



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

DIAGNOSTIC TEST ITEMS

GRADE 6 AND 9

MATHEMATICS

ENGLISH

QUESTIONS AND MEMORANDA

1. INTRODUCTION

The diagnostic test 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 tests/questions are designed to fulfill 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 DBE has embarked on the design of diagnostic assessments using MCQs and assessment rubrics (for Languages) 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.

MCQs designed for the diagnostic questions included in this package, 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 test items 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 Plan (ATP). The content therefore includes coverage from terms one to four. However, teachers may include questions from the resource bank into the ATP to facilitate assessment for learning.

These diagnostic assessments/questions are a phase based assessment. It also includes questions from four grades. There are questions set on the critical skills

from the two earlier grades, the current grade and the next grade. The selection of questions from the four grades was done by looking at those concepts that were taught in the two earlier grades and were then extended in the next two grades as well. This would enable the teacher to identify at which specific grade the knowledge gap is.

The assessment guidelines per subject and grade have a detailed explanation of the topics/skills that are in this category. The spread of questions in the composite assessment is weighted to facilitate a phase based assessment and is broken down into the four composite grades as illustrated below:

Table 1: Percentage spread of questions (Languages and Mathematics)

Weighting	Spread of Questions			
	$\pm 10\%$	$\pm 20\%$	$\pm 60\%$	$\pm 10\%$
Grade 6	4	5	6	7
Grade 9	7	8	9	10

The purpose of including the content of the other grades is to diagnose the skill/concept acquisition at the earlier grade, the current grade as well as to ascertain whether the learner is ready to make the transition to the next grade. 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 grades/topics.

These diagnostic questions 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 assessment should not be used for grading a learner; as the intended purpose is to facilitate learning.

3. THE STRUCTURE OF THE DIAGNOSTIC TEST ITEMS

The diagnostic test items is divided into sections or questions. Questions 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. Each paper has a spread of the content areas and skills that span the entire phase and is extended into the next phase. The texts/topics that have been selected for the Languages questions indicate the concept/skill progression from one grade to the next. The Mathematics questions are clustered according to content areas.

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 3 for further clarity.

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

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

Mathematics

4. PROPOSED USAGE OF THE MATHEMATICS DIAGNOSTIC TEST ITEMS

- 4.1 Parts of the paper may be used independently at different intervals i.e. as a revision activity, formative task, etc.
- 4.2 Certain questions **per topic** or skill assessed may be selected from each section to compile a shorter testlet.

EXAMPLES

Grade 6: Common fractions

Section A question 6

Section C question 3 & 6

Grade 9: Algebraic expressions

Section A question 20, 21,
25 - 31

Section B question 13 -17

Section C question 3 - 4

- 4.3 Questions may be selected according to **levels of difficulty** and can be used to support learning according to different cognitive demands or be used to support progressed learners. E.g. Levels of difficulty (easy, moderate & difficult)

Table 2: Levels of difficulty using the Bloom's taxonomy

EXAMPLES

Grade 6 (moderate questions)

Section A

Question 4 – 9, 11–14, 17, 19 – 22, 25 – 27 & 29

Section B

Question 3, 5, 7, 9, 10, 12, 14, 19 – 22 & 24

Section C

Question 1 – 4 and 7

Grade 9 (easy questions)

Section A

Question 1 – 3, 6 – 8, 10, 13, 17, 20, 21, 23, 25, 26, 34, 35, 40 – 43, 45 & 48

Section B

Question 1 – 6, 9, 10, 13 – 16, 18, 20, 21, 23 – 26 & 28 – 30

Section C

Question 3, 7, 8, 14 & 15

- 4.4 Questions 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 lower grades. This will assist the teacher to know learners' level of proficiency. A sample of questions for each grade is as follows:

Level of difficulty	Blooms Taxonomy	Descriptors (These are not limited to the ones listed below)
Easy	Remembering and Understanding	Complete, list, name, identify; recall, repeat, state, classify, re-group/group, rearrange/arrange, collect, categorise, select, recognize, supply, separate, isolate, draw etc.
Moderate	Application and Analysis	Predict, infer, interpret, understand, rewrite in a certain order, apply, demonstrate, illustrate, investigate, factorise, differentiate, similarities, solve etc.
Difficult	Evaluating and Creating	Analyse, evaluate, justify, provide a reason, criticize, judge, derive, combine, construct, synthesise; proof; etc.

