41%] Positive

BLUE CLASSIFICATION: **IT IS COMPLICATED AND LONG**: Too much text, many steps involved, confusing, [n= 13, 13/37 => 35%], Negative

PURPLE CLASSIFICATION: FUN: Interesting, surprises. [n= 7, 7/37 = 19%] Positive

OVERALL RATING: 3.14

TASK 8: LOGICAL REASONING

Stuart has a 330 mL bottle of orange juice. He thinks he can pour it all into his glass, which is a cylinder with diameter 7 cm and height 8 cm. Stuart's friend Patrick thinks the glass will overflow. Answer the following questions.

a. Will Stuart's glass overflow?
b. If the glass was full, what volume of fluid would it contain.

Show your work here.

Comments

1. Question I know how to do, but the question was not going to help me with anything in the real world. (ST 1)
2. The question is simple and does not include a lot of random numbers. (ST4)
3. There is a picture, named characters and not too much text. (ST 5)
4. I didn't understand how to get the answers for the task. (ST 7)
5. Because the formula is already given and the information is fairly clear. (ST 9).
6. Right away understood it and its about something close to me, making it feel more "natural." *I really liked it. (ST 10).
7. Easy, real life applicable. (ST 11)
8. Short and simple, I forgot the formula so that why I am not doing it. (ST 12)
9. Its simple when you know how to do it, but I have forgotten. (ST 13)
10. Task that is fun math, working with centimeter etc. I like visuals and multiple answers, question steps (a,b,c). (ST 14)
11. It was a bit hard to understand. (ST 15)
12. I don't know how to solve. (ST 16).
13. I would enjoy the question because it tells me what I need to do and the purpose for it, as well as not being too intimidating of a question. (ST 17)
14. Looks like a tricky question that would definitely get me thinking, however, I don't remember how to measure the volume of the cylinders. (ST 18)
15. Pretty good organized, but boring. (ST 19)
16. It looks easy and simple, it is also a multiple choice question, which is fun. (ST 21)
17. Not too many numbers and explanation. (ST1)
18. Very clear text, easy to understand, I wanted to do the task, but forgot how to. (ST 2)
19. I don't remember how to do it. (ST 3)

20. I like the picture, but the task itself is straight forward. I am quite neutral towards it. It is easy to understand and which I think is good. (ST 4)
21. I am not good at volume man. (ST 5)
22. Explained well, has a picture to follow. (ST 6)
23. It is easy if you know the formula. (ST 7)
24. The question is a little bit complicated and confusing. (ST 8)
25. I don't remember this. (ST 9)
26. This wasn't very motivating because it included a real-life situation that seemed a bit unrealistic. (ST 10)
27. Good picture, easy explanation. (ST11)
28. Short text, fun picture. (ST12)
29. You immediately know what you have to do in order to solve the question. (ST13)
30. Nice colours. (ST14)
31. I haven't learned volume yet and cylinder, but I understand the task. With some more knowledge, I could solve. (ST15)
32. No reasoning. (ST16)
33. I think the question is a little bit silly, as it isn't realistic that two people would think about this when pouring themselves a glass of orange juice. (ST17)
34. A bit boring, maybe. (ST18)
35. Don't have time to do. (ST19)
36. Gives clear overview of tasks, easy to dissect the question. Like the picture. (ST20)
37. I don't really know how to solve this but I would try. (ST21)

COLOR CODED CLASSIFICATION OF STUDENT COMMENTS TO TASK 1

GREEN CLASSIFICATION: I FOUND IT SIMPLE: Straightforward method, easy, picture helps, engages, motivates, [n= 16, 16/37 = 43 %] Positive

BLUE CLASSIFICATION: **I DO NOT KNOW/REMEMBER THE MATH** (but formula was given): Don't remember the formula, how to calculate, [n= 10, 10/37 => 27%], Negative

