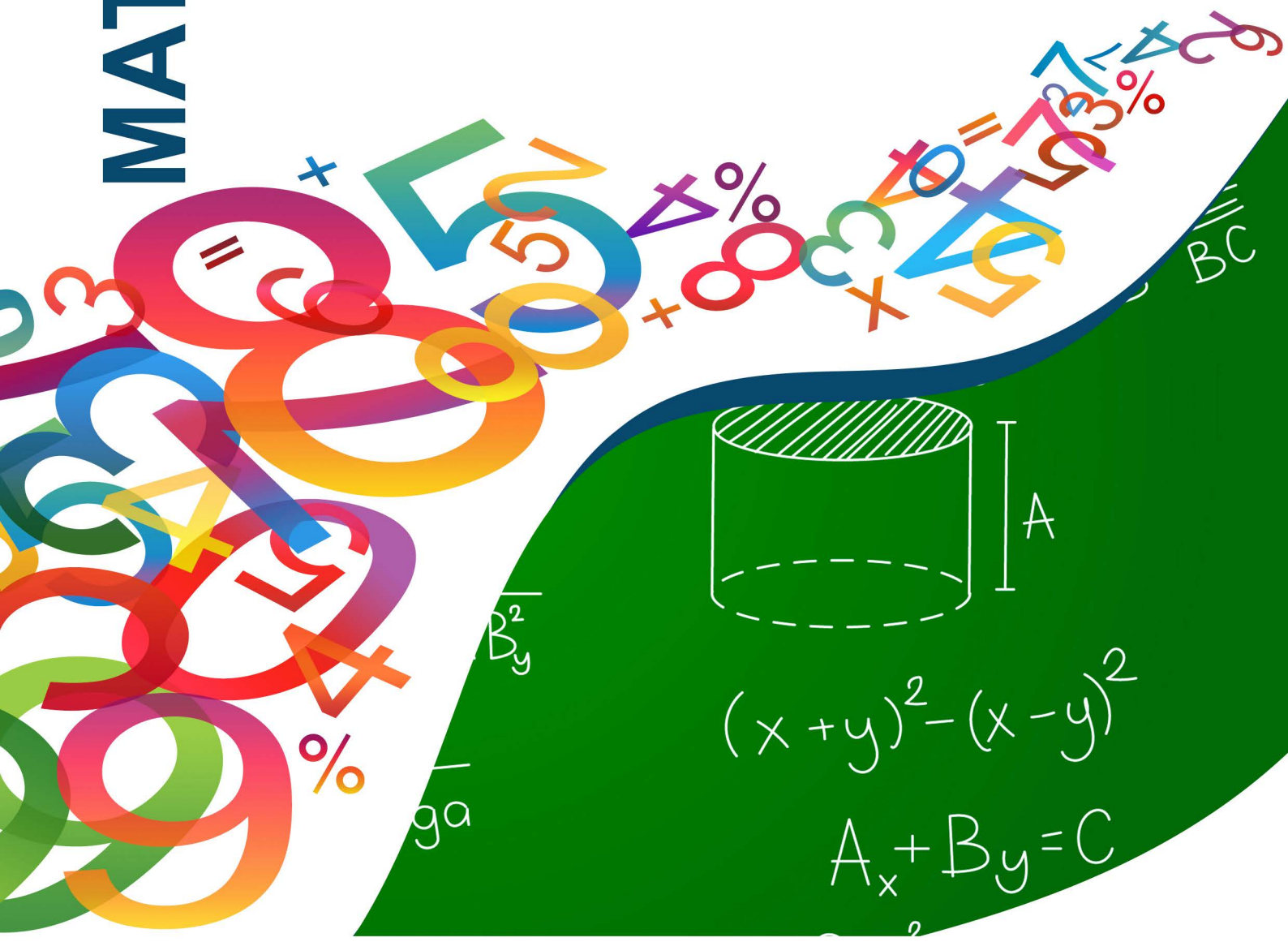
ENGLISH

MATHEMATICS

GRADE 9

Diagnostic Assessment



education
Department of Education
REPUBLIC OF SOUTH AFRICA

Read to Lead
A Reading Nation is a Leading Nation

2030 NDP

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Section 01

1. INTRODUCTION

The diagnostic resource bank of items aims to improve the relationship between assessment and classroom instruction. Assessment for learning is the process of gathering information about a learner's learning from a variety of sources, using a variety of approaches, or 'assessment tools', and interpreting that evidence to enable both the teacher and the learner to determine where the learner is in his or her learning; where the learner needs to go; and how best to get there. Teachers can adjust instructional strategies, resources, and environments effectively to help all learners achieve grade specific outcomes only if they have accurate and reliable information about what their learners know and are able to do at a given time.

When findings of assessment results are used to improve classroom practice, learner performance in general can improve. The diagnostic assessment questions are designed to fulfil three purposes of assessment: namely to,

- reveal the misconceptions learners bring as prior knowledge to a class;
- measure the conceptual gains of a class as a whole; and
- identify concepts that are weak areas of understanding for the individual learner or as a class/grade.

A traditional multiple-choice question (MCQ) provides little information about the learner's understanding of the concept/skill tested. The Department of Basic Education (DBE) has embarked on the design of diagnostic assessments using MCQs that are designed to assist teachers to diagnose learner misconceptions using the Pearson distractor rationale model as a basis for the classification of learner misconceptions. The diagnosis is also linked to the CAPS learning outcomes and skill acquisition. This does not mean that there are only MCQ items in the booklet.

MCQs designed for the diagnostic questions included in this booklet, include a breakdown of learners' understanding through the incorrect responses. All distractors are written not only to focus the attention of the teacher on those learners who are able to identify the correct response, but also to assist the teacher in identifying and understanding the misconceptions captured in the incorrect responses.

2. PURPOSE OF THE DIAGNOSTIC TEST ITEMS

This diagnostic resource should be used in conjunction with the requirements as stipulated in the CAPS document. It therefore does not replace the curriculum or the Annual Teaching Plans (ATP). The content therefore includes coverage from terms one to four and it focuses on certain selected topics and skills. However, there may be a need to align the topic or skills with the revised ATP to facilitate assessment for learning.

Once the teacher has identified the gaps in the conceptual knowledge/ skill acquisition it would be easier to design targeted intervention programmes to bring learners on par for the transition to subsequent topics.

These diagnostic items should be used as a tool for teachers to assess the strengths and weaknesses of learners for the purpose of designing teaching and learning strategies that will address the individual needs of the learner. This would also enable the teacher to zoom into the skills and sub-skills that are required by each topic content selected in order to narrow the knowledge gap or misconception identified and to assist learners in the development and mastery of content and skills.

This assessment should **not** be used for grading a learner; as the intended purpose is to facilitate learning. The use of the items should instead promote formative assessment.

3. THE STRUCTURE OF THE DIAGNOSTIC TEST ITEMS

Items are framed to direct teachers to possible misconceptions which could be as a result of an earlier grade knowledge deficit, erroneous conceptual knowledge or lack of comprehension.

MCQs are constructed in such a way that each distractor provides information on whether the learner has mastered the skill/concept or whether there is a misconception. The distractors are graded according to four levels of understanding. Levels one, two and three enlighten the teacher about the nature of the misconception. Level four is the correct response, see Table 1 for further clarity.

Short questions are constructed to assess mental computations, knowledge recall and application of rules or theorems.

Longer responses are constructed so that thought process, application of content areas and concepts across the subject are consolidated to arrive at the intended response.

4. PROPOSED USE OF THE MATHEMATICS ITEMS/QUESTIONS

4.1 A teacher may select certain items at different intervals i.e. as a revision activity, formative task, etc.

4.2 Items may also be used as a baseline assessment if administered prior to teaching a particular lesson. A teacher may want to establish whether learners meet the basic skills and knowledge acquired from the previous grades. This will assist the teacher to know learners' level of proficiency.

4.3 Items may be used at the beginning of a phase to establish whether learners meet the conceptual knowledge for the new grade/phase.

4.4 Certain items, *per skill assessed*, may be selected from a section to compile a shorter activity

4.5 Items may be selected according to *levels of difficulty* and can be used to support learning according to different cognitive demands

4.6 Diagnostic items can also be selected according to *cognitive levels*.

4.7 The teacher should decide when, where and how the assessment may be used to enhance teaching and learning

5. DESIGN

Table 1 lists and describes the types of errors that correspond to each of the four levels of understanding encapsulated in the Mathematics MCQs. The distractor rationale as advocated by Pearson, 2004, forms the basis for diagnosing misconceptions. The taxonomies and cognitive levels as stipulated in CAPS (for Grades 4-9) are incorporated into the levels of understandings to provide the teacher with holistic information about the level of performance.

A more detailed unpacking of the nature of the misconceptions is addressed in the marking guidelines of each diagnostic items.

Table 1: Levels of understanding (thought process)

Levels of understanding	Descriptors for the levels of understanding.
Level 1	Learners demonstrate (i.e. a combination but may not be all of the following) that they: - have no understanding of the question or a conceptual misunderstanding; - are unfamiliar with operational procedures but can compute basic straight forward operations; - are not able to implement (un)related strategies to solve a problem; - excessive depend on the information that is provided in the question and is incorrectly used/duplicated; - utilise unrelated vocabulary to the question. - Etc.
Level 2	Learners demonstrate (i.e. a combination but may not be all of the following) that they: - can apply some computational ability that may not necessarily relate to the question or that demonstrate inadequate conceptual knowledge and flawed reasoning to support conclusions/inferences; - can apply basic mathematical knowledge in straight forward situations; - demonstrate a limited knowledge of some concepts and some procedures; - Etc.
Level 3	Learners demonstrate (i.e. a combination but may not be all of the following) that they can: - apply some conceptual knowledge and ability to analyse but is inconsistent in computational and reasoning skills; - apply their knowledge and understanding to solve problems. - solve word problems involving operations with whole numbers and use division in a variety of problem solving situations. - interpret and use data to solve problems with minimal error of judgement; - use given information to complete various graphs; - Etc.
Level 4	Correct response.

Levels of understanding	Descriptors for the levels of understanding.
	Learners demonstrate (i.e. a combination but may not be all of the following) that they: - consistently apply/demonstrate correct computational and reasoning skills required in the question; - apply their understanding and knowledge in a variety of relatively complex situations and explain their reasoning; - solve a variety of multi-step word problems; - apply geometric knowledge of a range of two-and three-dimensional shapes in a variety of situations; - draw a conclusion from given data and justify their conclusion. - Etc.

Each level of understanding is captured in the distractors of all the multiple-choice questions. An item will include distractors that correspond to each level of understanding set out in the Table 1.

When learner responses are analysed the diagnostic distractors will reveal patterns in a learner's understanding of the content being tested. The teacher is thus guided towards instruction that specifically addresses a learner's understanding of a concept in the specific content.

6. MARKING GUIDELINES

6.1 Multiple Choice Questions (MCQs): One mark is allocated per item. However, the focus of these assessments is not on scoring the learner, but rather on what the learner is able to do or not do.

6.2 The marking guideline has columns indicating the item number, expected answer per item, the diagnosis or clarification, the level of understanding, the level of difficulty and the mark allocation. The mark allocation is merely a guide for the learner response and should not be the focus of the task

6.3 Open ended (OE) items (process items with steps): These items require application and a reason as a response. A scoring guide has been included to guide teachers in identifying scores of 0/1/2 or more. The teacher is assisted in identifying and understanding the misconception and the level of skill development required to improve cognition and performance.

6.4 In cases where learners are required to display multiple steps/procedures in order to solve a problem, apply the following techniques when marking:

a. where there is clear evidence of a misread/misinterpretation, a penalty of 1 mark is generally appropriate. A learner should not be penalised for the same error throughout the assessment;

b. if a learner has knowledge of the method but could not get the final correct answer, award a method (M) mark but not an accuracy (A) mark. If the method is incorrect but the answer is correct, award a mark for the answer only; and

c. consistent Accuracy mark is applied when an answer is correctly followed through from an incorrect previous answer.

E.g. Grade 3 question

What is the number that is 5 more than 20?

1.1 Write the number symbol for the number.

1.2 Write the number name for the same number you wrote in 1.1 above.

Learner response

1.1 25 (the answer is *incorrect*)

1.2 **Twenty five**. (The number name is correct according to the number symbol provided by the learner in number 1.1 even though it was not the expected answer.)

In this instance do not award a mark for the 1st answer (in 1.1) but do award a mark for the 2nd answer (in 1.2) because it was correctly followed through from an incorrect answer. This is how to apply **consistent accuracy** (CA) marking.

6.5 The Cognitive levels are as prescribed in the CAPS for the Intermediate and Senior Phases and will now be introduced in the Foundation Phase. The cognitive levels, their descriptors and examples are indicated in Table 4.

