MINISTRY OF EDUCATION

REPUBLIC OF GHANA

NATIONAL COUNCIL FOR CURRICULUM AND ASSESSMENT

PREPARATORY MATERIALS FOR COMMON CORE ASSESSMENT

MATHEMATICS

Overview

The standards-based mathematics [CCP] curriculum focuses on developing learners' conceptual understanding, as well as application of concepts to everyday-life situations as opposed to the objective based curriculum where teaching and learning mainly focused on learners' ability to memorise and reproduce content. The implication of this shift is that assessments will move beyond the memorisation of discrete bits of information that does not encourage critical thinking and problem solving. Therefore, as a way of preparing learners and supporting teachers to ascertain whether learners are demonstrating conceptual understanding and meeting the standards, sample items have been carefully constructed for learners to engage with and measure their proficiency in preparation for their final examination.

The test covers all the strands and sub-strands as well as content standards and learning indicators.

Number Concepts: Learning number concepts is essential for junior high school students as it provides a foundation for understanding and interacting with the world around them. Number concepts help students develop critical thinking and problem-solving skills, which are essential for everyday decision-making. They learn to analyze situations, identify patterns and apply mathematical principles to solve problems in various contexts, such as budgeting, time management, and planning which are essential for managing personal finances, understanding economic concepts, and planning for the future. Number concepts help students to learn how to evaluate information, make logical deductions, and draw conclusions based on evidence. These skills are valuable for problem-solving and decision-making in everyday life.

Algebra Concepts: Algebra teaches students how to analyze and solve problems using variables and equations. This skill is essential for everyday problem-solving, such as planning a budget, analyzing data, make connections, and draw conclusions. These skills are valuable for evaluating situations and making informed decisions in everyday life.

Geometry and Measurement Concepts: Learning geometry and measurement concepts is important for junior high school students because it helps them develop spatial reasoning skills and understand the physical world around them. Geometry helps students develop spatial awareness, which is important for understanding and navigating the physical world. It helps them understand the relationships between objects, shapes, and spaces. Geometry teaches students how to solve problems involving shapes, sizes, and spatial relationships. This skill is useful in everyday life, such as when planning a room layout or designing a garden. It also helps students develop the ability to visualize objects and shapes in their minds. This skill is useful in fields such

as architecture, engineering and design. Measurement concepts teach students how to quantify and compare sizes, distances and angles. This is important for tasks such as cooking, construction and planning travel routes.

Data Concepts: Learning data handling and probability concepts is important for junior high school students because it helps them make sense of the vast amount of information they encounter in everyday life. Understanding data handling concepts helps students interpret and analyze data in various forms, such as tables, charts and graphs. This skill is valuable for making informed decisions based on data, such as interpreting election results or analyzing trends in consumer behaviour. Learning data handling concepts helps students become statistically literate, enabling them to understand and critically evaluate statistical information presented in the media and everyday life. Further, probability concepts help students understand and assess risks in various situations, such as in insurance, games of chance and weather forecasting. This skill is valuable for making decisions under uncertainty.

Assessment of concepts on these four strands should focus on the following key areas:

1. **Understanding of Concepts**: Assess whether students understand basic number concepts such as place value, operations (addition, subtraction, multiplication, division), fractions, decimals, percentages, and basic algebraic concepts. Use a variety of assessment methods such as written tests, quizzes, and oral assessments to gauge understanding.

2. **Problem-Solving Skills**: Evaluate students' ability to apply number concepts to solve real-life problems. Provide them with real-life scenarios and ask them to apply their mathematical skills to analyze the situation, identify the problem, and propose a solution.

3. **Critical Thinking and Reasoning**: Assess students' ability to use logical reasoning and critical thinking skills when working with numbers. Provide them with tasks that require them to analyze information, make connections, and draw conclusions based on evidence. Assess students' ability to communicate their mathematical thinking clearly and effectively. Ask them to explain their reasoning, justify their solutions and communicate their findings in a coherent manner.

4. **Numerical Fluency**: Evaluate students' fluency with numbers, including their ability to perform basic arithmetic operations quickly and accurately. Use timed tests or activities to assess fluency in addition, subtraction, multiplication, and division.

5. **Application of Skills**: Provide students with tasks that require them to apply their number concepts skills in practical situations. This could include tasks related to budgeting, measuring, estimating, and analyzing data.

6. **Statistical Literacy:** Assess students' ability to interpret and evaluate statistical information presented in various forms, such as tables, charts, and graphs.

Based on these four strands and its assessment implications, a table of specification was designed to ensure that the items were proportionally distributed across the strands and the various levels of the cognitive domain of learning. Hence, performance indicators [**Minimum Proficiency**] [1] were crafted from the various learning indicators to construct the table of specification for the crafting of the items (See Table 1). The minimum proficiency indicators require learners to be able to demonstrate knowledge and understanding of concepts as well as reason and apply these concepts in real-life contexts.

Learners are required to apply various standard algorithms as well as personal strategies acquired in class to solve the problems. In addition, however, most items require learners to demonstrate critical thinking skills by reasoning through the items that are presented in real life context. For example, the following minimum proficiency "*Solve real-life problems involving powers of natural numbers [**Level 3**]*" may be represented in an item as this:
 A bacteria culture starts with 2 bacteria and doubles every hour. How many hours will it take for the culture to reach 32 bacteria?

BACTERIA GROWTH

A. *2 hours*
B. *3 hours*
C. *4 hours*
D. *5 hours*
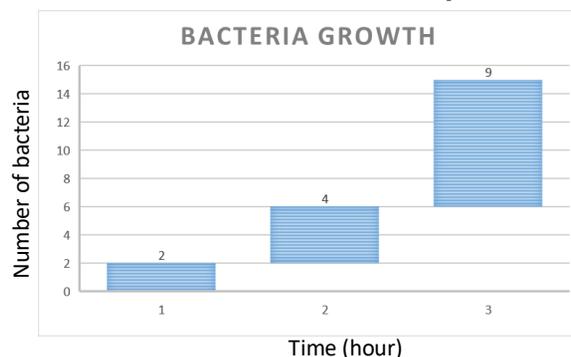
This item demonstrates a shift from the old assessment regime where this would have been presented as: *Find the value of n in* $2^n = 32$. The difference between the two items is that learners are given the opportunity to apply their knowledge in learning the concept of powers of numbers in a real-life context as opposed to reproducing the concept directly as they learnt it. Yes, it is important to learn standard algorithms and mathematical structures such as this $m^n = t$, however, that is not enough in the 21st Century world where information and content are readily available at the snap of their fingers. What is important is the application of these contents to solving problems and improving lives. Majority of the items are crafted from everyday life situations. Real and existing data/information such as Census data, Cocoa production, etc. are used for learners to appreciate the essence of what they are learning in the classroom.