BROWN CLASSIFICATION: I LIKE THE PICTURE: like the picture, colour, good picture, [n= 8, 8/37 = 22 %] positive

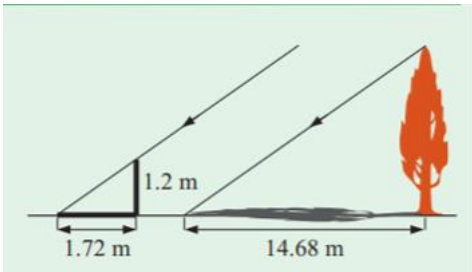
OVERALL RATING: 3.49

TASK 9: LOGICAL REASONING

Dean needs to accurately find the height of a tree in his garden. Local Council regulations prohibit the growth of garden trees beyond 20 m. They argue that in storm conditions falling branches and uprooted large trees are dangers to houses and lives. As Dean cannot climb the tree, he decides to use shadows to help solve the problem. On a windless sunny day, he stands a 1.2 m stick vertically on the ground. The length of the stick's shadow is 1.72 m and at the same time, the tree's shadow measures 14.68 m.

Using the diagram to estimate:

- The height of the tree
- The angle of elevation of the sun (the angle that the sun's rays make with the horizontal ground



Comments

1. The image demoted me because it makes the picture look harder than it actually is. (ST 1)
2. The question or task is easy and straight forward, but there is a lot of text in the first paragraph. (ST4)
3. Way too much text, but the diagram is good. (ST 5)
4. The task was confusing. . (ST 7)
5. I forgot the formula for SOH CAH TOA (ST 9).
6. Understood what to do, but comparisons make it feel unusual. (ST 10).
7. Super confident, I could do it and it's a recent subject. (ST 11)
8. I have done this and hated it. (ST 12)
9. We have learned about this recently, but I think the answers is phrased weirdly. I would like to have a clearer diagram. (ST 13)
10. Not a fan of shapes, triangles, etcs, but still an easy task where we know how to solve. (ST 14)
11. I felt like he should have measured it another way and by shadows, but maybe by his height. (ST 15)
12. Sounds interesting, but confusing. (ST 16).
13. The question appeals to me because of the mystery and because it is well phrased. It is also not intimidating. (ST 17)
14. Looks like a fun task and I would honestly love to solve it, however, I am lazy and can't be bothered to do so, because this isn't a graded test. (ST 18)
15. Too much writing, boring. . (ST 19)
16. I like the concept and diagrams are good. (ST 21)
17. Looks interesting. I liked this unit, making it motivational. (ST1)

18. Clear instruction. I just didn't remember how to solve. (ST 2)
19. I can't remember the formula. (ST 3)
20. This I believe is trigonometry and I like that unit and thought it was fun. I like that you have to think a little bit before figuring out what to do, but it is not so confusing that you wont be able to figure out what to do. (ST 4)
21. It is familiar, therefore I would do it because its old news. (ST 5)
22. Easy kind of problem gives enough information. (ST 6)
23. This is easy, but time consuming. (ST 7)
24. The text is too long and confusing. (ST 8)
25. Pythagoras is kind a gross. (ST 9)
26. This wasn't motivating because it included a diagram that made it look hard. .(ST 10)
27. Good picture, too much text. (ST11)
28. The text is long and the picture is not clear, it looks hard. (ST12)
29. If I remembered trigonometry, I would be very motivated to do it. (ST13)
30. Too much text. (ST14)
31. Didn't understand. (ST15)
32. I would give it a try, because the picture fits with the text, so I can relate it to the question while I read it. (ST17)
33. A bit much maybe. (ST18)
34. Like the diagram, easy to follow. (ST20)
35. This seems okay, I am somewhat motivated. (ST21)

COLOR CODED CLASSIFICATION OF STUDENT COMMENTS TO TASK 1

BLUE CLASSIFICATION: **IT HAS TOO MUCH TEXT**: Long text, too many words, hard to understand [n=9, 9/35 => 26%], Negative