Table 3: Example of the Marking Guideline (for a MCQ)

1. Complete: 2 + 2 + 2 + 2 =

No.		Expected answer	Level of understanding or error analysis	Cognitive level	Level of difficulty
2.	A	6	3 Added only the first 3 numbers	R	E
	B	4	2 Added the first two numbers only.		
	C	2	1 Thought it is a number pattern		
	D	8 ✓	4 Correct response		

Table 4: MATHEMATICS COGNITIVE LEVELS

LEVEL 1:	LEVEL 2:	LEVEL 3:	LEVEL 4:
KNOWLEDGE (K)	**ROUTINE PROCEDURES (R)**	**COMPLEX PROCEDURES (C)**	**PROBLEM-SOLVING (P)**
• **Knowing** • **Remember/Recall**	• **Applying routine procedures in familiar contexts** • **Understanding**	**Applying multi-step procedures in a variety of contexts (including word sums)**	**Reasoning and reflecting**
• Straight recall • Identification of correct formula • Know and use formulae such as the area of a rectangle, a triangle and a circle where each of the required dimensions is readily available. • Read information directly from a table (e.g. the time that bus number 1 234 departs • Use of mathematical facts • Appropriate use of mathematical vocabulary • Know appropriate vocabulary such as equation, formula, bar graph, pie chart, Cartesian plane, table of values, mean, median and mode. • Write the next three numbers in the sequence: 103; 105; 107… • Determine the factors of 64	• Perform well-known procedures. • Learners know what procedure is required from the way the problem is posed. • Simple applications and calculations using the basic operations including: ○ algorithms for +, -, ×, and ÷ ○ calculating a percentage of a given amount • Calculations which might involve many steps • Derivation from given information may be involved • All of the information required to solve the problem is immediately available to the student and where each of the required dimensions is readily available. • Estimation and appropriate rounding off of numbers	• Problems involving complex calculations and/or higher order reasoning • The required procedure is not immediately obvious from the way the problem is posed. • Learners will have to decide on the most appropriate procedure to solve the solution to the question and may have to perform one or more preliminary calculations before determining a solution. • Investigations to describe rules and relationships – • There is often not an obvious route to the solution • Problems not based on a real world context - could involve making significant connections between different representations • Conceptual understanding	• Unseen, non-routine problems (which are not necessarily difficult) • Higher order understanding and processes are often involved • Might require the ability to break the problem down into its constituent parts • Generalise patterns observed in situations, • Make predictions based on these patterns and/or other evidence and determine conditions that will lead to desired outcomes. • Pose and answer questions about what mathematics they require to solve a problem and then to select and use that mathematical content. • The sum of three consecutive whole numbers is 27. Find the numbers. • Sarah divided a certain number by 16. She found an answer of 246 with a remainder of 4. What is the number? • Busi has a bag containing three coloured balls: 1 blue, 2 red ball and 3

• Write the prime numbers that are factors of 36	• Measure dimensions such as length, weight and time using appropriate measuring instruments sensitive to levels of accuracy. • Draw data graphs from provided data. • Solve equations by means of trial and improvement or algebraic processes • Determine the value for if x + 4 = 10. • Use three different techniques of calculating 488 + 16 • Calculate: 115 + 31 012. •	• One or more preliminary calculations and/or higher order reasoning • Solve equations by means of trial and improvement or algebraic processes • Select the most appropriate data from options in a table of values to solve a problem. • Decide on the best way to represent data to create a particular impression. • Betty is 4 years old and Jabu is 8 years old. Determine the ratio between their ages. Write the ratio in simplest fractional form. • Investigate the properties rectangles and squares to identify similarities and differences. • There were 20 sweets in the packet. William and his friend ate $\frac{2}{5}$ of the sweets. How many sweets are left	yellow balls. She puts her hand in the bag and draws a ball. What is the chance that she will draw a red ball? • Write the answer in simplest fractional form. •

7. MODERATION

Internal moderation is important in assuring that the marking criteria/guideline is consistently applied, and that there is a shared understanding of the academic standards learners are expected to achieve. There should be processes in place for assuring comparability of marks for alternative assessments. Schools may therefore determine the format for moderation as a standardisation and quality-assurance measure.

Moderation should focus on the following aspects amongst others:

a. Content coverage: The alignment of the to the revised ATP content for the subject,
b. Quality of individual items: The validity, fairness and practicability of each item within a test or task,
c. Clarity of the instructions for specific items,
d. Biasness and clarity of diagrams and pictures
e. *Ensuring that what is assessed is in line with what the learner has been exposed to*
f. The appropriateness of the language level of the learners for which it is designed,
g. Coverage of cognitive skills: The consistency of the level of development of the learner regarding the cognitive levels of the test or task.
h. Technical criteria: sufficient time allocation per item/test/task, layout, correct numbering, the memorandum/marking guideline matches the item, etc. must be considered.

8. DATA ANALYSIS AND UTILISATION

The teacher would be able to collect data on an individual learner, a class, for the entire grade and report at each level. Further data can be collected per topic/skill/content area. The teacher is also able to use the class or grade test/task to identify the knowledge deficit is. Since this is an exercise in assessment for learning, targeted interventions can be designed to address

strengths and weaknesses. Teachers would be able to give feedback to parents on learning gaps, deficits and strengths per learner.

8.1 Purpose of the data analysis

After administering a test, the teacher can do his/her own diagnostic analysis to identify:

a. the overall level of performance of the class/grade or school;
b. individual learners or schools that need special intervention;
c. groups of learners or schools who need special support; and
d. topics that require priority attention in teaching and learning.

8.2 Use of basic statistics for analysis

Basic statistics that can be used to summarize the data from a test include the following:

a. mean (often called average) – calculated by adding the scores of all the learners and dividing the sum by the number of learners. The mean is one score that is used to summarize all the scores obtained by learners in a test. A high mean score represents high performance and a low mean score represents low performance. However, the mean score does not indicate how learner scores are spread from the highest to the lowest and thus is not adequate for identifying individuals who either over-perform or under-perform;

b. median (or middle score) – calculated by first arranging the scores from the highest to the lowest and then determining the score that divides the data into two equal halves. Half of the learners who wrote a test will have scores above the median score and the other half will have scores below the median score. If the number of learners is an odd number the median will be a real score that sits half-way between the extreme scores, e.g. 76, 57, 49, 45 and 39 have 49 as the median score. However, if the number of learners is an even number the median will be a score that may not belong to any of the learners calculated by adding the two adjacent scores that are half-way between the extremes and dividing their sum by two (2), e.g. the median of 76, 57, 49 and 45 is calculated by adding 57 and 49 and dividing the sum by two, i.e. (57 + 49)/2 = 106/2 = 52. As can be observed, 52 is not one of the four given scores but it is the median score that sits half-way between the extreme scores, viz. 76 and 45. The median does not show what the extreme scores are, i.e. the highest and the lowest scores,

c. maximum is the highest score obtained by a learner in a test.
d. minimum is the lowest score obtained by a learner in a test.
e. range is the difference between the maximum and the minimum scores. The larger the range, the more diverse the ability levels of the test takers. A relatively small range indicates that the class of test takers has a relatively homogeneous ability profile.

8.3 Available tools for data analysis

Tools that are available for analysis of data include pre-programmed computer software such as the SA-SAMS in schools, the Microsoft Excel programme and even hand calculators. The Microsoft Excel programme, which comes with almost every computer software, is a reasonably easy-to-use tool for performing item-level diagnostic analysis of test data. An Excel spreadsheet is arranged in columns and rows.

8.4 Preparing data for analysis on Excel

Excel makes available useful formulae to calculate basic statistics. To prepare for analysis of data from an administered test, do the following:

a. mark the test and write the scores obtained by each learner next to the relevant question/item number in their books or scripts;
b. enter learner names and other particulars (e.g. the gender of each learner) in the rows, one after another;
c. enter test item numbers in the columns, one after another;
d. enter the score of each learner on each item in the correct cell (i.e.

where the relevant column and row meet);

e. check if all data has been entered correctly (i.e. do thorough data cleaning);

f. use correct formulae to calculate the statistics that you want to use to summarize and analyse the test data; and

g. interpret the statistics in terms of what they suggest about performance of individuals in your class, performance of identifiable groups of learners (e.g. boys and girls) and performance in specific content areas.

8.5 Analysis and interpretation

To summarise the data calculate the average percentage score, the median, maximum and minimum score percentages and you may do this separately for boys and girls. To make sense of the analysis it is recommended that different colour codes be used to mark specific observations (Excel provides a wide range of colour codes) and also represent findings with appropriate graphs to enhance visual impressions to aid decision-making on where to focus improvement interventions. For instance, the following observations can be made from the analysis that has been done:

a. Overall performance

Overall performance in this class, measured through the mean score, may be e.g. 54,4% which is relatively acceptable but still leaves room for improvement. The median score for the class may be 56% which means that half of the learners obtained scores above 56% and another half obtained scores below 56%.

b. Performance spread

Although the mean and median scores were both above 50%, learner scores may range between 8% and 100% which is a fairly wide range that suggests diverse abilities in this class. This implies

that intervention strategies will have to be diversified in order to meet the learning needs of different learners, i.e. a one-size-fits-all improvement strategy will not work in this class.

c. Individual learner differences in performance

Individual learners who were identified to be particularly at risk have been indicated with e.g. red colour coding. They obtained scores below 40% and thus fall within the “Not achieved” and “Elementary achievement” levels. They require special attention in terms of teaching strategies and learning opportunities.

d. Group differences in performance

Analysis was done at two group levels, viz. boys and girls. All the summary statistics indicate that the boys performed much lower than the girls. Their mean score was 49,3% against the 60% mean score obtained by girls. The median score for the boys was 4% lower than of the girls, viz. 52% as against 56%. Boys’ scores ranged between 8% and 88% while the lowest score for the girls was 32% and the highest was 100%. It is evident that in this class boys require a different or more focused intervention than the girls.

e. Performance in specific topics or skills

The percentage scores per item indicate the items and, therefore, the topic or skill where interventions must focus. The analysis and diagnosis (8.5a – e) identifies:

i. which learners need special attention; and

ii. which content areas require special focus;

The analysis also suggests what materials will be required to improve on the identified areas, what extra support the teacher will need (if necessary), whether additional time will be required, who else should be involved in the interventions

and a host of other possibilities that the data analyser may see fit in their context.

8.6 Diagnostic or error analysis

Error analysis is the study of errors in learners' responses with a view to look for possible explanations for these errors. It provides specific information about the relative skill proficiency or misconception a learner has in his/her response, in order to understand what the learner can or cannot do. It is a multifaceted activity, for the teacher, because it involves analysis of the correct, partially correct and incorrect thought processes of the learners' individual responses and thinking about possible remediating interventions that might work well.

Understanding the errors, a learner or a group of learners make will determine how learners are grouped in a certain subjects to enhance effective teaching.

9. HOW TO ANSWER MULTIPLE CHOICE QUESTIONS (MCQS)

9.1 The Structure of an MCQ

An example of the structure of the MCQ item is exemplified below.

What is the number symbol for six hundred and ninety-eight? STEM

A	60 098	DISTRACTORS
B	6 098	
C	968	
D	698	KEY

Explanation:

- A stem is the question or statement to respond to.
- Distractors are incorrect options that are plausible
- A key is the correct answer

9.2 Strategies for answering MCQs

9.2.1 Read the question carefully. Understand the question and be sure of what is expected of you. Underline the key words in the question. You may need to read the question more than once.

9.2.2 Try to answer the question before you check out the options. You may be required to work out the answer before you are able to choose the correct option.

9.2.3 Read each option cautiously. Delete the options that you are sure is incorrect, until you are left with the correct option.

9.2.4 Make sure that the option you have chosen matches what the question requires.

9.2.5 Often there will be an option that will obviously be wrong. Eliminate this option.

9.2.6 Two options may sound alike. However, one of the options may be partially correct; it may be a partial answer to the question. Re-read the question to make sure that the option fully answers the question.

9.2.7 If you are unsure of which options are incorrect, leave the question and move to the questions you are sure of. However, make sure that you come back to the question. Don't leave blanks. **Choose the most suitable option for every question.**

9.2.8 There will be only **ONE** correct option.

Note to the learner!

- *There is no pattern in which the answers are arranged.*
- *Check your work. If you made a mistake, strike out the incorrect option and circle the correct answer.*

Section

02

ASSESSMENT

The test items are developed from two content areas namely; Space and shape (SS) as well as Data Handling (DH). The items are topic based. In this booklet *Geometry and Transformations under Space and Shape as well as Probability under Data Handling* are the topics selected. Various aspects of Geometry are covered e.g. 2-D shapes, 3-D objects.

The teacher may select a particular skill, cognitive level or level of difficulty from the items to create a formative assessment activity or any type of assessment deemed fit.