Hence, over 60% of the items are **sourced-based items** and require learners to think critically. As indicated in the curriculum, the profile dimension requires 30% of all assessment items to cover the knowledge and understanding domain [Depth of

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[1] **Minimum Proficiency:** *represents the basic knowledge, skills, and abilities that learners are expected to demonstrate.*

Knowledge, **DOK]** [2] Level 1, 40% must be application [DoK Level 2] and 30% of the items must cover reasoning [DoK Level 3 & 4]. Hence, 70% of the items require learners to demonstrate competencies beyond the knowledge level. Further, "Number" is emphasized the most with 37%. Geometry & Measurement and Algebra follow with 27% and 28% of the items respectively. Data have relatively fewer items (8%) but still contributes significantly to the overall assessment.

The test comprises two parts. The first part is made up of multiple choice items with four options where learners are to read carefully and identify the correct answer from the options provided. Apart from the correct answer, the other three options are crafted using learners' misconceptions and common mistakes. The second part is a written part where learners construct their own responses.

In summary, the items comprehensively reflect the assessment requirement in the mathematics curriculum for junior high schools. That is, there is a shift from the existing assessment structure where majority of the items required extensive use of formulae and standard algorithms to solving mathematics problems. This assessment will require from learners the ability to think critically and solve mathematics problems that are contextualized within the everyday experiences of the learner.

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[2] **Depth of Knowledge (DOK):** *refers to the complexity or depth of understanding required to successfully engage with a particular task or concept.*

JHS Mathematics: TOS ITEMS

Strand	Sub-strand	DOK			Total of Items/Tasks
		Level 1	Level 2	Level 3	
Numbers [22 (37%)]	Number and Numeration Systems	x			8(13%)
		x			
		x			
			x		
			x		
				x	
				x	
				x	
	Number Operations	x			5(8%)
		x			
			x		
			x		
				x	
	Fractions, Decimals and Percentages	x			5(8%)
		x			
			x		
			x		
			x		
	Ratios and Proportion	x			4(7%)
			x		
			x		
				x	
Algebraic Reasoning [17(28%)]	Pattern and Relationships	x			8(13)
		x			
		x			
		x			
		x			
			x		
				x	
				x	

Category	Topic				Total
	Algebraic Expressions		x		4(7%)
			x		
			x		
				x	
	Variables and Equations		x		5(8%)
			x		
				x	
				x	
				x	
Geometry Around us [16(27%)]	Shapes and Space	x			4(7%)
		x			
			x		
				x	
	Measurement	x			9(15%)
		x			
			x		
			x		
			x		
			x		
			x		
				x	
				x	
	Position & Transformation	x			3(5%)
			x		
				x	
Handling data 5(8%)	Data		x		4(7%)
			x		
				x	
				x	
	Chance or Probability			x	1(2%)
	Total	**18(30%)**	**24(40%)**	**18(30%)**	**60(100%)**

SET 1	

SN	Performance Indicator	
1	Read and write in number quantities up 10, 000,000. **[Level 1]**	Which of the following correctly reads the given number quantity 6,245,789? A. Six million, two hundred forty-five thousand, seven hundred eighty-nine. B. Six million, two hundred fifty-four thousand, seven hundred eighty-nine. C. Six million, two hundred forty-five thousand, seven hundred ninety. D. Six million, two hundred fifty-four thousand, seven hundred ninety.
2	Identify missing numbers in a given backward sequence **[Level 1]**	Fill in the missing numbers in the sequence: 20,000, 19,995, __, 19,985, __, 19,975, 19,970. A. 19,990, 19,980 B. 19,992, 19,982 C. 19,993, 19,983 D. 19,994, 19,984
3	Compare and order three 6-digit whole numbers using ">, <, or =". **[Level 2]**	In a manufacturing plant, three different cutting machines can cut the following number of wood: Machine A - 532,678 Machine B - 523,876 Machine C - 532,789 Order the machines from the highest to the lowest number of wood they can cut. A. 532,678 > 532,789 > 523,876 B. 532,789 > 532,678 > 523,876 C. 532,789 > 523,876 > 532,678 D. 532,678 > 523,876 > 532,789
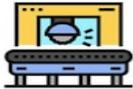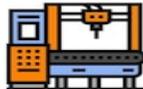
4	Use the knowledge on sets and sets of factors of numbers to solve real life problems involving union and intersection (including two-set problems) **[Level 3]**	The Venn diagram shows the findings of a survey on students' favourite food for lunch. Use the information to answer question 4. How many students like waakye but not jollof? A. 3 B. 4 C. 7 D. 10
5	Express integers of any size into standard form/scientific notation **[Level 2]**	The distance from the Earth to the Sun is approximately 93,000,000 miles. Write this distance in scientific notation. A. 9.3×10^6 miles B. 9.3×10^7 miles C. 9.3×10^8 miles D. 9.3×10^{-7} miles

6	Round (off, up, down) whole numbers (6-digit) to the nearest ten-thousands. **[Level 1]**	If the cost of a building project is estimated at GH₵876,543, rounded to the **nearest ten-thousands**, what is the rounded cost?
		
		   A. GH₵870,000
		   B. GH₵870,500
		   C. GH₵880,000
		   D. GH₵880,500

7	Round decimals using everyday transactional ideas to the nearest hundredth. **[Level 3]**	A student purchased three items at a school store. What is the total cost of the items rounded to the nearest Ghana cedi?
		
		GH₵5.20 GH₵8.50 GH₵12.20
		
		   A. GH₵25.00
		   B. GH₵26.00
		   C. GH₵27.00
		   D. GH₵28.00

8	Express decimal numerals to given significant and decimal places using real life context **[Level 3]**	A carpenter needs to cut a piece of wood into two equal parts. If the wood is 3.678 meters long, to which decimal place should the carpenter measure and cut to ensure the two parts are as close to equal as possible?
		