BROWN CLASSIFICATION: I FIND IT DIFFICULT, I DO NOT REMEMBER THE MATH: Hate the topic, forgot how to solve [n= 6, 6/35= 17 %] Negative

GREEN CLASSIFICATION: THE VISUAL IS ENGAGING: Image made me choose, picture helps, engages, motivates [n= 5, 5/35 = 14 %] Positive

PURPLE CLASSIFICATION: **I FIND IT INTERESTING**: Recent learning helpful, interesting, easy to do [n= 5, 14 %] Positive

YELLOW CLASSIFICATION: I FIND IT EASY: it is easy, simple, straight forward familiar [n= 5, 14 %] Positive

OVERALL RATING: 3.06

TASK 10: HEARTBEAT

The average person's heart beats 70 times per minute. It can be shown that the average person's heart beats 2.57 billion times in a lifetime.

a. According to this information, how long is the average life span?
b. What assumptions have to be made to solve this problem? How do they affect your answer to part **a?**

Show your work and explain.

Comments

1. The question look simple, but when you do, it becomes hard. (ST 1)
2. It is not a boring question and seems interesting, but also requires a lot of background information. (ST4)
3. It is simple and straight to the point. (ST 5)
4. I feel motivated because it's a real life scenario. (ST 7)
5. I don't have the time, I am sorry. (ST 9).
6. Feels close to **me (like task 8),** but when I read it, I already know that there is a lot of calculations and ruins it for me. (ST 10).
7. Another real-life applicable question I think I could do. (ST 11)
8. Its about life and death. (ST 12)
9. It is simple and there is clear instruction. (ST 13)
10. More of a theoretical answer, have to think about "assumption", etc. Question is open and interesting. (ST 14)
11. It feels like it is not just math, but also science. It also looks easy to solve. (ST 15)
12. I don't know how to solve it. (ST 16).
13. The question is phrased okay and the question is relatively easy. (ST 17)
14. Looks by the initial thought in my mind that it was way too difficult for me to put my efforts into and attempt of solving it (ST 18)
15. This task is okay. Its not too confusing, it is well organized and the question is pretty simple. (ST 19)
16. This one seems quite fun and fast, which is good. (ST 21)
17. Clear instructions, just I don't remember how to do it. (ST1)
18. Clear instruction. (ST 2)
19. I don't how to do to it. (ST 3)
20. The task sounds interesting, but I am stuck on how to solve it and the way I thought is long and not appealing. (ST 4)
21. Logic using past knowledge to solve a problem. Assumptions, all good and motivating things. (ST 5)
22. Need to make assumptions, answer might not be correct. (ST 6)
23. This is easy if you have a calculator. (ST 7)
24. The question is a bit confusing. (ST 8)
25. I don't like word questions. (ST 9)
26. This was motivating as you get numbers and you are supposed to figure out something important .(ST 10)
27. Easy explained, good theme, not too much text. (ST11)

28. Short text, but no picture, which makes it boring. (ST12)
29. I love these types of questions. (ST13)
30. No image. (ST14)
31. I feel not to solve this task, too high numbers. (ST15)
32. Too long. (ST16)
33. I don't really like questions that involve time, but the story/prompt is interesting. (ST17)
34. Cant say this is fun. (ST18)
35. Good set up of words, good connection between tasks. (ST20)
36. This interests me and I am motivated to try solve it. (ST21)

COLOR CODED CLASSIFICATION OF STUDENT COMMENTS TO TASK 1

PURPLE CLASSIFICATION: **I FIND IT INTERESTING**: Fun, interesting [n= 12, 12/36 = 33%] Positive

BLUE CLASSIFICATION: **I FIND IT DIFFICULT**: Lot of calculations, hard to understand [n=10, 10/36 => 28%], Negative

GREEN CLASSIFICATION: IT IS SIMPLE AND STRAIGHTFORWARD: Simple, clear instruction [n= 8, 8/36 = 22 %] Positive

OVERALL RATING: 3.31

TASK 11: PALEONTOLOGY

Archaeologists use a coordinate grid system when excavating a site. This allows them to easily record the location of artefacts at a site, which simplifies future excavations. If the coordinates (in cm) of the top and bottom of the arm bone of this dinosaur skeleton are (6.2, 22.3) and (9.1, 11.8), find the length of the arm bone, rounded to the nearest tenth of a centimetre. (Assume that the arm bone is perfectly straight).