Each item is attached to its characteristic (tag) above it. Please note the following keys used in the tag:

Cognitive levels		Levels of difficulty
K: Knowledge		E: Easy
R: Routine procedure		M: Moderate
C: Complex procedure		D: Difficult
P**:** Problem solving		

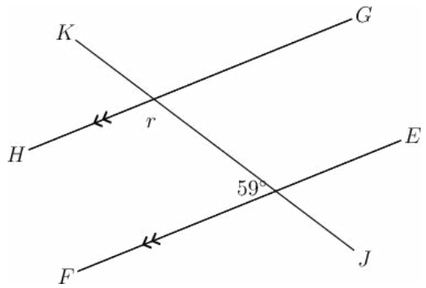
The tag provides the following information in this order: content area, topic, skill assessed, cognitive level and level of difficulty e.g.:

Content area	Topic	Skill assessed	Cognitive level	Level of difficulty
SS	Geometry of straight lines	Solving problems	R	E

Space and Shape

Geometry – Transformations: multiple-choice questions (MCQ)

SS	Geometry of straight lines	Angle relationships	R	E



In the diagram above, $EF \parallel GH$.

1. Determine the value of r.

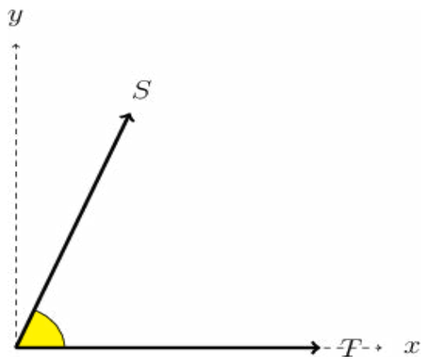
   A 239^0

   B 121^0

   C 59^0

   D 31^0

SS	Geometry of straight lines	Angle relationships	K	E



2. The diagram below shows two rays: T and S. They form … angle.

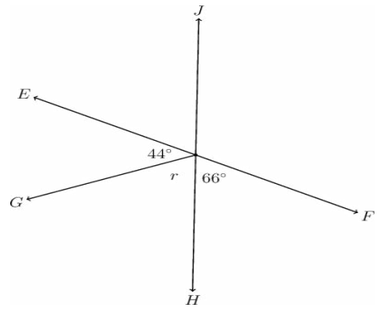
   A a revolution

   B a reflex

   C an obtuse

   D an acute

SS	Geometry of straight lines	Angle relationships	R	E



In the diagram above, EF and JH are straight lines.

3. What is the value of r?

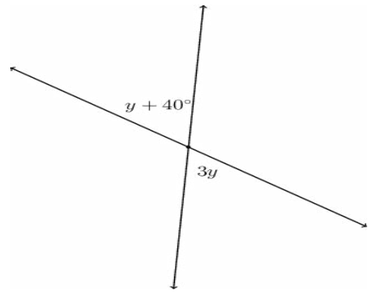
   A 24^0

   B 46^0

   C 70^0

   D 66^0

SS	Geometry of straight lines	Angle relationships	R	E



4. What is the value of y?

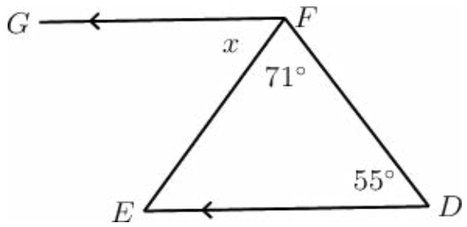
   A 50^0

   B 35^0

   C 20^0

   D 10^0

SS	Geometry of straight lines	Angle relationships	C	E



In the diagram above, $DE \parallel FG$

5. The value of x is …

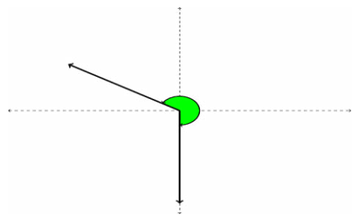
A 126^0

B 109^0

C 55^0

D 54^0

SS	Geometry of straight lines	Angle relationships	K	E



6. What angle is represented in the diagram above?

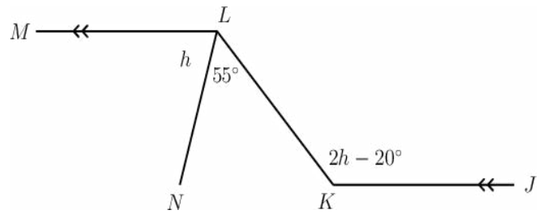
A Reflex

B Revolution

C Obtuse

D Acute

SS	Geometry of straight lines	Angle relationships	R	M



In the diagram above, $JK \parallel LM$

7. The value of h is …

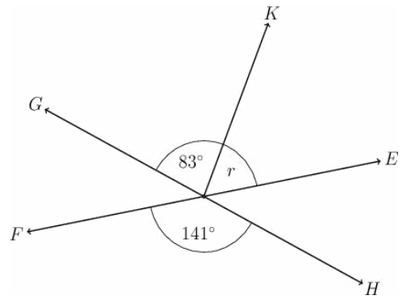
A 25^0

B 35^0

C 55^0

D 75^0

SS	Geometry of straight lines	Angle relationships	R	E



8. What is the value of r?

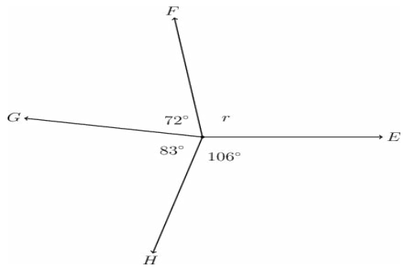
A 141^0

B 83^0

C 58^0

D 39^0

SS	Geometry of straight lines	Angle relationships	R	E



9. The value of r is …

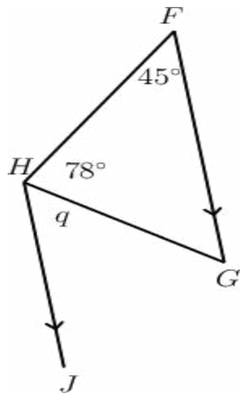
A 74^0

B 83^0

C 99^0

D 108^0

SS	Geometry of straight lines	Angle relationships	C	M



10. What is the value of q?

A 123^0

B 102^0

C 57^0

D 45^0

SS	Geometry of 2-D shapes	Classifying 2-D shapes	K	E

11. The quadrilaterals with diagonals that bisect one another at right angles are a ...

A kite and rhombus.

B rhombus and a square.

C rhombus and a rectangle.

D square and a kite.

SS	Geometry of 2-D shapes	Classifying 2-D shapes	K	E

12. A right-angled isosceles triangle have ...

A one right angle and no equal sides.

B three equal sides and a 90° angle.

C two equal sides and two 60° angles.

D two equal sides and a 90° angle.

SS	Geometry of 2-D shapes	Classifying 2-D shapes	K	E

13. A quadrilateral with 4 equal sides and diagonals that are **NOT** equal in length, is called a ...

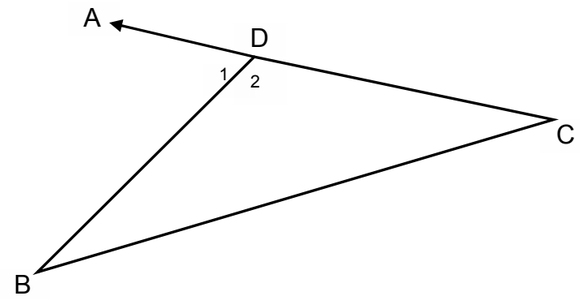
A square.

B parallelogram.

C rectangle.

D rhombus.

SS	Geometry of 2-D shapes	Solving problems	R	M



In the figure above ADC is a straight line segment, $\mathrm{BD} = \mathrm{DC}$ and $\hat{\mathrm{B}} = 25°$

14. Calculate the size of $\hat{\mathrm{D}}_1$.

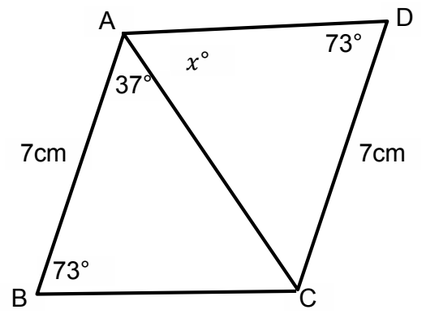
A 25°

B 50°

C 130°

D 75°

SS	Geometry of 2-D shapes	Congruent triangles	R	M



$\Delta\mathrm{ABC} \equiv \Delta\mathrm{CDA}$

15. What is the value of x?

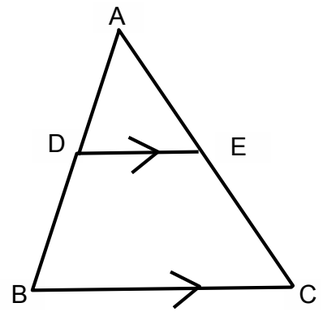
A 73°

B 53°

C 110°

D 70°

SS	Geometry of 2-D shapes	Similar triangles	R	M



16. Choose the correct statement and reason for the above diagram.

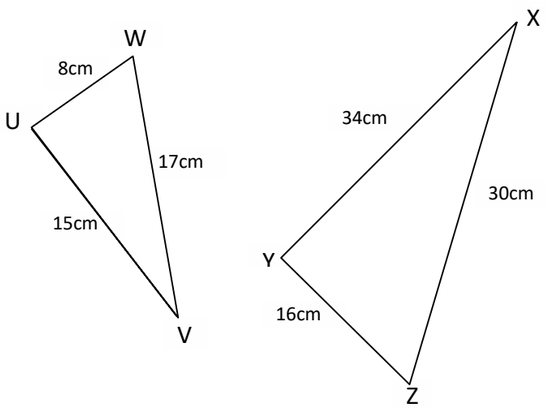
A $\Delta ABC \equiv \Delta ADE$ (sss)

B $\Delta ABC \equiv \Delta ADE$ $(s\angle s)$

C $\Delta ABC \Vert\Vert\Vert \Delta ADE$ $(\angle\angle\angle)$

D $\Delta ABC \Vert\Vert\Vert \Delta ADE$ $(s\angle s)$

SS	Geometry of 2-D shapes	Similar triangles	R	M



17. The statement for proportional sides of the two triangles is ...

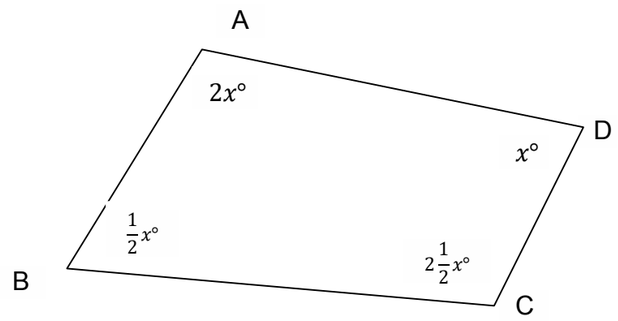
A $\frac{UV}{ZX} = \frac{VW}{XY} = \frac{UW}{ZY} = \frac{1}{2}$

B $\frac{UV}{XY} = \frac{VW}{YZ} = \frac{UW}{XZ} = \frac{1}{2}$

C $\frac{XY}{WU} = \frac{YZ}{UV} = \frac{XZ}{VW} = 2$

D $\frac{XY}{WU} = \frac{YZ}{UV} = \frac{XZ}{VW} = \frac{1}{2}$

SS	Geometry of 2-D shapes	Properties of 2-D shapes	C	M



18. The size of $\hat{C} =$ ...

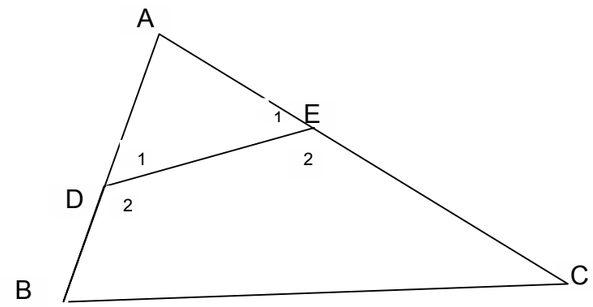
A 60°

B 150°

C 75°

D 240°

SS	Geometry of 2-D shapes	Classifying 2-D shapes	R	M



19. $\hat{D}_2 =$ ...

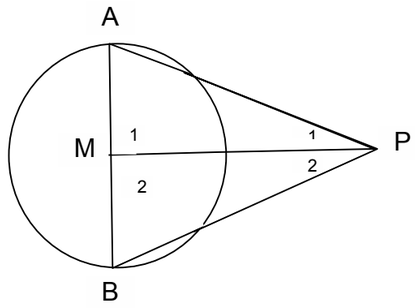
A $\hat{E}_1 + \hat{A}$ (ext. ∠ of Δ)

B $\hat{D}_1 + \hat{A}$ (ext. ∠ of Δ)

C $180° - \hat{E}_2$ (co-int. ∠s)

D $180° + \hat{D}_1$ (∠s on straight line)

SS	Geometry of 2-D shapes	Congruent triangles	R	M



M is the centre of the circle and MP⊥AB.