		   A. Nearest whole meter
		   B. Nearest tenth of a meter
		   C. Nearest hundredth of a meter
		   D. Nearest thousandth of a meter

9	Multiply and divide given decimals and benchmark fractions by powers of 10. **[Level 1]**	The cost of an item is GH¢10.75. How much should a customer pay for 100 of the items?
		
		   A. GH¢10.7500
		   B. GH¢107.50

		C. GH¢110.75 D. GH¢1,075.00
10	Add and subtract four-digit numbers using real-life context **[Level 2]**	The graph shows the world's largest cocoa bean producers in 2019. How much more cocoa did Ivory Coast and Ghana together produced than the four other countries put together? A bar chart titled with values: Ivory Coast 3575, Ghana 1851, Ecuador 657, Belgium 526, Netherlands 442, Malaysia 259. A. 1,884 B. 3,542 C. 5,426 D. 7,310
11	Solve story problems involving decimals on the four basic operations (money transactions, measurements etc. **[Level 2]**	A carpenter bought 8.75 meters of wood to make shelves. If each shelf requires 1.25 meters of wood, how many shelves can the carpenter make? 1.25 m 8.75 m
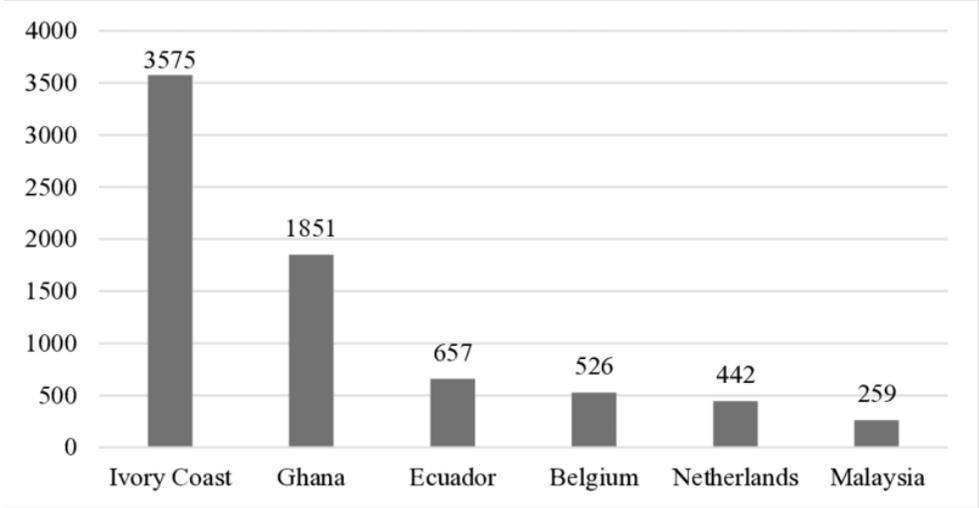
		A. 5 shelves
		B. 6 shelves
		C. 7 shelves
		D. 8 shelves
12	Solve exponential equations **[Level 1]**	Solve the equation $2^x = 64$. A. $x = 3$ B. $x = 4$ C. $x = 5$ D. $x = 6$
13	Solve real life problems involving powers of natural numbers. **[Level 3]**	A bacteria culture starts with 2 bacteria and doubles every hour. How many hours will it take for the culture to reach 32 bacteria? BACTERIA GROWTH E. 2 hours F. 3 hours G. 4 hours H. 5 hours
14	Compare the equivalence of decimals, percentages and fractions. **[Level 1]**	Which of the following fractions is equivalent to 75%? A. $\frac{1}{4}$ B. $\frac{5}{7}$ C. $\frac{3}{4}$ D. $\frac{1}{2}$
15	Compare and order fractions limit to the benchmark fractions. **[Level 1]**	Compare and order the fractions $\frac{1}{3}, \frac{2}{5}$ and $\frac{7}{15}$ from the smallest to the largest.
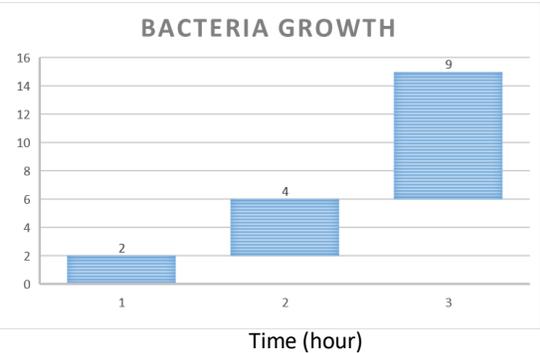
		A. $\frac{1}{3} < \frac{2}{5} < \frac{7}{15}$
		B. $\frac{7}{15} < \frac{2}{5} < \frac{1}{3}$
		C. $\frac{2}{5} < \frac{1}{3} < \frac{7}{15}$
		D. $\frac{7}{15} < \frac{1}{3} < \frac{2}{5}$
16	Solve problems involving addition, subtraction, multiplication and division of fractions. **[Level 2]**	A recipe for a loaf of bread requires $\frac{3}{4}$ cup of flour. If you want to make 4 loaves of bread for a party, but you only have 2 cups of flour, how many more cups of flour do you need? ¾C = How many more flour do I need to bake four loaves of bread? 1C 1C A. 1 cup B. 2 cups C. 2 ¼ cups D. $2\frac{3}{4}$ cups
17	Find a fraction of given quantity (i.e. money or given quantity of objects) **[Level 2]**	Mr Abompe bought 10,000 bricks for his house project. If the workers used $\frac{2}{5}$ of the bricks during the first week, how many of the bricks are left? A. 2,000 B. 4,000
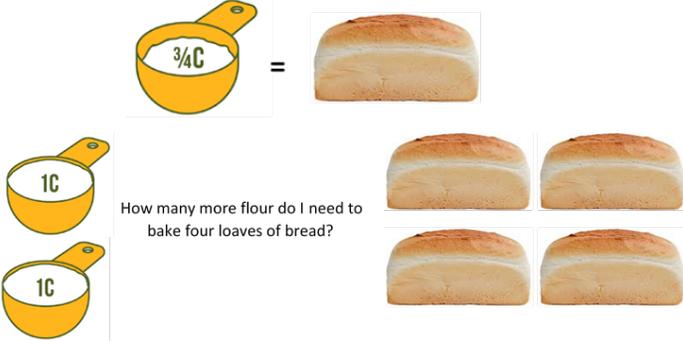
		C. 5,000 D. 6,000
18	Divide a quantity (i.e. money or objects) or a fraction by a fraction. **[Level 2]**	A length of rope is $5\frac{1}{3}$ feet long. How many $1\frac{1}{3}$ foot-long pieces can be cut from it? A. 3 B. 4 C. 5 D. 6

19	Describe quantities with ratio language.
	
	The ratio of Musa to Alhasan's age is 1:2. If Alhasan is 50 years old and his son, Musa is 25 years old, we can say that
	   Alhasan is twice as old as his son.
	   Musa is half the age of his father. **[LEVEL 1]**
		The ratio of boys to girls in a certain JHS 3 class is 1:3. This means…
		
		3 girls : 1 boy
		
		A. The boys are three times more than the girls.
		B. The girls are three times more than the boys.
		C. There are three more boys than the girls in the class.
		D. There are three more girls than the boys in the class.