Comments

1. The task is simple and easy to do, but I feel it could be worded differently. (ST4)
2. Too much text and question is confusing, but dinosaurs are cool and so is the picture. (ST 5)
3. The task is simple and makes me motivated. (ST 7)
4. Because I knew the formula and we just learned about it (ST 9)
5. As I read the question, so much information gets thrown at me. Got confused immediately and makes want to go over it, especially in test situations, this will be more stressful. (ST 10).
6. Super easy because it's an easy question formulated in a hard way. (ST 11)
7. I don't like archaeology. (ST 12)
8. We have learned this recently and I feel that I can solve it easily using the distance diagram. (ST 13)
9. Coordinates which we have learned about, interesting because we can use the math and think about it in a real life setting. (ST 14)
10. We can easily find it, you have to think a bit, but that's okay. (ST 15)
11. Confusing. (ST 16).
12. The question provides lot of complicated words and is somewhat clustered in information. (ST 17)
13. Looks interesting and hard. Doesn't really look fun to solve though. (ST 18)
14. Too much text. If I got this in a math lesson and I was tired, I would not attempt it. . (ST 19)
15. It seems boring and the task isn't very attractive, but plus for picture. (ST 21)
16. Clear question (ST1)
17. Too complicated, I am very tired. (ST 2)
18. I don't know how to do it. (ST 3)

19. For this task, you would have to draw and I think it is fun. It is also a bit easy, some tasks are funner when they are challenging, but not too challenging and this one is a bit too easy. (ST 4)
20. Uninteresting task. (ST 5)
21. Easy to answer, but confused why there are two different numbers. (ST 6)
22. This is easy if you know the distance formula. (ST 7)
23. The question is a little bit confusing. (ST 8)
24. Its like science and math and I don't like either. (ST 9)
25. This is motivating to me as it includes coordinates, and I like working with coordinates. (ST 10)
26. Don't really understand, fun task. Fun theme. Good picture. (ST11)
27. Text too long, small paragraphs would be better. (ST12)
28. I was a bit confused when there was decimals in the coordinates, but when I looked at them closer, I understood it. (ST13)
29. I like this question because the story makes sense (it is actually something that happens in real life, it is realistic) and because it gives you additional facts that you might not have known before. (ST17)
30. Did you try to make this motivating. (ST18)
31. Good structure of text, good picture. Not fond of coordinate geometry. (ST20)
32. I am not very motivated to solve this problem. (ST21)

COLOR CODED CLASSIFICATION OF STUDENT COMMENTS TO TASK 1

GREEN CLASSIFICATION: IT IS EASY: Good picture, helps, engages, motivates, simple, easy to understand [n= 9, 9/32 => 28%] Positive

YELLOW CLASSIFICATION: **THE TASK IS CONFUSING**: too complicated, confusing, should have been worded better [n= 8, 8/32 => 25%], Negative

PURPLE CLASSIFICATION: THE CONTEXT IS INTERESTING: real life task, it is fun, it is interesting [n= 5, 5/32 => 16%], Positive

BLUE CLASSIFICATION: **IT HAS A LONG TEXT**: Lot of text, complicated words [n= 5, 5/32 => 16%], Negative

BROWN CLASSIFICATION: IT IS BORING: Not interested, boring, not fun [n= 4, 4/32=13%] Negative