20. AMP ≡ Δ BMP because ...

A SSS

B 90°,H,S

C S∠ S

D ∠∠∠

SS	Geometry of 3-D shapes	Classifying 3-D objects	K	E

21. Which platonic solid has 6 edges and 4 vertices?

A An icosahedron

B A tetrahedron

C An octahedron

D A dodecahedron

SS	Geometry of 3-D shapes	Classifying 3-D objects	K	E

22. An octahedron is a regular polyhedron with 8 ... faces

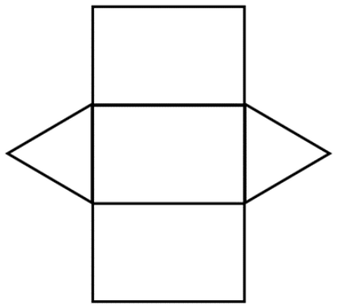
A square

B regular pentagonal

C equilateral triangular

D triangular

SS	Geometry of 3-D shapes	Classifying 3-D objects	K	E



23. Which 3-D object can be formed from the net above?

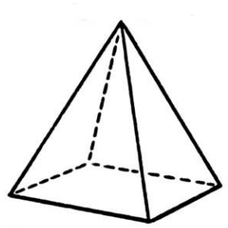
A A rectangular-based pyramid.

B A triangular pyramid.

C A rectangular prism.

D A triangular prism.

SS	Geometry of 3-D shapes	Classifying 3-D objects	K	E



24. What is the name of the 3-D object drawn above?

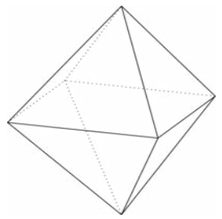
A A rectangular-based pyramid.

B A triangular pyramid.

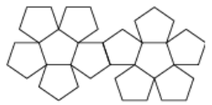
C A rectangular prism.

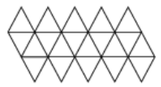
D A triangular prism.

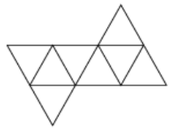
SS	Geometry of 3-D shapes	Building 3-D models	K	E

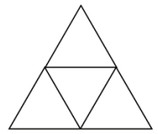


25. Which of the nets represent the geometric solid above?

A 

B 

C 

D 

SS	Geometry of 3-D shapes	Classifying 3-D objects	K	E

26. Which statement is **NOT** true for a cylinder?

A It is a 3-D object.

B It has two circular bases that are parallel to each other.

C It has two bases that are polygons.

D The radius of its curved surface is equal from the top to the bottom between the bases.

SS	Geometry of 3-D shapes	Classifying 3-D objects	K	E

27. How many faces does a dodecahedron have?

A 6

B 8

C 10

D 12

SS	Geometry of 3-D shapes	Classifying 3-D objects	K	E

28. Name the 3-D object which has one curved surface, no bases, no vertices and no edges.

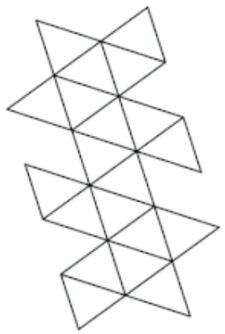
A Cylinder

B Sphere

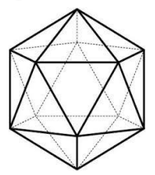
C Dodecahedron

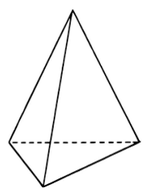
D Icosahedron

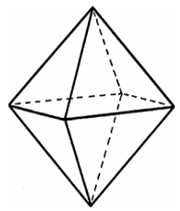
SS	Geometry of 3-D shapes	Nets of 3-D objects	K	E

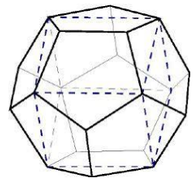


29. Which geometric solid is formed by the net drawn above?

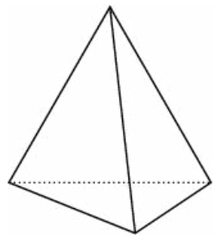
A 

B 

C 

D 

SS	Geometry of 3-D shapes	Classifying 3-D objects	K	E



$V + F - E = 2$

V - Vertices, F - Faces and E – Edges

30. How many edges does the geometric solid drawn above have?

A 2

B 4

C 6

D 8

Transformations

SS	Transformations	Symmetry	K	E

31. How many lines of symmetry are there in a regular hexagon?

A 2

B 4

C 6

D 8

SS	Transformations	Rotation	K	D

32. Rotating any point P 90° clockwise about the origin, has the same effect as …

A rotating point P 180° clockwise about the origin.

B rotating point P 270° clockwise about the origin.

C rotating point P 180° anti-clockwise about the origin.

D rotating point P 270° anti-clockwise about the origin.

SS	Transformations	Reflection	K	E

33. The co-ordinates of A′, the image of A$(-2; 1)$, in the Y-axis are …

A $(-2; -1)$

B $(2; -1)$

C $(-1, ; 2)$

D $(2; 1)$

SS	Transformations	Reflection	K	E

34. If S$(4; -1)$ maps onto S′ $(-1; 4)$, it means that point S has been reflected in the …

A $y = x$ line.

B $y = -x$ line.

C X-axis.

D Y-axis.

SS	Transformations	Translation	K	M

35. The co-ordinates of A′, the image of A$(-1; 4)$, in the $y = -x$ line are …

A $(-1; -4)$

B $(-4; 1)$

C $(-4; -1)$

D $(4; -1)$

SS	Transformations	Translation	K	E

36. The translation which maps A$(4; -1)$ onto A′ $(0; 2)$ is …

A A$(x; y) \longrightarrow$ A′$(x - 4; y - 3)$.

B A$(x; y) \longrightarrow$ A′ $(x - 4; y + 3)$.

C A$(x; y) \longrightarrow$ A′ $(x + 4; y + 3)$.

D A$(x; y) \longrightarrow$ A′ $(x + 4; y - 3)$.

S	Transformations	Translation	K	E

37. If A$(-2,-4)$, the co-ordinates of the image A′ under the translation A$(x;y)$ A′ $(x-2;y)$ are …

A $(0;-4)$

B $(-2;-6)$

C $(0;-6)$

D $(-4;-4)$

SS	Transformations	Rotation	K	E

38. What will the co-ordinates of point Q(4;−3) be after it is rotated 270° anti-clockwise about the origin?

A Q′(4; 3)

B Q′(−3; 4)

C Q′(3; 4)

D Q′(−3; −4)

SS	Transformations	Enlargement	R	M

39. If one dimension of a 2-D shape is doubled, it has the same effect as …

A enlarging the area of the 2-D shape by a scale factor of 4.

B enlarging the area of the 2-D shape by a scale factor of 2.

C enlarging the area of the 2-D shape by a scale factor of $\frac{1}{4}$.

D enlarging the area of the 2-D shape by a scale factor of $\frac{1}{2}$.

SS	Transformations	Translation	K	E

40. What kind of transformation is described by the rule R$(x;y)\longrightarrow$R′ $(-y;x)$?

A Rotating the object 90° clockwise about the origin.

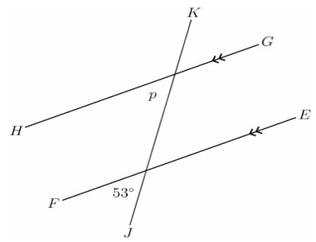
B Rotating the object 90° anti-clockwise about the origin.

C Reflecting the object about the $y=-x$ line.

D Reflecting the object about the Y-axis.

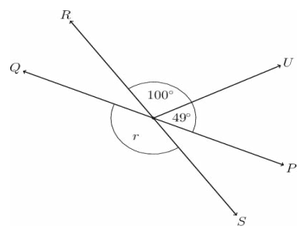
Short questions

SS	Geometry of straight lines	Angles and relationships	R	E



41. Calculate the value of p.

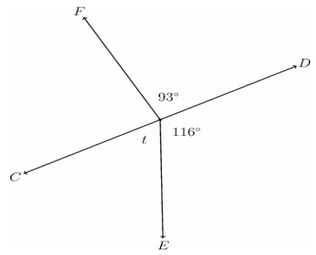
SS	Geometry of straight lines	Angles and relationships	R	E



PQ and RS are straight lines

42. Determine the value of r.

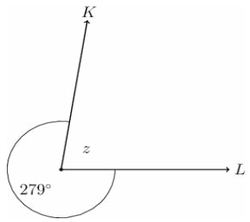
SS	Geometry of straight lines	Angles and relationships	R	E



CD is a straight line.

43. Determine the value of t.

SS	Geometry of straight lines	Angles and relationships	R	E



44. Determine the value of z.

SS	Geometry of 2-D shapes	Classifying 2-D shapes	K	E

Congruent; similar; an isosceles; an obtuse-angled; a right-angled

45. Choose a word only once from the list above to complete each sentence.

45.1 In ΔABC, $AB = AC$, this means that $\hat{B} = \hat{C}$ and ΔABC is …

45.2 In ΔABC, $\hat{A} = 45°$ and $\hat{C} = 25°$, this means that $\hat{B} = 110°$ and ΔABC is …

45.3 In ΔABC, $AB = 5$ cm, $AC = 4$ cm and $BC = 3$ cm, this means that ΔABC is …

45.4 In ΔABC and ΔDEF, $\hat{A} = \hat{D}$ and $\hat{B} = \hat{E}$, this means that the triangles are …

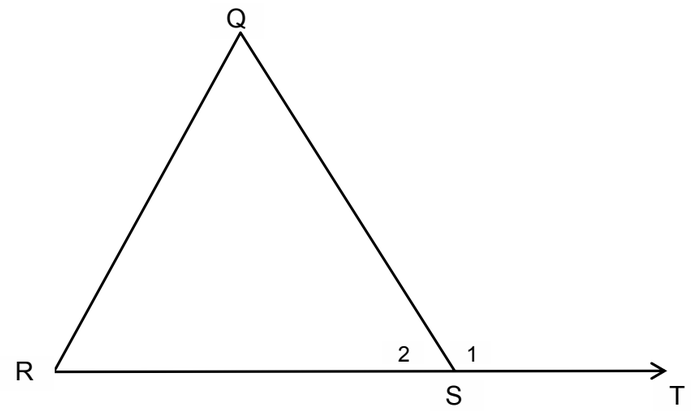
SS	Geometry of 2-D shapes	Similar triangles	K	E

$\Delta KLM \;|||\; \Delta ABC$

46. What are the proportional sides of ΔKLM and ΔABC?

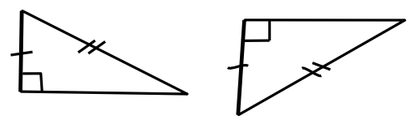
$\frac{KL}{\quad} = \frac{\quad}{\quad} = \frac{\quad}{AC}$

SS	Geometry of 2-D shapes	Angle relationships	R	E



47. ΔQRS with RS extended to T. RQ = QS and $\hat{S}_2 = 35°$
Determine the size of $\hat{Q}$.

SS	Geometry of 2-D shapes	Congruency	R	E



48. The two triangles are congruent.
Give a reason for the condition of congruency above.

SS	Geometry of 3-D shapes	Classifying 3-D objects	K	E

49. What is another name for a cube?

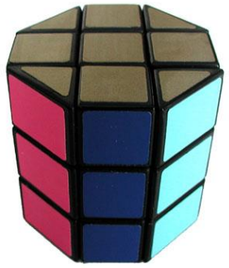
SS	Geometry of 3-D shapes	Classifying 3-D objects	K	M

50. Given the following information about a Platonic solid in the format of the formula:
$20 - 30 + 12 = 2$
What is the name of this 3-D object?

SS	Geometry of 3-D shapes	Classifying 3-D objects	K	E

51. An icosahedron has … faces.

SS	Geometry of 3-D objects	Classifying of 3-D objects	C	M



The prism consists of octagons, triangles ad squares.

52. Answer the following questions.

52.1 How many octagons are the in the prism?

52.2 How many squares are the in the prism?

52.3 How many triangles are the in the prism?

52.4 How many …s are the in the prism?

52.5 How many …s are the in the prism?

SS	Transformations	Reflections	K	E

53. What will be the co-ordinates of G(4;−2) be, if it is reflected about the $y = x$ line?

SS	Transformations	Reflections	K	E

54. What are the co-ordinates of S, if S′(2;−5) is reflected in the Y-axis?

SS	Transformations	Transformations	K	M

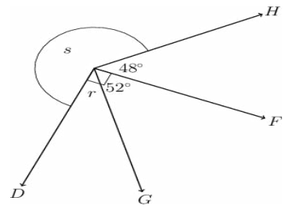
55. What are the co-ordinates of the image of B(−1;1) under the translation $(x; y) \rightarrow (x - 2; y)$?