20	Use equivalent ratios to solve problems **[Level 2]**	A recipe for making a drink calls for 2 cups of lemon juice and 6 cups of water to serve 8 people. If you want to serve 16 people instead, how much lemon juice and water will you need? <table><tr><th>Ingredients</th><th>Lemon Juice</th><th>Water</th></tr><tr><td>Original Recipe</td><td>2 cups</td><td>6 cups</td></tr><tr><td>Servings</td><td colspan="2">8</td></tr><tr><td>New Recipe</td><td>? cups</td><td>? cups</td></tr><tr><td>Servings</td><td colspan="2">16</td></tr></table> A. 4 cups of lemon juice and 12 cups of water B. 8 cups of lemon juice and 24 cups of water C. 16 cups of lemon juice and 48 cups of water D. 32 cups of lemon juice and 96 cups of water

	Use the proportional reasoning to find missing values in the tables, and plot pairs of values on the coordinate plane. **[Level 2]**	The distance in miles travelled by a car in hours is shown in the graph below.
21		

The distance in miles travelled by a car in hours is shown in the graph below.
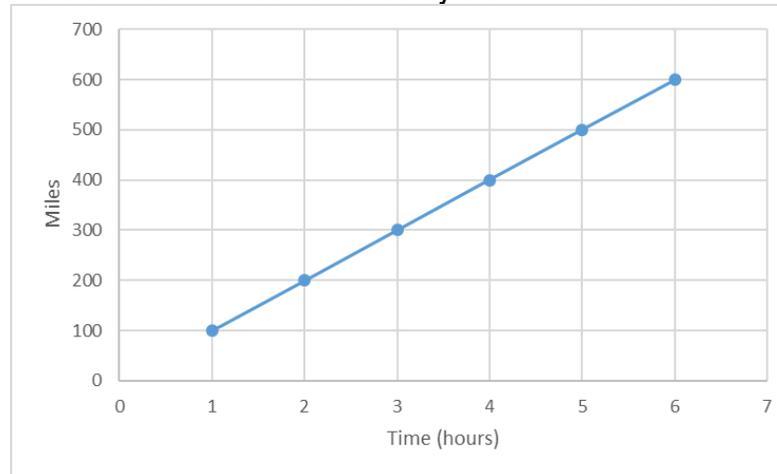
If the car continues to travel at the same speed, how far will the car travel in 9½ hours?

    A. 600 miles
    B. 750 miles
    C. 900 miles
    D. 950 miles

Assuming the care uses a litre of fuel for every 8 miles, how much fuel will be needed to travel 100 miles if the cost of fuel is GH¢14.25 per litre? Leave your answer to the nearest Ghana cedi.
    A. GH¢114
    B. GH¢142
    C. GH¢178
    D. GH¢1425

22	Apply the knowledge of speed to draw and interpret travel graphs or distance-time graphs. **[Level 3]**	The graph below shows a journey made by Anita from Accra to Shama and to Breku. Use the graph to answer the questions that follow.

Distance-time graph
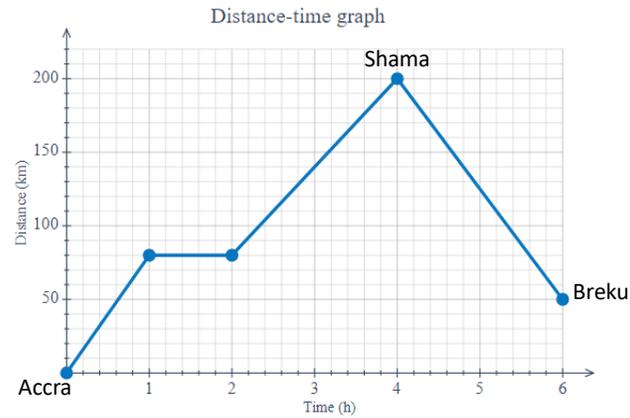
What speed did Anita travel in the first hour?

A. 40 km/h
B. 50 km/h
C. 80 km/h
D. 200 km/h

How long did Anita rest during the entire journey?
A. ½ hour
B. 1 hour
C. 1 ½ hours
D. 2 hours

What was Anita's average speed from Shama to Breku?
A. 50 km/h
B. 75 km/h
C. 120 km/h
D. 200 km/h |

23	Simplify given surds **[Level 1]**	Simplify: $\sqrt{20}$ A. $2\sqrt{5}$ B. $5\sqrt{2}$ C. $4\sqrt{5}$ D. $5\sqrt{4}$
24	Extend a given relation presented symbolically and numerically **[Level 1]**	A shop sells biscuits in packs of 6. The table below shows the number of biscuits sold and the corresponding price. | Number of biscuits	Price (GH¢)
----	----
6	10
12	18
18	26
24	34	 If this pattern continues, how much would it cost to buy 30 biscuits? A. GH¢42 B. GH¢50 C. GH¢48 D. GH¢54
25	State the rule for a given mapping/relation/pattern **[Level 3]**	The table below shows the number of chairs and the corresponding number of tables need for a conference. | Number of tables	Number of chairs
----	----
2	10
4	20	

6	30
8	40

What is the rule that relates the number of tables to the number of chairs?
  A. Number of chairs = Number of tables + 2
  B. Number of chairs = 5 - Number of tables
  C. Number of chairs = Number of tables x 5
  D. Number of chairs = Number of tables ÷ 2