OVERALL RATING: 3.03

TASK 12: GREAT BLUE HOLE TASK

When faced with the problem of trying to breathe underwater, ocean explorer, Jacques Cousteau, designed an underwater breathing apparatus called the Aqualung. It was the precursor of today's scuba gear and allowed Cousteau to explore places that had never been seen before. In 1972, he explored the Great Blue Hole, a cylindrical formation in Belize which began forming over 70 million years ago. The Great Blue Hole has a depth of roughly 125 m. If there is 9132700 m^3 of water in the Great Blue Hole, find its radius. Round your answer to the nearest tenth. (Volume of cylinder = $\pi r^2 h$).

Comments

1. The text felt a bit squashed, but the image was nice. I wouldn't willingly want to solve this because of the numbers (9132700) and the effort it would require. (ST4)
2. Again, too much text, but cool picture. (ST 5)
3. Didn't understand the task. . (ST 7)
4. I understood it at once (ST 9)
5. A lot of unnecessary stuff for me, but as I read through the question I know I just have to reverse solve it. (ST 10).
6. Again, pretty simple I think because you can just reverse operate. I forget formulae. (ST 11)
7. Sounds interesting and mysterious. (ST 12)
8. Too much text (ST 13)
9. Interesting because of the exploration, but too complicated. (ST 14)
10. It is a lot of text, the picture is cool and might be a bit motivating. (ST 15)
11. Complicated. (ST 16).
12. The question speaks of a relevant and interesting topic while being well phrased. (ST 17)
13. Looks fun and difficult. I can see that I am given the formula for the volume of the cylinder on this one. However, I still don't feel the bother to solve it with its formula. I might be more motivated to solve some of the earlier ones. (ST 18)
14. Fun and interesting information. Too much text. . (ST 19)
15. The question does not sound entertaining plus picture. (ST 21)
16. Don't need the whole backstory. If it started from "The great Blue Hole…" would be better. (ST1)
17. Too detailed back story, a lot of unnecessary information. Too much text, was too confusing to do. (ST 2)

18. There is a lot of writing, I didn't really understand it. (ST 3)
19. The picture makes the task more intriguing. (ST 4)
20. Gives me everything I need to understand it myself. Story is motivating, interests me and makes me want to do the task. (ST 5)
21. Have to convert high numbers. (ST 6)
22. This is time consuming. (ST 7)
23. There is a little bit too much text. (ST 8)
24. I don't need the backstory. (ST 9)
25. It was motivating when looking at the photo but then all the numbers made it look a bit complicated. .(ST 10)
26. Good picture, like story, good explanation. (ST11)
27. Long text. (ST12)
28. Although there was a lot of text, it had my attention and the picture helps visualize the question a lot. (ST13)
29. I forgot how you do this. (ST16)
30. I liked it because the story was interesting and because you are given the formula. (ST17)
31. A bit understanding this one. (ST18)
32. A lot of unnecessary text, but it is engaging and includes clear numbers and formula. Good to include picture. (ST20)
33. Although this seems interesting, it confuses me a bit. (ST21)

COLOR CODED CLASSIFICATION OF STUDENT COMMENTS TO TASK 1

BLUE CLASSIFICATION: **IT HAS TOO MUCH TEXT**: Too much text, confusing story, big numbers [n= 14, 14/33 = 42%] Negative

PURPLE CLASSIFICATION: **IT HAS INTERESTING CONTEXT**: Interesting, easy to understand, theme is good, motivates [n=11, 11/33 = 33%] Positive

GREEN CLASSIFICATION: THE VISUAL IS ENGAGING: Interesting picture, [n=9, 9/33 = 27%] Positive

OVERALL RATING: 2.91

TASK 13: CURRENCY CONVERSION TASK

Claudia lives in Canada. She is planning a holiday to Norway. She exchanges 2000 CAD into Norwegian kroners at a rate of 1 CAD = 6.99 CAD.