SS	Transformations	Enlargements	K	M

56. Describe the transformation $(x; y) \rightarrow (4x; 4y)$.

Open-ended questions

SS	Geometry of straight lines	Angle relationships	C	M

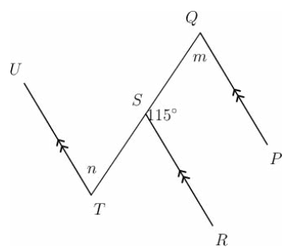


57. Answer the following questions.

57.1 Determine the value of r with reasons.

57.2 Determine the value of s with reasons.

SS	Geometry of straight lines	Angle relationships	R	M



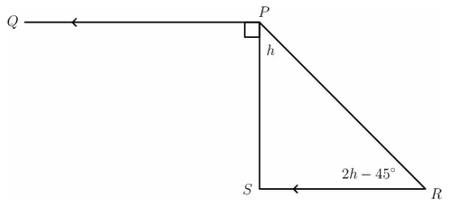
$PQ \parallel RS \parallel TU$

58. Answer the following questions.

58.1 Determine *m* with reasons.

58.2 Determine *n* with reasons.

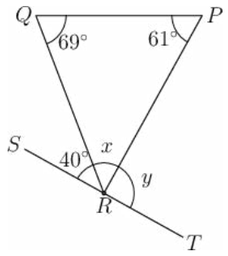
SS	Geometry of straight lines	Angle relationships	R	M



$PQ \parallel RS$

59. Calculate the value of h with reasons.

SS	Geometry of straight lines	Angle relationships	C	M

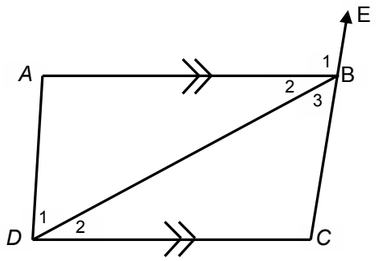


60. Answer the following questions.

60.1 Determine the value of x with reasons.

60.2 Determine the value of y with reasons.

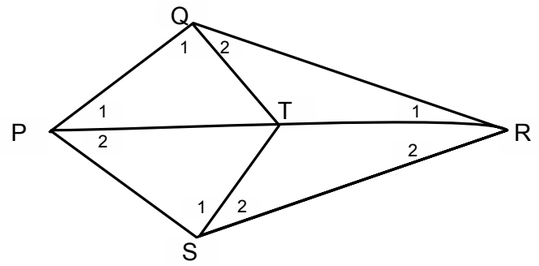
SS	Geometry of 2-D shapes	Problems solving	C	M



In the quadrilateral ABCD, AB∥DC. $\hat{B}_3$ = 60° and $\hat{C} = 105°$.

61. Determine the size of $\hat{D}_2$.

SS	Geometry of 2-D shapes	Congruent triangles	R	E



PQ = PS and QR = SR

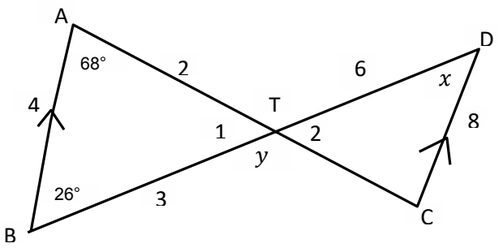
62. Answer the following questions.

62.1 Prove that $\Delta PQR \equiv \Delta PSR$.

62.2 Prove that $\hat{P}_1 = \hat{P}_2$

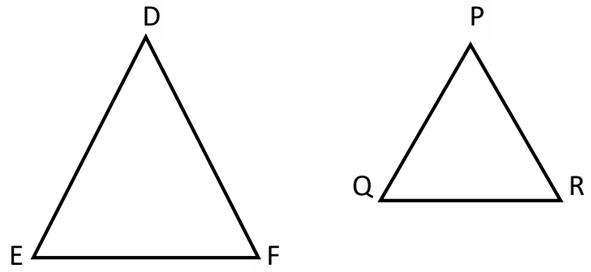
62.3 Prove that $QT = TS$

SS	Geometry of 2-D shapes	Similar triangles	R	M



63. Determine the value of x and y.

SS	Geometry of 2-D shapes	Similar triangles	R	M



$\widehat{E} = \widehat{P} = 63°$, DE = DF= 16 cm en PQ = PR = 12 cm.

64. Answer the following questions.

64.1 Prove that ΔDEF ||| ΔQPR.

64.2 Calculate the length of PR if EF = 8 cm.

SS	Geometry of 3-D shapes	Classifying 3-D objects	R	E

Given the Euler formula: $V + F - E = 2$
V – Vertices, F - Faces and E - Edges
In a triangular prism

65. Use the Euler's formula to calculate:

65.1 Number of vertices

65.2 Number of faces

65.3 Number of edges

SS	Geometry of 3-D objects	Classifying 3-D objects	R	E

A polyhedron has 25 faces and 13 vertices.

66. Use the Euler's formula to determine the number of edges of the polyhedron.

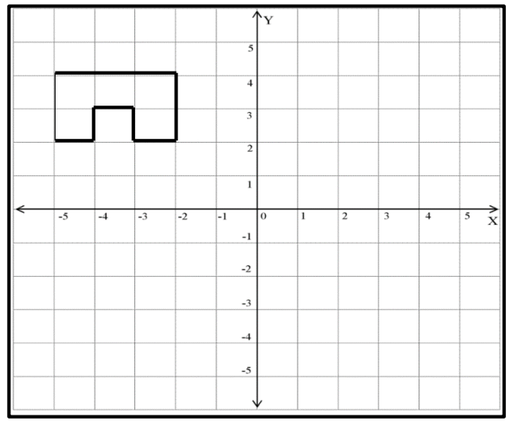
SS	Geometry of 3-D objects	Classifying 3-D objects	K	M

67. What is a regular polyhedron?

SS	Geometry of 3-D shapes	Classifying 3-D objects	K	M

68. What are the properties of a cylinder?

SS	Transformations	Reflect, Rotate, Translate	R	M



69. Answer the following:

69.1 Draw the reflection of the figure in the X-axis. (Name it Figure B)

69.2 Rotate the figure 90˚ clockwise about the origin. (Name it Figure C)

69.3 Move the figure 2 positions to the right and 2 positions downward. (Name it Figure D)

SS	Transformations	Symmetry	R	M

70. Draw a sketch of a quadrilateral that has 4 axes of symmetry.

SS	Transformations	Reflect, Rotate, Translate	K	M

71. Write the co-ordinates of C′ if C(–2;3) is reflected in the $y = -x$ line and then C′′ if C′ translated 3 units downward.

SS	Transformations	Reflect, Rotate, Translate	R	M

P(–3;2), Q(–1;4), R(–1;2) are vertices of ΔPQR.

72. Answer the following:

72.1 Write the co-ordinates of P′ Q′, R′ , the images of P, Q and R after a rotation of 180˚ about the origin.

72.2 Translate ΔP'Q'R' by moving the triangle 2 positions upwards and 3 positions to the left. Write down the co-ordinates of P'', Q'' and R''.

MARKING GUIDELINES
MATHEMATICS: ENGLISH
GRADE 9

Levels of understanding or error analysis
1: There are unrelated strategies or excessive dependence on the information that is provided in the question and is incorrectly used/is duplicated.
2: There is some computational ability that **may** not relate to the question/topic.
3: There is some conceptual knowledge and ability to analyse but is inconsistent in computational and/reasoning skills.
4: *Correct response.* The learner is able to consistently apply/demonstrate correct computational and reasoning skills required in the question.

Geometry – Transformations

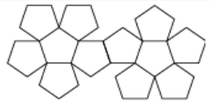
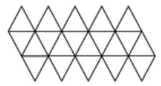
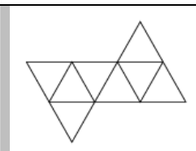
No.		**Expected answer**	**Level of understanding or error analysis**		**Cognitive level**	**Level of difficulty**
1.	A	239^0	1	Added $180^0 + 59^0$ when transposing instead of subtracting	R	E
	B	121^0 ✓	1	Correct response		
	C	59^0	1	Misconception that co-interior angles are equal		
	D	31^0	1	Misconception that co-interior angles are complementary		
2.	A	a revolution	1	Lack of knowledge of identification of different types of angles	K	E
	B	a reflex	1	Lack of knowledge of identification of different types of angles		
	C	an obtuse	1	Lack of knowledge of identification of different types of angles		
	D	an acute ✓	1	Correct response		

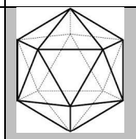
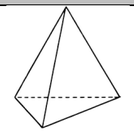
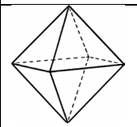
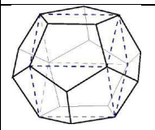
3.	A	24^0	1	Misconception that $r + 66^0 = 90^0$ assuming by looking at the diagram that it has a right angle	R	E
	B	46^0	1	Misconception that $r + 44^0 = 90^0$ assuming by looking at the diagram that it has a right angle		
	C	70^0 ✓	1	Correct response		
	D	66^0	1	Assuming that $r = 66^0$ by looking at the diagram		
4.	A	50^0	1	Ignoring $3y$, assuming that $y + 40^0 = 90^0$ by looking at the diagram then seeing that it has a right angle	R	E
	B	35^0	1	Added $3y + y + 40^0$ then equated to 180^0 lack of knowledge of supplementary angles		
	C	20^0 ✓	1	Correct response		
	D	10^0	1	Added $3y + y$ when transposing instead of subtracting		
5.	A	126^0	1	Misconception that x is an exterior angle of ΔEFD	C	E
	B	109^0	1	Misconception that $x + 71^0 = 180^0$ assuming angles on a straight line		
	C	55^0	1	Misconception that x is corresponding with $55^0 GF \parallel ED$		
	D	54^0 ✓	1	Correct response		
6.	A	Reflex ✓	1	Correct response	K	E
	B	Revolution	1	Lack of knowledge of identification of different types of angles		
	C	Obtuse	1	Lack of knowledge of identification of different types of angles		
	D	Acute	1	Lack of knowledge of identification of different types of angles		

7.	A	25^0	1	Transposed h but didn't change the sign so added instead of subtracting $2h + h = 55^0 + 20^0$	R	M
	B	35^0	1	Transposed 20^0 but didn't change the sign so subtracted instead of adding $2h - h = 55^0 - 20^0$		
	C	55^0	1	Ignoring h and 55^0 and making $2h - 20^0 = 90^0$ assuming from the diagram that it has a right angle		
	D	75^0 ✓	1	Correct response		
8.	A	97^0	1	Misconception that assuming GE is a straight line $r + 83^0 = 180^0$	R	E
	B	83^0	1	Misconception that $r = 83^0$ by just looking at the diagram		
	C	58^0 ✓	1	Correct response		
	D	39^0	1	Misconception that assuming vertically opposite angles are supplementary and that x is vertically opposite to 141^0 $r + 141^0 = 180^0$		
9.	A	74^0	1	Misconception that $r + 106^0 = 180^0$ assuming that they are angles on a straight line	R	E
	B	83^0	1	Misconception that $r = 83^0$ vertically opposite angles		
	C	99^0✓	1	Correct response		
	D	108^0	1	Misconception that $r + 72^0 = 180^0$ assuming that they are angles on a straight line		
10.	A	123^0	1	Misconception that q is an exterior angle of ΔFGH	C	M
	B	102^0	1	Misconception that $q + 78^0 = 180^0$ assuming angles on a straight line		
	C	57^0 ✓	1	Correct response		
	D	45^0	1	Misconception that q is corresponding with 45^0 $HJ \parallel FG$		
11.	A	kite and rhombus	1	Do not know properties of quadrilaterals	K	E
	B	rhombus and a square ✓	1	Correct response		
	C	rhombus and a rectangle	4	Do not know properties of quadrilaterals		
	D	square and a kite	1	Do not know properties of quadrilaterals		
12.	A	one right angle and no equal sides	1	Used scalene, right-angled triangle	K	E