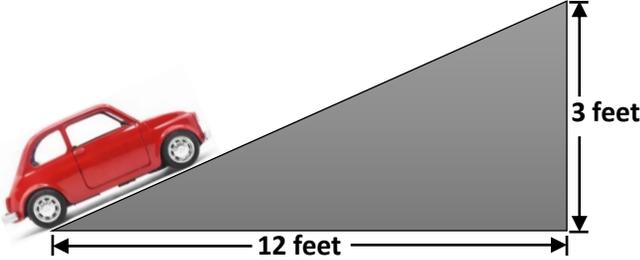| 26	Complete a table of values for a given rule/relation **[Level 1] Alternatively, interpret a given linear graph.**	The graph shows a relationship between the number of children and the corresponding number of sachet milk each family received. Use the graph to answer the questions that follow.
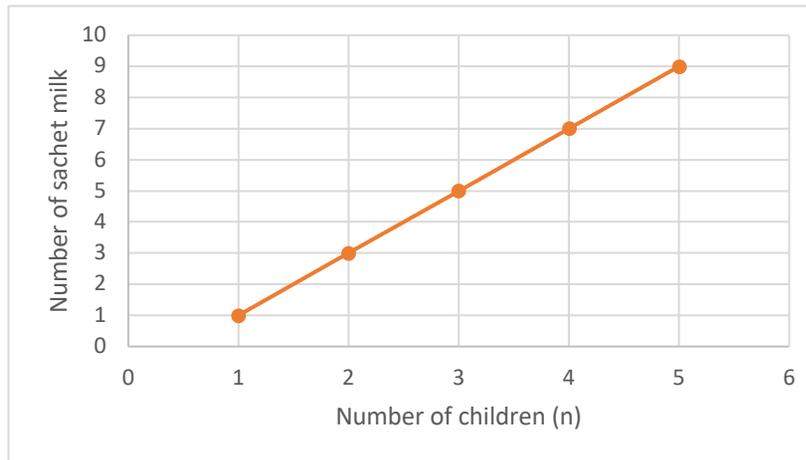
Which of the following mathematical expressions is the rule for the relationship, assuming **n** represents the number children?
  A. $2n - 1$
  B. $2n + 1$
  C. $n - 1$
  D. $n + 1$

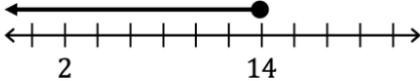|		
		How many sachet milk will 12 children receive? A. 12 B. 18 C. 23 D. 24
27	Use knowledge of symmetry to determine the lines of symmetry of given polygons. **[Level 1]**	Look at the sails on the boat. How many lines of symmetry has the sail in the shape of a triangle labelled ABC? A. 0 B. 1 C. 2 D. 3

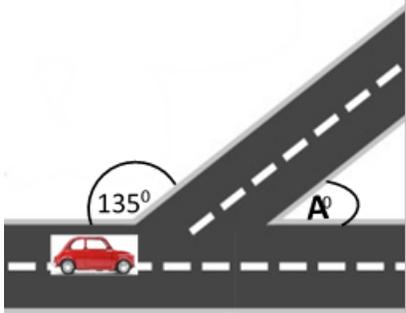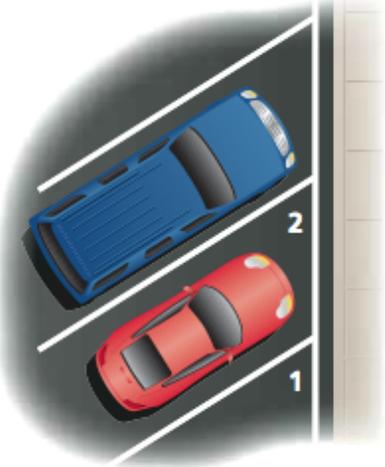|		
28	Calculate the gradient/slope of a line from given two points **[Level 1]**	What is the slope of the hill the car is climbing? 3 feet 12 feet A. $\frac{1}{4}$ *feet* B. 4 *feet* C. 15 *feet* D. 36 feet
29	Find the equation of a straight line given the gradient and a point **[From Level 1 to Level 3]**	Your car is currently 3 years old and is worth GH¢10,000. Two years ago it was worth GH¢12,400. Assume the car's value depreciates linearly with time. Create an equation for the value of the car in terms of its age? Let V represent the value of the car (in GH¢) and t the age of the car (in years) A. $V=-2400t + 17200$ B. $V = -2400t+13200$ C. $V = -2400t+19200$ D. $V=-2200t+17200$
30	Use graphs to solve equations involving two linear relations. **[Level 2]**	Jane and Mark went to a store to buy some pens and notebooks. They bought a total of 8 items and spent GH¢28. Pens cost GH¢3 each, and notebooks cost GH¢4 each. How many pens and notebooks did they buy? A. 4 pens and 4 notebooks B. 5 pens and 3 notebooks C. 6 pens and 2 notebooks

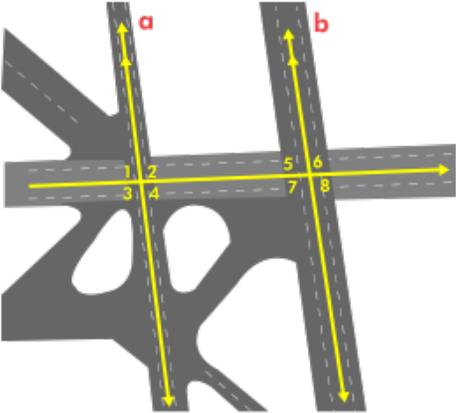|		
		D. 3 pens and 5 notebooks
31	Use proportional relationships to solve multistep ratio and percent problems, examples: simple interest, tax, discount and commissions, NHIL, depreciation, insurance, etc. **[Level 3]**	Nii Armah visited the bank to invest some amount of money. Study the picture carefully and use the information in it to answer question 31. What will be Nii Armah's simple interest? A. GH¢2000 B. GH¢20,000 C. GH¢22,000 D. GH¢200,000
32	Create simple algebraic expressions using simple logic to translate a set of instructions into an algebraic expression. **[Level 2]** **OR** Form algebraic expressions from real life situations.	Study the building plan carefully.
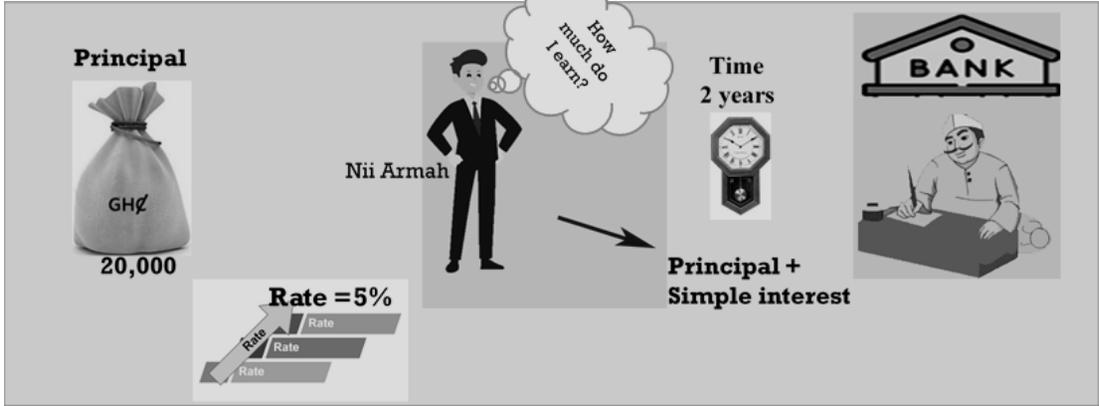
Which of the following algebraic expressions can be used to find the perimeter of the warehouse?