1. Calculate how many Norwegian Kroners she receives.
2. Before she even leaves Canada, Claudia becomes ill and has to cancel her holiday. She sells the Norwegian Kroners back to the bank at a rate of 1 NOK = 0.12 CAD. Calculate how many Canadian Dollars she receives.
3. Determine how much money the bank makes from the two transactions.
4. Calculate Claudia's loss as percentage of her original 2000 CAD.

Comments

1. The task is short and each question is being built up slowly, which I like. I although feel there could be an accidental mistake when multiplying so many times. (ST4)
2. I don't like currency conversion. (ST 5)
3. It is a real life situation, but it is too long. . (ST 7)
4. I got confused by CAD (ST 9)
5. Numbers are just not "fun." (ST 10).
6. Simple calculations. (ST 11)
7. Seems simple. (ST 12)
8. Clear information, seems simple. (ST 13)
9. Easy calculations, decimals are fun, good to have a specific problem. (ST 14)
10. It is four small tasks in one end, little text. (ST 15)
11. Not interested. (ST 16).
12. There are a lot of steps but they appear to be simple. (ST 17)
13. Looks too boring. (ST 18)
14. Too long. (ST 19)
15. More entertaining questions and there is more of them. (ST 21)
16. Too much text, seems like a lot to do. (ST1)
17. Clear instruction. (ST 2)
18. It seems a long calculation process. (ST 3)
19. This task is confusing. (ST 4)
20. Easy to calculate, so fairly motivating. (ST 5)
21. Have to convert a lot of numbers. (ST 6)
22. This is easy, but slightly time consuming. (ST 7)
23. It made sense at the start, but then it got a bit over complicated at the end. (ST 8)
24. Words (ST 9)
25. This motivates me because I love everything that has to do with economy and conversion. .(ST 10)
26. Like theme, enough explanation. (ST11)
27. Long text, lots of numbers. (ST12)
28. Easy to understand. (ST13)

29. I don’t really know why (ST16)
30. There is an error in the question, so it is confusing because it says 1 CAD = 6.99 CAD. (ST17)
31. Nah, I don’t know. (ST18)
32. Good setup of task, don’t like currency conversion tasks. (ST20)
33. This question seems logical and I am motivated to try and solve it. (ST21)

COLOR CODED CLASSIFICATION OF STUDENT COMMENTS TO TASK 1

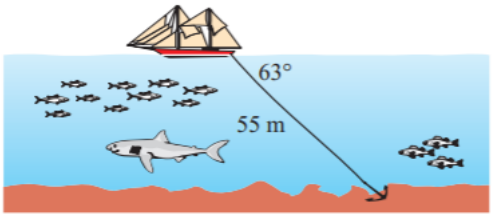
GREEN CLASSIFICATION: IT IS EASY AND SIMPLE: Simple instruction, easy to calculate, interesting [n= 16, 16/33 = 48%] Positive

BLUE CLASSIFICATION: **IT IS TOO LONG**: Too much numbers, too much text, time consuming [n= 11, 11/33 => 33%], Negative

OVERALL RATING: 2.94

TASK 14: WHERE THE ANCHOR LIES

A boat has an anchor rope length of 55 m. The boat drifts with the ocean current so that the rope makes an angle of 63 degrees with the surface of the water. Find the depth of the water at the position where the anchor lies at the bottom.