	B	three equal sides and a 90° angle	1	Used equilateral triangle		
	C	two equal sides and three 60° angles	1	Do not know properties of triangles		
	D	two equal sides and a 90° angle. ✓	4	Correct response:		
13.	A	square.	1	Only looked at 4 equal sides.	R	E
	B	parallelogram	1	Do not know properties of parallelogram.		
	C	rectangle	1	Do not know properties of rectangle.		
	D	rhombus ✓	1	Correct response: rhombus have 4 equal sides but diagonals are not equal		
14.	A	25°	1	Assumed $\hat{D}_1$ and $\hat{B}$ alt. $\angle s$	R	E
	B	50° ✓	1	Correct response: $\hat{B} = \hat{C}$ $(\angle s\ opp\ equal\ sides)$ $\hat{B} + \hat{C} = 50°$.		
	C	130°	1	Calculated size of $\hat{D}_2$		
	D	75°	1	Assumed all ∠s = 25°, and added 3 $\angle s$		
15.	A	73°	1	Assumed ADC is an isosceles Δ	K	E
	B	53°	1	Assumed $\hat{A} = 90°$		
	C	110°	1	Confused with ext. ∠		
	D	70°✓	1	Correct response.		
16.	A	$\Delta ABC \equiv \Delta ADE$ (sss)	1	Do not know diff. btw similar & congruent. Assumed 3 sides =.	R	M
	B	$\Delta ABC \equiv \Delta ADE$ $(s\angle s)$	1	Do not know diff. btw similar & congruent. Assumed 2 sides = and∠ .		
	C	$\Delta ABC \Vert\Vert\Vert \Delta ADE$ $(\angle\angle\angle)$ ✓	1	Correct response: Triangles are equiangular = similar		
	D	$\Delta ABC \Vert\Vert\Vert \Delta ADE$ $(s\angle s)$	1	Correct statement, wrong reason, cannot differentiate btw $\Vert\Vert\Vert\ and\ \equiv$.		
17.	A	$\frac{UV}{ZX} = \frac{VW}{XY} = \frac{UW}{ZY} = \frac{1}{2}$ ✓	1	Correct response: $\Delta XYZ \Vert\Vert\Vert \Delta VWU$	R	M
	B	$\frac{UV}{XY} = \frac{VW}{YZ} = \frac{UW}{XZ} = \frac{1}{2}$	1	Correct ratio, but difficulty identifying equal angles		
	C	$\frac{XY}{WU} = \frac{YZ}{UV} = \frac{XZ}{VW} = 2$	1	Correct ratio, but difficulty pairing equal angles and corr. sides.		
	D	$\frac{XY}{WU} = \frac{YZ}{UV} = \frac{XZ}{VW} = \frac{1}{2}$	1	Lacks understanding of similarity concept		

18.	A	60°	1	Only calculated x.	C	M
	B	150° ✓	1	Correct response: $x + 2x + \frac{1}{2}x + 2\frac{1}{2}x = 360°$ $x = 60°$ $\hat{C} = 2\frac{1}{2}(60°) = 150°$		
	C	75°	1	Used sum of angles of triangle		
	D	240°	1	Multiplied x by 60°. Lacks knowledge of properties of quads.		
19.	A	$\hat{E}_1 + \hat{A}$ (ext. ∠ of Δ) ✓	1	Correct response:	R	M
	B	$\hat{D}_1 + \hat{A}$ (ext. ∠ of Δ)	1	Mixed up opposite angles in relation to ext. angle		
	C	$180° - \hat{E}_2$ (co-int. ∠s)	1	Lack understanding. No ‖ lines.		
	D	$180° + \hat{D}_1$ (∠s on straight line)	1	Wrong statement for angles on str. line.		
20.	A	SSS	1	Not enough information to use SSS - only 2 sides	R	M
	B	RHS	1	Not enough information to use RHS - cannot use hypotenuse		
	C	S∠ S ✓	1	Correct response: AM=MB, MP common and $\hat{M}_1 = \hat{M}_2 = 90°$		
	D	∠∠∠	1	Confuse ≡ with ⫴. Not enough info to prove 3 $\angle s$ equal.		
21.	A	An icosahedron	1	Lack of knowledge of properties of the platonic solid	K	E
	B	A tetrahedron ✓	1	Correct response		
	C	An octahedron	1	Lack of knowledge of properties of the platonic solid		
	D	A dodecahedron	1	Lack of knowledge of properties of the platonic solid		
22.	A	Square	1	Lack of knowledge of properties of an octahedron	K	E
	B	Regular pentagonal	1	Lack of knowledge of properties of an octahedron		
	C	Equilateral triangular ✓	1	Correct response		
	D	Triangular	1	Lack of knowledge of properties of an octahedron		
23.	A	A rectangular-based pyramid.	1	Lack of knowledge of using nets to create models	K	E
	B	A triangular pyramid.	1	Lack of knowledge of using nets to create models		
	C	A rectangular prism.	1	Lack of knowledge of using nets to create models		

	D	A triangular prism. ✓	1	Correct response		
24.	A	A rectangular-based pyramid ✓	1	Correct response	K	E
	B	A triangular pyramid	1	Lack of skill to identify shape of the base of the pyramid		
	C	A rectangular prism	1	Lack of understanding of the difference between prism and pyramid		
	D	A triangular prism	1	Lack of understanding of the difference between prism and pyramid		
25.	A		1	Lack of knowledge of using nets to create models	K	E
	B		1	Lack of knowledge of using nets to create models		
	C	 ✓	1	Correct response		
	D		1	Lack of knowledge of using nets to create models		
26.	A	It is a 3D object	1	Lack of knowledge of properties of a cylinder	K	E
	B	It has two circular bases that are parallel to each other	1	Lack of knowledge of properties of a cylinder		
	C	It has two bases that are polygons ✓	1	Correct response		
	D	The radius of its curved surface is equal from the top to the bottom between the bases	1	Lack of knowledge of properties of a cylinder		
27.	A	6	1	Lack of knowledge of properties of a dodecahedron	K	E
	B	8	1	Lack of knowledge of properties of a dodecahedron		
	C	10	1	Lack of knowledge of properties of a dodecahedron		
	D	12 ✓	1	Correct response		

28.	A	Cylinder	1	Lack of knowledge of properties of a sphere	K	E
	B	Sphere ✓	1	Correct response		
	C	Dodecahedron	1	Lack of knowledge of properties of a sphere		
	D	Icosahedron	1	Lack of knowledge of properties of a sphere		
29.	A	 ✓	1	Correct response	K	E
	B		1	Lack of knowledge of using nets to create models		
	C		1	Lack of knowledge of using nets to create models		
	D		1	Lack of knowledge of using nets to create models		
30.	A	2	1	Wrong substitution into the formula	K	E
	B	4	1	Wrong substitution of number of faces into the formula		
	C	6 ✓	1	Correct response		
	D	8	1	Wrong substitution of number of vertices into the formula		
31.	A	2	1	Do not know the properties of regular polygons	K	E
	B	4	1	Do not know the properties of regular polygon		
	C	6 ✓	4	Correct response		
	D	8	1	Do not know the properties of regular polygons		
32.	A	rotating point P 180° clockwise about the origin.	1	Do not know the rotation about the origin	K	M
	B	rotating point P 270° clockwise about the origin.	1	Do not know the rotation about the origin		
	C	rotating point P 180° anti-clockwise about the origin.	1	Do not know the rotation about the origin		

	D	rotating point P 270° anti-clockwise about the origin. ✓	4	Correct response:		
33.	A	$(-2;-1)$	1	Reflection in X-axis	R	E
	B	$(2;-1)$	1	Reflection in origin		
	C	$(-1,;2)$	1	Reflection in $y=-x$ line		
	D	$(2;1)$ ✓	4	Correct response		
34.	A	$y=x$ line. ✓	4	Correct response:	R	E
	B	$y=-x$ line.	1	Signs incorrect		
	C	X-axis.	1	X-values must be the same and Y-values must have different signs		
	D	Y-axis.	1	Y –values must be the same and X-values must have different signs		
35.	A	$(-1;-4)$	1	Reflection in the X-axis	K	E
	B	$(-4;1)$ ✓	4	Correct response.		
	C	$(-4;-1)$	1	Rotation 90° anti-clockwise		
	D	$(4;-1)$	1	Reflection in the $y=x$ line		
36.	A	A$(x;y)\longrightarrow$A′$(x-4;y-3)$.	1	Do not know the vertical change	R	E
	B	A$(x;y)\longrightarrow$A′ $(x-4;y+3)$. ✓	4	Correct response		
	C	A$(x;y)\longrightarrow$A′ $(x+4;y+3)$.	1	Do not know the vertical change		
	D	A$(x;y)\longrightarrow$A′ $(x+4;y-3)$.	1	Do not know the vertical or horizontal change		
37.	A	$(0;-4)$	1	Incorrect horizontal movement	K	E
	B	$(-2;-6)$	1	Incorrect horizontal and vertical movement		
	C	$(0;-6)$	1	Incorrect horizontal and vertical movement		
	D	$(-4;-4)$✓	4	Correct response		
38.	A	Q′(4; 3)	1	Reflection in X-axis	K	E
	B	Q′(−3; 4)	1	Reflection in origin		
	C	Q′(3; 4)	1	Rotation 90˚ anti- clockwise		
	D	Q′(−3; −4) ✓	4	Correct response		
39.	A	enlarging the area of the 2-D shape by a scale factor of 4.	1	Enlarged by doubling 2 dimensions	R	M
	B	enlarging the area of the 2-D shape by a scale factor of 2. ✓	4	Correct response:		
	C	enlarging the area of the 2-D shape by a scale factor of $\frac{1}{4}$.	1	Do not know reductions		
	D	enlarging the area of the 2-D shape by a scale factor of $\frac{1}{2}$.	1	Do not know reductions		
40.	A	Rotating the object 90° clockwise about the origin.	1	Do not know difference between clockwise and anti-clockwise	R	M
	B	Rotating the object 90° anti-clockwise about the origin. ✓	4	Correct response		
	C	Reflecting the object about the $y=-x$ line.	2	Co-ordinates must be swopped and both signs changed		
	D	Reflecting the object about the Y-axis.	1	Y-co-ordinate must be the same and the sign of the X-co-ordinate must change		

Short questions: Geometry – Transformations

No.	Expected answer	Clarification	Mark	Cognitive level	Level of difficulty
41.	53^0 ✓	Answer: 1 mark	1	R	E
42.	149^0 ✓	Answer: 1 mark	1	R	E
43.	64^0 ✓	Answer: 1 mark	1	R	E
44.	81^0 ✓	Answer: 1 mark	1	R	E
45.1	an isosceles ✓	Answer: 1 mark	1	K	E
45.2	an obtuse-angled ✓	Answer: 1 mark	1	K	E
45.3	a right-angled ✓	Answer: 1 mark	1	K	E
45.4	Similar ✓	Answer: 1 mark	1	K	E
46.	$\frac{KL}{AB} = \frac{LM}{BC} = \frac{KM}{AC}$	Answer: 1 mark	1	K	E
47.	110^0	Answer: 1 mark	1	R	E
48.	RHS or 90^0, H,S	Answer: 1 mark	1	R	E
49.	Hexahedron ✓	Answer: 1 mark	1	K	E
50.	Dodecahedron ✓	Answer: 1 mark	1	K	M
51.	20 ✓	Answer: 1 mark	1	K	E
52.1	12 ✓	Answer: 1 mark	1	C	M
52.2	20 ✓	Answer: 1 mark	1	C	M
52.3	90 ✓	Answer: 1 mark	1	C	M
52.4	60 ✓	Answer: 1 mark	1	C	M
53.	G'(–2;4) ✓	Answer: 1 mark	1	K	E
54.	S(–2;–5) ✓	Answer: 1 mark	1	K	E
55.	B' (–3;1) ✓	Answer: 1 mark	1	K	E
56.	Enlargement with a scale factor of 4. ✓	Answer: 1 mark	1	K	M

Guide for marking	
Method mark (M)	• Marks are awarded for applying a correct method. • Where there is clear evidence of a misread, a penalty of 1 mark is generally appropriate. This may be achieved by awarding a '**M**' mark but not an '**A**' mark.
Accuracy mark (A)	Accuracy marks may be awarded for the correct answer only.
Consistent Accuracy (CA)	Mark an answer correctly followed through from an incorrect previous calculation.