A. $3500cm + xcm$
B. $3500cm \times xcm$
C. $2(3500cm + xcm)$
D. $2(3500cm \times xcm)$

33	Simplification of algebraic expressions (expansion, factorisation, operations) including fractions. **[Level 2]**	A balloon costs GH¢2. If Jane wants to buy 5 balloons for herself and then buy an additional "x" balloons for each of her 10 friends, what algebraic expression can be used to express the total cost of balloons? A. 2(5+10x) B. 2(5 ×10x) C. 2(5+10 +x) D. 2(5 -10x)

34	Substitute values into given formulae and evaluate them. **[Level 2]**	 Find the total distance around the nut, given that $x = 2\ cm; y = 1.9\ cm\ and\ t = 2.1\ cm$. A. 6 cm B. 7.98 cm C. 11.8 cm D. 12 cm
35	Use the knowledge of simplifying and factorising expressions to solve real world problems. **[Level 3]**	You are constructing a frame for the rectangular photo shown. You want the frame to be the same width all the way around and the total area of the frame and photo to be 315 sq. in. What should the outer dimensions of the frame be? A. 2 cm B. 11 cm C. 17 cm D. 16 cm
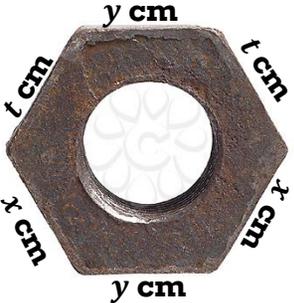
36	Translate word problems to linear equations in one variable and vice versa **[Level 3]**	Two sisters bought together 10 tablets. One bought 4 tablets. Which of the following equations represents the number of tablets (t) the other bought? A. $t = 10 - 4$ B. $t = 10 - 6$ C. $t = 4 + 10$ D. $t = 6 + 10$
37	Solve linear equations in this form **[Level 2]** ● + ◆ × △ ● + ● + ● = 60 ● + ◆ + ◆ = 40 ◆ + △ + △ = 20	Study the puzzle carefully, what is the product of the two shapes? A. 9 B. 11 C. 18 D. 99
38	Solve linear equations in one variable in real life context **[Level 3]**	Study the scenario below;

		A taxi charges GH¢20 for hire for up to 10km ride. It also charges GH¢5 for every other km. How much will the customers pay for a 22km ride? A. GH¢ 25 B. GH¢ 40 C. GH¢ 60 D. GH¢ 80
39	Solve simple linear inequalities and present the solution set **[Level 2]**	Which of the following linear inequalities has its solution represented on the number line below? A. $\{x: x > 2\}$ B. $\{x: x \le 2\}$ C. $\{x: x \ge 14\}$ D. $\{x: x \le 14\}$
40	Solve real-life problems involving linear equations and inequalities. **[Level 3]**	A school has a budget of GH240 per classroom to buy drinks. A sachet drink costs GH10, and a bottle drink costs GH12. If you want to buy 12 sachet drink, what is the maximum number of bottle drink you can buy? Let "s" represent sachet drink and "b" for bottle drink. A. $b \le 10$ B. $b \le 11$ C. $b \le 12$ D. $b \le 13$

41	Determine the missing angle for complementary, supplementary, adjacent and vertically opposite Angles. **[Level 1]**	Take a look at the road in the picture below. 135⁰ A⁰ What is the value of angle A⁰? A. 45⁰ B. 90⁰ C. 135⁰ D. 180⁰
42		

		The painted lines that separate parking spaces are parallel. The measure of angle 1 is 60 degrees. What is the measure of angle 2? A. 60 B. 120 C. 180 D. 240
43	Draw and determine the values of alternate and corresponding angles **[Level 1]**	If a traffic light is placed at Angle 4 on Road 'a', at what angle should a traffic light be placed on road 'b' that will be at the same angle? A. 5 B. 6 C. 7 D. 8
44	Determine the values of angles in a triangle using knowledge of the sum of interior angles in a triangle and other properties. **[Level 3]**	What is the value of angle B in the picture?