Grade 6 Baseline questions (whole numbers)

Grade 4

Section A

Question 12

Section B

Question 1

Grade 5

Section A

Question 2 & 5

Section B

Question 2 & 6

Section C

Question 2

Grade 9 Baseline questions (fractions)

Grade 7

Section A

Question 1 & 10

Section B

Question 1

Grade 8

Section A

Question 4 & 8

- 4.5 Diagnostic questions can also be selected according to **cognitive levels**. A sample of questions for each grade is as follows:

Cognitive levels	Grade 6	Grade 9
Knowledge	Section A Question 12, Section B Question 7	Section A Question 2, Section B Question 1, Section C Question 8
Routine Procedure	Section A Question 15, Section B Question 21, Section C Question 5	Section A Question 3, Section B Question 7, Section C Question 11

Complex Procedure	Section C question 7	Section A Question 12, Section B Question 17, Section C Question 9
	Section A question 27, Section B question 11	Section A Question 50, Section C Question 10
Problem Solving		

- 4.6 The teacher should decide when, where and how the assessment may be used to enhance teaching and learning.
- 4.7 The questions may be used at the beginning of a phase to establish whether learners meet the conceptual knowledge for the new grade/phase.

5. DESIGN

The table below 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. The cognitive levels are now introduced in the Foundation Phase CAPS.

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

Table 3: Levels of understanding (thought process)

Levels of understanding of **Descriptors for the levels of understanding. There is:**

Level 1	Learners demonstrate (i.e. a combination but may not be all of the following) that they:
	<ul style="list-style-type: none"> - 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;

Levels of understanding of Descriptors for the levels of understanding. There is:

- 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 of Descriptors for the levels of understanding. There is:

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. A question will include distractors that correspond to each level of understanding set out in the table above.

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: MATHEMATICS

- 6.1 Multiple Choice Questions (MCQs): Marks are allocated according to the cognitive demand of the question. 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 Section A and B are allocated a mark each per answer. Marks for Section C are allocated according to the demand of the question.
- 6.3 The marking guideline has columns indicating the number for each question, the expected answer per question, the level of understanding/error analysis (for Section A), the cognitive level, the level of difficulty, the grade level at which a question and its answer are pitched. The mark allocation is merely a guide for the learner's response and should not be the focus of the task.

- 6.4 The levels of difficulty indicate the cognitive demands of the question which are: Easy (E), Moderate (M) and difficult (D).
- 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 5.

Table 4: Example of the Marking Guideline (for Mathematics)

No.	Expected answer	Level of understanding/Error analysis	Cognitive level	Level of difficulty	Grade
1. A	$\frac{8}{18}$	1 Added numerators and denominators together.	R	E	7
B	$\frac{37}{40}$	4 Correct response: $\frac{3}{10} \times \frac{4}{4} + \frac{5}{8} \times \frac{4}{4} = \frac{12}{40} + \frac{25}{40} = \frac{37}{40}$			
C	$\frac{8}{40}$	2 Correct LCM but added numerators.			
D	$\frac{15}{80}$	2 Multiplied 3 by 5 and 10 by 8			

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

- 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.
- 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.
- Consistent Accuracy mark is applied when an answer is correctly followed through from an incorrect previous answer.

E.g. Grade 3 question

1. 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 **205** (the answer is incorrect)

1.2 **Two hundred and 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 but award a mark for the 2nd answer because it was correctly followed through from an incorrect answer. This is how to apply **consistent accuracy** (CA) marking.

Table 5: MATHEMATICS COGNITIVE LEVELS

LEVEL 1:	LEVEL 2:	LEVEL 3:	LEVEL 4:
KNOWLEDGE (K)	ROUTINE PROCEDURES (R)	COMPLEX PROCEDURES (C)	PROBLEM-SOLVING (P)
<ul style="list-style-type: none"> • Knowing • Remember/Recall 	<ul style="list-style-type: none"> • Applying routine procedures in familiar contexts • Understanding 	<ul style="list-style-type: none"> • Applying multi-step procedures in a variety of contexts (including word sums) 	<ul style="list-style-type: none"> • Reasoning and reflecting
<ul style="list-style-type: none"> • 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... 	<ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> ○ algorithms for +, -, \times, and \div ○ 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. 	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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?