- **Credit learners in instances where they have used different but mathematically sound strategies to solve the problems.**
- **Unless stated otherwise, learners who give a correct answer only, should be awarded full marks.**
- **Underline errors committed by learners and apply Consistent Accuracy (CA) marking.**

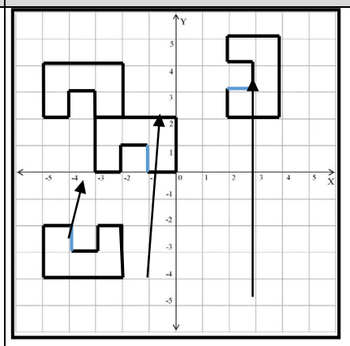
No.		Expected answer	Clarification	Mark	Cognitive level	Level of difficulty
57.	57.1	$r + 52^0 = 90^0$ Complementary angles✓ $r = 90^0 - 52^0$ $r = 38^0$ ✓**A**	Statement and reason: 1 mark Answer: 1 mark	5	C	M
	57.2	$s + r + 48^0 + 52^0 = 360^0 <'$ s around a point✓ $s + 38^0 + 48^0 + 52^0 = 360^0$✓ **M** $s = 360^0 - 38^0 - 48^0 - 52^0$ $s = 222^0$✓**A**	Statement and reason: 1 mark Substitution: 1 mark Answer: 1 mark			
58.	58.1	$m + 115^0 = 180^0$ Co-interior $<'$ s $QP \parallel SR$✓ $m = 180^0 - 115^0$ $m = 65^0$✓**A**	Statement and reason: 1 mark Answer: 1 mark	4	R	M
	58.2	$m = n$ Alternate $<'$ s $QP \parallel TU$✓ $n = 65^0$✓**A**	Statement and reason: 1 mark Answer: 1 mark			
59.		$S = 90^0$ Alternate $<'$ s $QP \parallel SR$✓ $P + S + R = 180^0$ sum of $<'$ s of Δ✓ $h + 90^0 + 2h - 45^0 = 180^0$✓**M** $3h = 180^0 - 90^0 + 45^0$ $\frac{3h}{3} = \frac{135^0}{3}$ $h = 45^0$✓**A**	Statements and reasons: 2 marks Substitution: 1 mark Answer: 1 mark	4	C	M

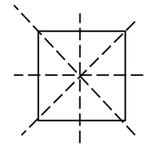
No.		Expected answer	Clarification	Mark	Cognitive level	Level of difficulty
60.	60.1	$R+Q+P=180^0$ sum of $<'s\ of\ \Delta$✓ $x+69^0+61^0=180^0$✓**M** $x=180^0-69^0-61^0$ $x=50^0$✓**A**	Statement and reason: 1 mark Substitution: 1 mark Answer: 1 mark	6	C	E
	60.2	$x+y+40^0=180^0<'s$ on a straight line✓ $y+50^0+40^0=180^0$✓**M** $y=180^0-90^0$ $y=90^0$✓**A**	Statement and reason: 1 mark Substitution: 1 mark Answer: 1 mark			
61.		$\hat{B}_2=180°-\hat{B}_3-\hat{C}$ (co-int $\angle s, AB\|\|DC$) $\hat{B}_2=180°-60°-105°$ $\hat{B}_2=15°$ $\hat{B}_2=\hat{D}_2$ (alt $\angle s, AB\|\|DC$)) $\hat{D}_2=15°$	Statement & reason: 1 mark Substitution: 1 mark Statement & reason: 1 mark Answer: 1 mark	4	C	M
62.	62.1	In ΔPQR & ΔPSR : PQ = PS and QR = SR (Given) PR = PR (common) $\therefore \Delta PQR \equiv \Delta PSR$ (SSS)	Statement & reason: 1 mark Statement & reason: 1 mark Statement & reason: 1 mark	3		
	62.2	$\hat{P}_1=\hat{P}_2$ corr $\angle s$ $\Delta PQR \equiv \Delta PSR$	Statement & reason: 1 mark	1		
	62.3	In ΔPQT & ΔPST : $\hat{P}_1=\hat{P}_2$ (proved) PQ = PS (given) PT = PT (common) $\therefore \Delta PQT \equiv \Delta PST$ (S∠S) $\therefore$ QT = TS (corr. sides $\equiv \Delta s$) **OR** In ΔQTR & ΔSTR $\hat{R}_1=\hat{R}_2$ (corr $\angle s$ $\Delta PQR \equiv \Delta PSR$) QR= SR (given) TR = TR (common) $\therefore \Delta QTR \equiv \Delta STR$ (S∠S) $\therefore$ QT = TS (corr. sides $\equiv \Delta s$)	Statement & reason: 1 mark Statement & reason: 1 mark Statement & reason: 1 mark Statement & reason: 1 mark Statement & reason: 1 mark **OR** Statement & reason: 1 mark Statement & reason: 1 mark Statement & reason: 1 mark Statement & reason: 1 mark Statement & reason: 1 mark	5	P	M

63.		$x=26°$ (alt. $\angle s$ &AB‖DC) $\hat{T}_1=\hat{T}_2$ (vert. opp. $\angle s$) $\therefore \hat{A}=\hat{C}$ (sum $\angle s$ of Δ) $\therefore \Delta ABT \ ||| \ \Delta CDT$ ($\angle\angle\angle$) $\frac{AB}{CD}=\frac{BT}{DT}=\frac{AT}{CT}=\frac{1}{2}$ (prop. sides ||| Δs) $\frac{AT}{CT}=\frac{1}{2}$ $\frac{2}{y}=\frac{1}{2}$ $y=4$	Answer & reason: 1 mark Statement & reason: 1 mark Statement & reason: 1 mark Statement & reason: 1 mark Statement & reason: 1 mark Substitution: 1 mark Answer: 1 mark	7	P	M
64.	64.1	In ΔDEF and ΔQPR: $\hat{E}=\hat{F}=\hat{P}=\hat{R}=63°$ ($\angle s$ opp. equal sides and $\hat{E}=\hat{P}=63°-$ given) $\therefore \hat{D}=\hat{Q}$ (sum $\angle s$ of Δ) $\therefore \Delta DEF \ ||| \ \Delta QPR$ ($\angle\angle\angle$)	Statement & reason: 1 mark Statement & reason: 1 mark Statement & reason: 1 mark	3	R	M
	64.2	$\frac{DE}{QP}=\frac{EF}{PR}=\frac{DF}{QR}=\frac{16}{12}=\frac{4}{3}$ (prop. sides ||| Δs) $\frac{EF}{PR}=\frac{4}{3}$ $\frac{8}{PR}=\frac{4}{3}$ $\frac{4PR}{4}=\frac{24}{4}$ PR= 6 cm	Prop. statement: 1 mark Substitution: 1 mark Answer: 1 mark	3	C	M

No.		Expected answer	Clarification	Mark	Cognitive level	Level of difficulty
65.	65.1	$V+F-E=2$ $V+5-9=2$✓**M** $V-4=2$ $V=2+4$ $V=6$✓**A**	Correct substitution: 1 mark Answer: 1 mark	2	R	E
	65.2	$V+F-E=2$ $6+F-9=2$✓**CA** $F-3=2$ $F=2+3$ $F=5$✓**A**	Correct substitution: 1 mark Answer: 1 mark	2	R	E
	65.3	$V+F-E=2$ $6+5-E=2$✓**CA** $11-E=2$ $-E=2-11$ $-E=-9$ $E=9$✓**A**	Correct substitution: 1 mark Answer: 1 mark	2	R	E

No.	Expected answer	Clarification	Mark	Cognitive level	Level of difficulty
66.	$V + F - E = 2$ $13 + 25 - E = 2$✓**M** $38 - E = 2$ $-E = 2 - 38$ $-E = -36$ $E = 36$✓**A**	Correct substitution: 1 mark Answer: 1 mark	2	R	E
67.	A platonic solid is a special type of polyhedra that has faces that are congruent regular polygons✓✓**A**	Explanation: 2 marks	2	K	M
68.	A cylinder has one curved side, two identical bases that are circular, the bases are always congruent and parallel. ✓✓**A**	Explanation: 2 marks	2	K	M

No.		Expected answer	Clarification	Mark	Cognitive level	Level of difficulty
69.			Translation 2 positions right: 1 mark	6	R	M
	69.1	In quadrant 3: ✓ Figure B: reflection  ✓	Final position: 1 mark Reflection: 1 mark			
	69.2	In quadrant 1: ✓ Figure C: rotation  ✓	Final position : 1 mark Rotation: 1 mark			

No.		Expected answer	Clarification	Mark	Cognitive level	Level of difficulty
	69.3	In quadrant 2: Figure D: translation 2 positions down ✓	Translation: 1 mark			
70.			Square: 1 mark Vertical and horizontal lines of symmetry: 1 mark Diagonal lines of symmetry: 1 mark (all lines must intersect in the middle)	3	R	M
71.		C′(−3;2) ✓ C′′(−3;−1) ✓	1 mark for each pair of co-ordinates	2	R	M
72.	72.1	P′ (3; –2), ✓ Q′(1;–4), ✓ R′(1;–2), ✓	1 mark for each pair of co-ordinates	3	R	M
	72.2	P′′(0;0), ✓ Q′′(–2;–2), ✓ and R′′(–2;0), ✓	1 mark for each pair of co-ordinates	3	R	M

Data Handling

Probability: multiple-choice questions (MCQ)

DH	Probability	Probability	K	M

A bag contains 8 red marbles, 12 blue marbles, and 17 green marbles.

One marble is randomly selected from the bag.

1. What is the probability that the marble is red **or** green?

   A $\frac{8}{17}$

   B $\frac{12}{25}$

   C $\frac{25}{37}$

   D $\frac{29}{37}$

DH	Probability	Probability	K	E

A coin is tossed and a die with numbers 1-6 is rolled.

2. What is P (heads and 3)??

   A $\frac{1}{12}$

   B $\frac{1}{4}$

   C $\frac{1}{3}$

   D $\frac{2}{3}$

DH	Probability	Probability	K	E

3. The probability of picking an even number from numbers 1 to 13 is …

   A $\frac{6}{13}$

   B $\frac{1}{2}$

   C $\frac{1}{13}$

   D $\frac{7}{13}$

DH	Probability	Probability	K	E

A certain woman already has one child, which is a boy. She now expects a second child.

4. What is the probability of it being a boy again?

A $\frac{1}{2}$

B $\frac{0}{2}$

C $\frac{2}{2}$

D 2

DH	Probability	Probability	K	E

Thabiso has 6 blue, 3 orange, 2 red and 7 white marbles.

5. The probability that when he randomly selects a blue marble from the bag, is …

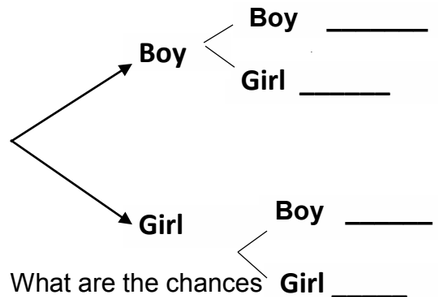
A 6

B $\frac{1}{3}$

C $\frac{1}{2}$

D $\frac{6}{13}$

DH	Probability	Probability	K	M



6. What are the chances Girl _____ are boys?

A $\frac{2}{4}$

B $\frac{1}{4}$

C $\frac{3}{4}$

D $\frac{4}{4}$

DH	Probability	Probability	R	M

A letter is randomly chosen from the word MATHEMATICS.

7. What is the probability of choosing an A?

A $\frac{1}{11}$

B $\frac{2}{11}$

C $\frac{9}{11}$

D $\frac{11}{11}$

DH	Probability	Probability	R	M

A packet has yellow and pink sweets.
The probability of taking out a pink sweet is $\frac{7}{12}$.

8. What is the probability of taking out a yellow sweet?

A 1

B $\frac{12}{12}$

C $\frac{7}{12}$

D $\frac{5}{12}$

DH	Probability	Probability	R	D

In a group of 42 pupils, all but 3 had a packet of chips or a Fanta or both.

32 pupils had a packet of chips and 7 of these also had a Fanta

9. What is the probability that each learner?

A $\frac{7}{32}$

B $\frac{32}{42}$

C $\frac{7}{42}$

D $\frac{3}{42}$

DH	Probability	Probability	R	D

A box contains blocks.
The number of blocks of each colour is given in the table.

Colour	Purple	Orange	White	Pink
Number of blocks	24	32	41	19

A block is selected randomly.

10. What is the probability that the block will be purple or white?

A 0,56

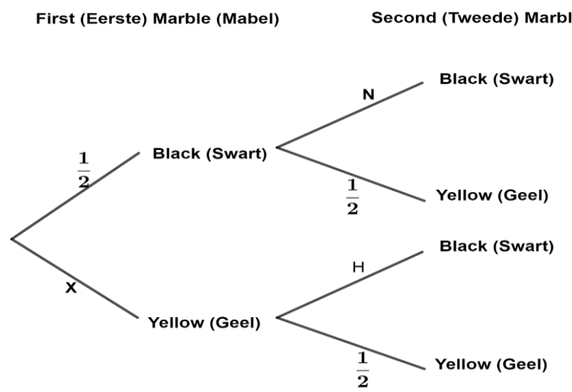
B 0,07

C 0,55

D 0,05

Short questions

DH	Probability	Probability	R	M



11. Determine the values of the missing probabilities X, N and H.

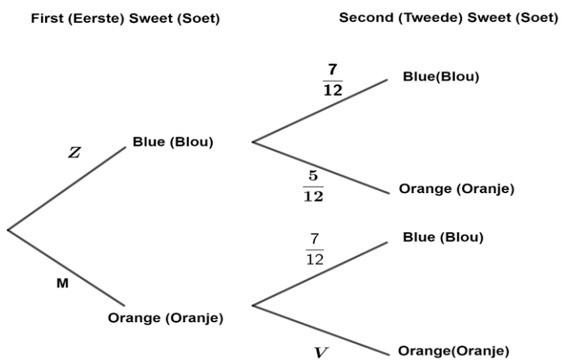
X =

N =

H =

DH	Probability	Probability	C	M

A box contains 7 blue sweets and 5 orange sweets. A sweet is drawn at random and then replaced. Another sweet is taken from the box and replaced.



12. Determine the values of the missing probabilities Z, M and V.

Z =

M =

V =

DH	Probability	Probability	C	M

The number of Grade 11 and 12 students taking Geography and History at East London High School are given in the following two-way frequency table.