A. 40^0
B. 70^0
C. 110^0
D. 180^0

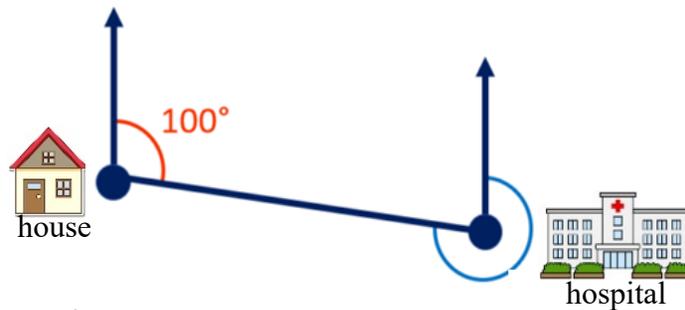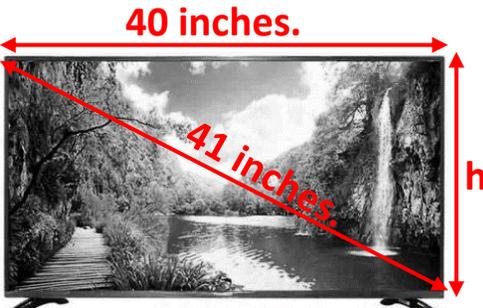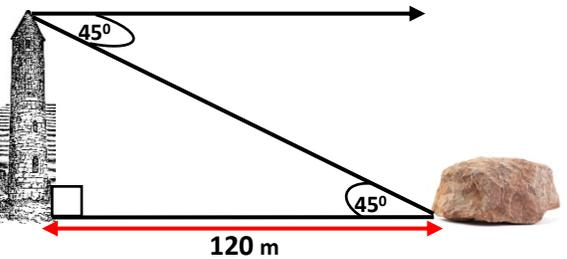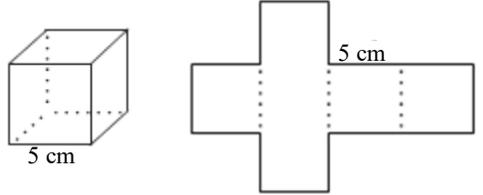| 45	Calculate the value of missing angles in polygons **[Level 2]**	The road sign below has all sides equal. Find the value of the angle marked A^0. A. 80^0 B. 90^0 C. 135^0 D. 180^0
46	Calculate the perimeter of plane figures including ones whose dimensions are in two different units (i.e. cm and mm, m and cm, or km and m) **[Level 2]**	The garden shown in the picture has all sides equal. What is the total distance around the garden without the gate?
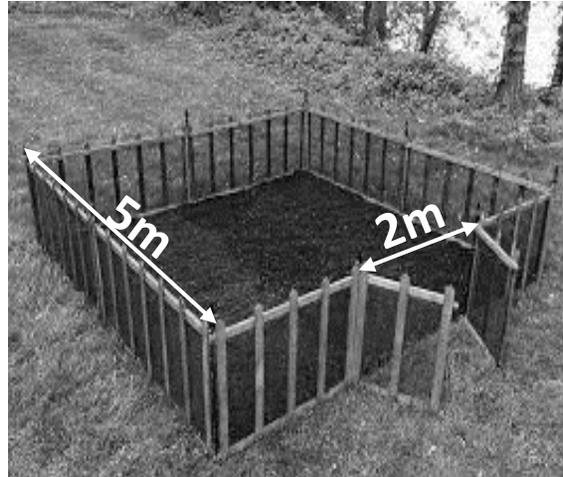
A. 7m
B. 10m
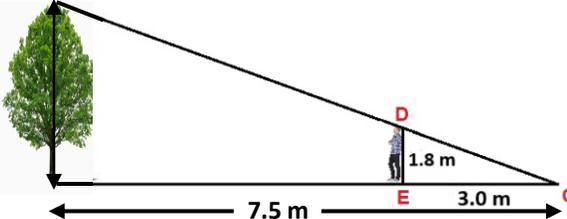C. 18 m
D. 20m

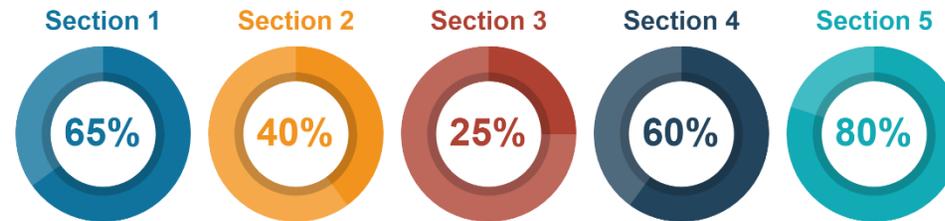| 47 | Find the back bearing **[Level 1]** | If the bearing from Mrs Anto's house to the community hospital is 100^0, what is the bearing from the community hospital to Mrs Anto's house? |

A. 90^0
B. 100^0
C. 280^0
D. 360^0

48	Determine the magnitude of a given vector. **[Level 2]**	Find the magnitude of the vector; $v = \binom{3}{4}$. A. 5 B. 7 C. 16 D. 25
49	Use the Pythagorean theorem to solve problems on right-angled triangle. **[Level 2]**	For a given right-angled triangle, if the square of the hypotenuse is 169 and the square of the opposite is 144, what is the length of the adjacent? A. 5 B. 12 C. 13 D. 25
50	Use the Pythagoras theorem to calculate the area of a triangle and other polygons and its' reverse in real-life problems **[Level 3]**	Shetu is buying a new television. She finds a television with a screen of 41-inch diagonal, and a length of 40 inches. What is the height of the television screen? **40 inches.** 41 inches. h A. 9 inches. B. 39 inches. C. 40 inches. D. 41 inches.
51	Use trig ratios and the Pythagoras theorem to solve problems involving angles of elevation and depression. **[Level 3]**	The angle of depression of a stone from the top of a tower on the ground is 45. If the stone is away from the building at a distance of 120 meters, find the height of the tower. [Take $Tan\ 45 = 1$]

A. 45 m
B. 90 m
C. 120 m
D. 165 m

52	Add, subtract and find the scalar multiplication of vectors in the component form. **[Level 2]**	Given $\underline{a} = \begin{pmatrix} 3 \\ -2 \end{pmatrix}, \underline{b} = \begin{pmatrix} 1 \\ 2 \end{pmatrix}$ and $\underline{c} = \begin{pmatrix} 5 \\ 5 \end{pmatrix}$, find $2a - b + c$ A. $\begin{pmatrix} -1 \\ 10 \end{pmatrix}$ B. $\begin{pmatrix} 10 \\ -1 \end{pmatrix}$ C. $\begin{pmatrix} 7 \\ 1 \end{pmatrix}$ D. $\begin{pmatrix} 1 \\ 7 \end{pmatrix}$
53	Calculate a missing value in a given problem involving equal vectors **[Level 1]**	Two vectors A = xi + 14j and B = 3i - 7yj are equal vectors if: A. x = 3, y = 2 B. x = 3, y = -2 C. x = 3, y = -1/2 D. x = 6, y = -1/2
54	Use the net of a cuboid to determine its surface area. **[Level 2]**	Calculate the surface area of the shape below 5 cm 5 cm A. 25 cm²

		B. 50 cm²
		C. 100 cm²
		D. 150 cm²

55	Solve problems of congruence and similar shapes **[Level 2]**	A line from the top of a tree to the ground passes over a man and reaches the ground at a point 7.5 m from the base of the tree. If the man is 1.8 m tall how high is the tree? h ... D ... 1.8 m ... E ... 3.0 m ... C ... 7.5 m A. 3.6 m B. 4.5 m C. 4.8 m D. 13.5 m
56	justify a method to collect data (quantitative and qualitative) **[Level 2]**	A class teacher has tasked her learners to investigate the knowledge that community members have about of cholera. Which of the data collection methods will be appropriate? A. Internet B. Observation C. Interview D. Data base
57	Organise and present data into a table and/or chart (Frequency table, bar chart, pie, stem and leaf, histogram, and analyse and interpret them. **[Level 3]**	The info-graphic shows the percentage of work done by various Sections of a school.