Comments

1. The task, image and text is easy to understand. The relevant image makes the task a bit easier and the text is short and simple. (ST4)
2. Just don't like it. (ST 5)
3. I understand the task clearly and its easy. . (ST 7)
4. It is linked to previous lessons. (ST 9)
5. Its something of interest and I know what to do with SOH CAH TAO, but there are others I just prefer. (ST 10).
6. Easy questions and good visuals. Oops, I am rusty. (ST 11)
7. I dont like trigonometry. (ST 12)
8. Diagram is not clear and I would rather have a question mark on the diagram for what we need to find. (ST 13)
9. Easy to do, fun question. (ST 14)
10. It is a little text and the picture gives. (ST 15)
11. Not interested. (ST 16).
12. The question is structured and easily understood. (ST 17)
13. Doesn't seem that difficult and it may be fun to solve, but I would rather want to solve some of the earlier ones. (ST 18)
14. Good amount of text, pretty organized. (ST 19)
15. Easy and simple question, it also has an image. (ST 21)
16. Clear info, not too much information. Since its visual, I can picture it more, making it more motivational. (ST1)
17. Very clear instruction (ST 2)
18. I enjoy working with trigonometry. (ST 3)
19. It seems interesting and I think the diagram makes it easier to solve. Again, I like trigonometry. (ST 4)
20. The shark looks like it is on drugs, so I am not motivated, put glasses on him and a book in his fin. (ST 5)
21. Gives you a diagram explaining it. (ST 6)
22. Only one of the sides are given, making it time consuming. (ST 7)
23. The question is simple, so it makes sense. (ST 8)
24. I don't know how to do this (ST 9)

25. This motivates me because I love the ocean and boat driving and this seems important to me. The picture makes it a bit unrealistic, but its fine. .(ST 10)
26. Good picture, enough explanation. (ST11)
27. Looks fun, short text, clear picture. (ST12)
28. The picture is good and helps understand the question. (ST13)
29. I don't remember the formula. (ST16)
30. I think the story is kind of boring, but the task is easy enough to do. (ST17)
31. Maybe this could be motivating. (ST18)
32. Easy task to understand and I like Trigonometry. Clear diagram that helps visualise task. (ST20)
33. This question seems logical and not very hard to solve. (ST21)

COLOR CODED CLASSIFICATION OF STUDENT COMMENTS TO TASK 14

GREEN CLASSIFICATION: IT IS EASY: easy to understand, recently learned topic, [n= 15, 15/33 = 45 %] Positive

PURPLE CLASSIFICATION: VISUAL HELPS: picture helps [n= 11, 11/33 = 33 %] Positive

BROWN CLASSIFICATION: IT IS INTERESTING: Looks interesting, theme is good, [n= 6, 6/33 = 18 %] Positive

BLUE CLASSIFICATION: **NOT INTERESTED, IT IS BORING:** Don't like it, boring, [n= 4, 4/33 => 12%], Negative

OVERALL RATING: 3.72

TRANSCRIPT OF INTERVIEWS

After solving these tasks, would you like to change your initial rating of motivation for the solved tasks? If so, why?

1. Maybe change task 5 to 3 because it was a bit more fun than what i expected to solve for Z. I had to think a bit, but not too much, so that was fun. I would not like to change task 14.
2. No, because I understood their concept while reading. They were also clear about what you need to answer.
3. Yes, the last task was a lot easier than i thought, also the first one
4. Not really, the tasks were as I expected them, although question 6 was harder than i expected.
5. No, because the tasks I chose were easy and fun and more satisfactory and fun when you know you got the question right. I like task 7 in the end. IT looked long, but it is very easy.
6. No, because the problems I chose to solve were interesting and fun to do. I like the step by step calculations, etc.
7. I would not change any ratings except, I thought that questions without visuals were a lot harder or less motivating with visuals.
8. Nope, both of them ended up being pretty simple, especially task 6 because its basically opinion based.
9. Maybe change task 5 to 3 because it was a bit more fun than what i expected to solve for Z. I had to think a bit, but not too much, so that was fun. I would not like to change task 14.
10. No, not really for task 7, but i would like to change it to a score of 5 for task 12, because it was very fun to do, at the same time as you were learning about a fascinating place in the world.
11. My rating for question 8 would go down to a 3 because i wasnt sure how to solve it with cm square and meters, which dismotivated me because it made it more difficult. My rating stayed the same for question 14
12. Yes, my motivation for the task 5 went up