	Geography	History	Total
11	101	73	x
12	y	31	121
Total	z	104	295

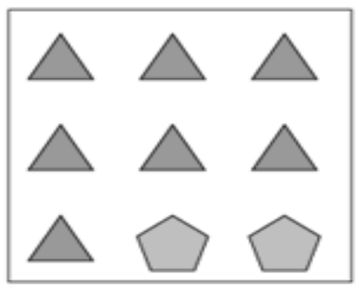
13. Determine the values of unknown quantities.

x =

y =

z =

DH	Probability	Probability	R	E

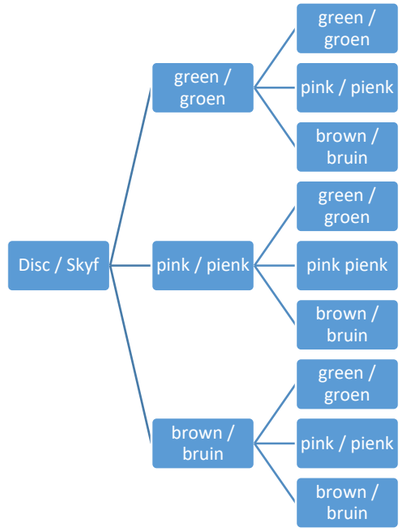


14. Determine the probability of selecting a triangle from the shapes above.

Open-ended questions

DH	Probability	Probability	P	M

A bag contains three coloured discs: green, pink and brown.
The tree-diagram shows the possible outcomes when a disc is pulled out of the bag.



15. Answer the following:

15.1 Write all the possible outcomes.

15.2 Write the total number of outcomes.

15.3 Write the probability of pulling out a brown and a brown.

15.4 Write the probability that the first disc is a pink and the second disc is a green.

15.5 Write the probability of pulling out a purple disc.

DH	Probability	Probability	P	M

A bag contains 5 black and 5 yellow balls. Luke picks a ball at random from the bag and replaces it back in the bag. He mixes the balls in the bag and then picks another ball at random from the bag.

16. Answer the following questions and give each answer in the simplest form.

16.1 What is the probability of picking a black ball?

16.2 What is probability of picking a yellow ball?

16.3 Represent the information on a Tree diagram.

16.4 What is the probability of **not** choosing a yellow ball from the bag?

DH	Probability	Probability	P	D

17. Roll and flip a blue die and two coins at the same time.

17.1 Draw a table and list all the possible outcomes.

17.2 Is it possible to roll the die and flip the coin 24 times and get each of the 24 possible outcomes once in the 24 rolls and coin flips?

Give a reason for your answer.

17.3 What is the probability of getting a 5, one head and one tail?

17.4 What is the probability of rolling an even number and getting two heads?

17.5 Which would be the best bet?

A. Getting a three and two tails
Or
B. Getting an odd number, one head and one tail.

Give a reason for your answer.

DH	Probability	Probability	P	D

18. A bag contains 6 white balls and 2 yellow balls. Bokamoso picks a ball at random from the bag and replaces it back in the bag. He mixes the balls in the bag and then picks another ball at random from the bag.

18.1 Calculate the probability of picking a yellow ball.

18.2 Calculate the probability of picking a white ball.

18.3 Construct the tree diagram.

18.4 Use the tree diagram in 18.3 to calculate the probability of picking a yellow ball first.

Write the answer in the simplest form.

MARKING GUIDELINES
MATHEMATICS: ENGLISH
GRADE 9

Levels of understanding or error analysis
1: There are unrelated strategies or excessive dependence on the information that is provided in the question and is incorrectly used/is duplicated.
2: There is some computational ability that **may** not relate to the question/topic.
3: There is some conceptual knowledge and ability to analyse but is inconsistent in computational and/reasoning skills.
4: *Correct response.* The learner is able to consistently apply/demonstrate correct computational and reasoning skills required in the question.

Probability

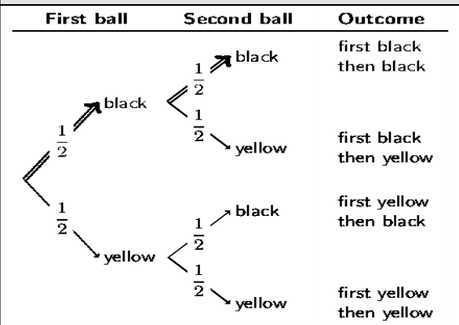
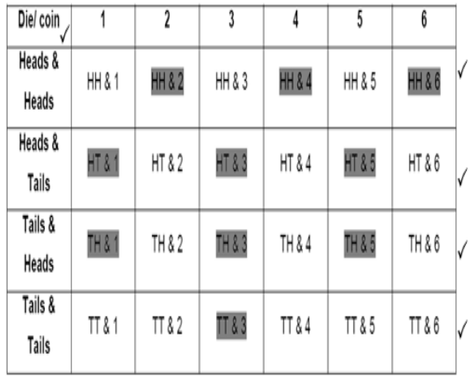
No.		Expected answer	Level of understanding or error analysis		Cognitive level	Level of difficulty
1.	A	$\frac{8}{17}$	1	Used the values of red marbles divided by the green marbles.	K	M
	B	$\frac{12}{25}$	1	Used the blue marbles divided by the total of red and green.		
	C	$\frac{25}{37}$ ✓	1	Correct response		
	D	$\frac{29}{37}$	1	Used the total of red and green divided by the total number of marbles.		
2.	A	$\frac{1}{12}$ ✓	1	Correct response	K	E
	B	$\frac{1}{4}$	1	Multiplied the probabilities of a tossed coin and die (i.e. $\frac{1}{2} \times \frac{3}{6}$).		
	C	$\frac{1}{3}$	1	Rounded off after multiplying the probabilities of a tossed coin and die (i.e. $\frac{1}{2} \times \frac{3}{6}$).		
	D	$\frac{2}{3}$	1	Used head + die, then divided by 3.		
3.	A	$\frac{6}{13}$ ✓	1	Correct response	K	E
	B	$\frac{1}{2}$	1	6 divided by 12 counting done didn't include the first number.		
	C	$\frac{1}{13}$	1	Divided the first number by the last number of the sample space.		

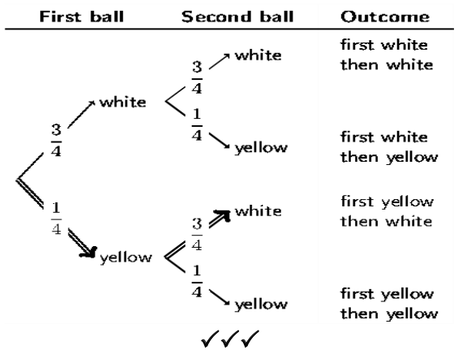
No.		Expected answer	Level of understanding or error analysis		Cognitive level	Level of difficulty
	D	$\frac{7}{13}$	1	Wrong identification even numbers between 1 and 13.		
4.	A	$\frac{1}{2}$	1	Used the probability of a girl or a boy.	K	E
	B	$\frac{0}{2}$	1	Wrong assumption for the events.		
	C	$\frac{2}{2}$ ✓	1	Correct response		
	D	2	1	Interpretation of the question which says second child.		
5.	A	6	1	Used the blue marbles since question asks about them.	K	E
	B	$\frac{1}{3}$ ✓	1	Correct response		
	C	$\frac{1}{2}$	1	Calculation errors, on the total number of marbles the blue marbles were not included.		
	D	$\frac{6}{13}$	1	Blue marble divided by the total number of orange, red and white marbles.		
6.	A	$\frac{2}{4}$	1	Error in interpretation of the events used the B's from the column before the outcomes.	K	M
	B	$\frac{1}{4}$ ✓	1	Correct response		
	C	$\frac{3}{4}$	1	Took all the B's and regarded them as the final outcome.		
	D	$\frac{4}{4}$	1	Divided the number of outcomes by the number of events		
7.	A	$\frac{1}{11}$	1	Error in reading out the word and counting the A's.	R	M
	B	$\frac{2}{11}$ ✓	1	Correct response		
	C	$\frac{9}{11}$	1	Used the other 9 letters excluding A's		
	D	$\frac{11}{11}$	1	Divided the number of outcomes by the number of events		
8.	A	1	1	Used the probability range of 0 - 1	R	M
	B	$\frac{12}{12}$	1	Divided the number of outcomes by the number of events		
	C	$\frac{7}{12}$	1	Simply took what was given.		
	D	$\frac{5}{12}$ ✓	1	Correct response		

No.		Expected answer			Cognitive level	Level of difficulty
9.	A	$\frac{7}{23}$	1	Pupils having Fanta divided by those having chips	R	D
	B	$\frac{23}{42}$	1	Pupils having chips divided by total number of learners.		
	C	$\frac{7}{42}$ ✓	1	Correct response		
	D	$\frac{3}{42}$	1	Divided chips or Fanta by 42 which is sample space.		
10.	A	0,56 ✓	1	Correct response	K	E
	B	0,07	1	Multiplied the probabilities of the two colours i.e. purple and white.		
	C	0,55	1	Incorrect rounding off of the response i.e. 0,20 + 0,35.		
	D	0,05	1	Multiplied the probabilities of the two colours i.e. orange and pink.		

No.	Expected answer	Clarification	Cognitive level	Level of difficulty
11.	$X = \frac{1}{2}$	1 mark	K	M
	$N = \frac{1}{2}$	1 mark	K	E
	$H = \frac{1}{2}$	1 mark	K	M
12.	$Z = \frac{7}{12}$	1 mark	K	M
	$M = \frac{5}{12}$	1 mark	K	E
	$V = \frac{7}{12}$	1 mark	K	M
13.	x = 174	1 mark	K	E
	y = 90	1 mark	K	M
	z = 191	1 mark	K	E
14.	$\frac{7}{9}$	1 mark	K	E

No.	Expected answer	Clarification	Cognitive level	Level of difficulty
15.1	GG GP GB PG PP PB BG BP BB ✓✓✓	1 mark for GG,GP,GB 1 mark for PG,PP,PB 1 mark for BG,BP,BB	P	M
15.2	9✓	1 mark for answer		
15.3	$\frac{1}{9}$✓	1 mark for answer		
15.4	$\frac{2}{9}$✓	1 mark for answer		
15.5	$\frac{0}{9} = 0$✓	1 mark for answer		
16.1	The probability of picking a black ball is: $P = \frac{\text{Number of black balls}}{\text{Total number of balls}}$ $P = \frac{5}{10}$ $P = \frac{1}{2}$✓	1 mark for answer	C	D
16.2	The probability of picking a yellow ball is: $P = \frac{\text{Number of yellow balls}}{\text{Total number of balls}}$ $P = \frac{5}{10}$ $P = \frac{1}{2}$✓	1 mark for answer		

No.	Expected answer	Clarification	Cognitive level	Level of difficulty
16.3	 ✓✓✓✓✓	5 marks for the Tree diagram		
16.4	The probability of **not** choosing a yellow ball from the bag is: $P = \frac{1}{2} \times \frac{1}{2}$✓ $= \frac{1}{4}$✓	1 mark for $\frac{1}{2} \times \frac{1}{2}$ 1 mark for answer		
17.1	 ✓ ✓ ✓ ✓	1 mark for each row	P	D
17.2	Yes✓ It is but the chances of this happening are very small. ✓	1 mark for yes 1 mark for reason		
17.3	$\frac{2}{24} = \frac{1}{12}$✓	1 mark for answer		
17.4	$\frac{3}{24} = \frac{1}{8}$✓	1 mark for answer		

No.	Expected answer	Clarification	Cognitive level	Level of difficulty
17.5	A: The chances of getting a 3 and two tails $= \frac{1}{24}$ B: The chances of getting an odd number, one heads and one tails = $\frac{6}{24} or \frac{1}{4}$ ✓ B is the best option as chances of winning are higher. ✓	1 mark for calculations 1 mark for choosing the correct option and reason		
18.1	Probability of picking a white ball is: $P = \frac{\text{Number of white balls}}{\text{Total number of balls}}$ $P = \frac{6}{8}$ $P = \frac{3}{4}$✓	1 mark for answer	P	D
18.2	Probability of picking a yellow ball is: $P = \frac{\text{Number of yellow balls}}{\text{Total number of balls}}$ $P = \frac{2}{8}$ $P = \frac{1}{4}$✓	1 mark for answer		
18.3	 ✓✓✓	3 marks for the Tree diagram		

No.	Expected answer	Clarification	Cognitive level	Level of difficulty
18.4	The probability of first choosing a yellow ball **before** a white ball from the bag is: $P = \frac{1}{4} \times \frac{3}{4}$ ✓ $= \frac{3}{16}$ ✓	1 mark for $\frac{1}{4} \times \frac{3}{4}$ 1 mark for $\frac{3}{16}$		

DIAGNOSTIC ASSESSMENT
ENGLISH MATHEMATICS
GRADE 9

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