Section 1	Section 2	Section 3	Section 4	Section 5
65%	40%	25%	60%	80%

What is the average percentage of work done by the five sections together?
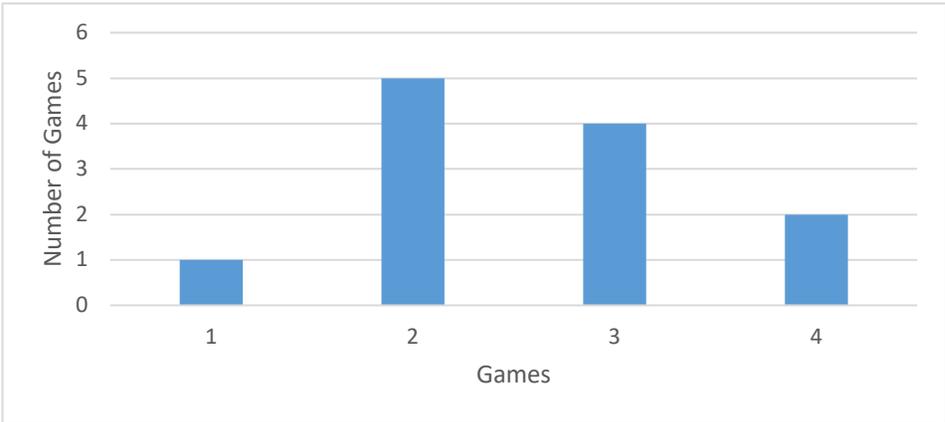
   A. 25%
   B. 46%
   C. 54%
   D. 80%

58	Construct a grouped frequency table from a given data set **[Essay type question: Level 3]**	A cocoa farmer made a table for the sale of her cocoa product for the year 2023 on quarterly basis.

Months	Sales (number of sacks sold)
January - March	29
April - June	18
July – September	42
October – December	31

What is the average number of sacks sold per month for the year?

   A. 10
   B. 30
   C. 108
   D. 120

59	Calculating the measures of central tendencies **[Level 2]**	The graph shows the number of goals scored in four different games by a team. How many goals do they need to score in their fifth match to raise their average to 4 goals per match? A. 4 B. 5 C. 6 D. 8
60	Calculate the probability of the event and express the probability as fractions, decimals, percentages and/or ratios. **[Level 3]**	Kofi has some red balls and some blue balls in a bag. Altogether he has 36 balls. Kofi picks one ball from the bag. The probability that Kofi picks a red ball is x and the probability that he picks a blue ball is 5x. Work out how many blue balls are in the bag. A. 5 B. 30 C. 31 D. 36

1. A group of 80 learners took a test in Mathematics or French or both. 15 of them passed in both Mathematics and French, but 11 more learners passed in French than Mathematics. Each learner passed in at least one of the two subjects.
   a) Represent the above information on a Venn diagram.
   b) Find the number that passed in
   i)   French.
   ii)   Only one subject

2. a) Dufie spent $\frac{1}{3}$ of her pocket money on breakfast and $\frac{1}{6}$ of what still remained on sweets. If she still had GH¢ 55.00, how much originally was her pocket money?

   b) Given that $4^y = \frac{1}{8}$, find the value of y.

   c) You are using a magnifying glass that shows the image of an object that is six times the object's actual size. Determine the length of the image of the spider seen through the magnifying glass.


1.5 cm
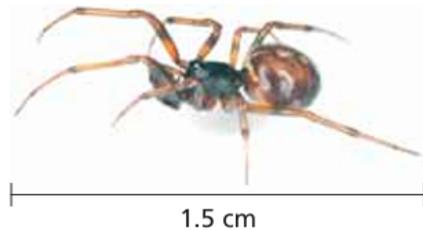
3. a) The total surface area of a cube is 384 cm2. Find the:
   i)   Length of a side of the cube.
   ii)   Volume of the cube.

b. A pickup truck has a bucket that measures 4 ft by 8 ft by 17 in. What is the volume of the bucket?

96 in.

17 in.

48 in.
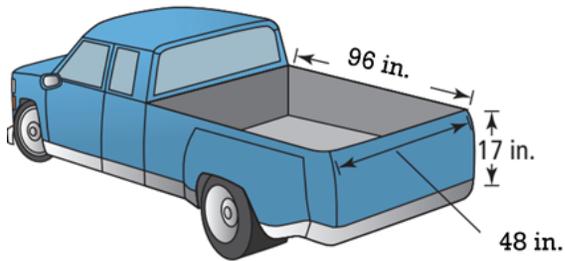
4. a) Mr. Mensah is four times as old as his daughter, Kukua. In 14 years' time, the sum of their ages will be 78. Find their present ages.

b) Two soup tins are similar. Tin P can hold 500 grams of soup while tin Q can hold 750 grams of soup. The height of tin P is 11 cm.
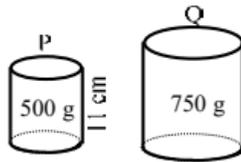
i.   Calculate the height of tin Q.
ii. Calculate the ratio of the heights of the tins.

5. a) A box contains 60 mangoes of which some are not ripe. The probability of selecting at random a mango that is ripe is $\frac{3}{5}$. How many mangoes are not ripe?

b) Factorise completely : $(m + n)(2x - y) - (m + n)$.
c) Given that $C = k \times 216 \times 27$, what is the smallest whole number k, that will make C a perfect square?

6. Copy and complete the magic square using any of the numbers

9,11,12, 14, 15, 16, 17, 18 and 19.

15	8	13
10		

Use each number once, such that the sum of the three numbers, horizontally, vertically or diagonally are equal.

b) Find the scale factor of the dilation. Then tell whether the dilation is a reduction or an enlargement.