<ul style="list-style-type: none"> • Determine the factors of 64 • Write the prime numbers that are factors of 36 	<ul style="list-style-type: none"> • Estimation and appropriate rounding off of numbers • 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: $115 + 31\ 012$. 	<ul style="list-style-type: none"> • Conceptual understanding • 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 	<ul style="list-style-type: none"> • Busi has a bag containing three coloured balls: 1 blue, 2 red ball and 3 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.
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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.

8. DATA ANALYSIS AND UTILISATION

The teacher would be able to collect data on an individual learner, a class, a grade or 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 phase test and identify at which grade 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 own diagnostic analysis to identify:-

- a) The overall level of performance of the class or school;
- b) Individual learners or schools that need special intervention;
- c) Groups of learners or schools who need special support and
- d) Subject content areas 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:-

- i. **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.
- ii. **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, i.e. the highest and the lowest scores, are.

- iii. **Maximum** is the highest score obtained by a learner in a test.
- iv. **Minimum** is the lowest score obtained by a learner in a test.
- v. **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 while 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:-

- i. Mark the test and write the scores obtained by each learner next to the relevant question/item number in their books or scripts;
- ii. Enter learner names and other particulars (e.g. the gender of each learner) in the rows, one after another;
- iii. Enter test item numbers in the columns, one after another;
- iv. Enter the score of each learner on each item in the correct cell (i.e. where the relevant column and row meet);
- v. Check if all data has been entered correctly (i.e. do thorough data

- cleaning);
- vi. Use correct formulae to calculate the statistics that you want to use to summarize and analyse the test data; and
 - vii. 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 eight percent (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 four percent (4%) lower than of the girls, viz. 52% as against 56%. Boys' scores ranged between eight percent (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 (from 'a' to 'e' above) 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 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 subject. to enhance effective teach

REFERENCES

1. Kelly V. King et al (2004), *The Distractor Rationale Taxonomy: Enhancing Multiple Choice Questions in Reading and Mathematics*, Pearson Education
2. The Cardiff University Assessment Strategy
(<http://www.cf.ac.uk/learning/themes/assess/strategy/index.htm>)

GRADE 6
MATHEMATICS
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DIAGNOSTIC TEST ITEMS MATHEMATICS: ENGLISH GRADE 6

Note to the teacher:

1. The test is designed as a diagnostic assessment tool.
2. Study the teacher guideline provided before you administer/select questions.
3. Administer the questions according to the sections/difficulty/topics/content area/cognitive levels or grade(s).
4. You may further break down the questions from the different sections/learning area content/difficulty/cognitive levels or grade(s).
5. The selection of questions will depend on the purpose of the assessment.
E.g.
 - You may want to check whether the Grade 6 learners in your class are competent in certain Grade 4 and 5 topics. Hence you will select all the Grade 4 and 5 items of the chosen content area from the different sections.
 - This may form a baseline assessment which can be administered at the beginning of the year.
 - You can then plan your lessons for your Grade 6 learners based on your diagnostic analysis of the baseline assessment.
 - In a similar manner you can select questions according to the different topics in the CAPS and the purpose of your assessment.

Please note the following keys:

	Content Area	Levels of difficulty	Cognitive levels
NOR	Numbers, Operations and Relationships	E: easy	K: knowledge
PFA	Patterns, Functions and Algebra	M: moderate	R: routine procedure
SS	Space and Shape (Geometry)	D: difficult	C: complex procedure
M	Measurement		P: problem solving
DH	Data Handling		
G (6)	Grade 6		

Please note that the tag above each question, as shown below, provides the following information in this order: content area, topic, grade level of the question, cognitive level and difficulty level e.g.:

Content area	Topic	Grade 4	Cognitive level	Level of difficulty
NOR	common fractions	G4	R	E

It is thereafter written above each question in the format:
NOR/common fractions/G4/R/E above each question.

SECTION A

Circle the letter of the correct answer from question 1 to question 30.

NOR/ Place Value/ G4/K/E

1. Write the number that is equal to
6 units + 2 tens + 7 hundred + 5 thousand.

A 7 562
B 6 275
C 5 726
D 2 756

(1)

NOR/Number Patterns/G5/K/R

2. Which number in this number pattern is INCORRECT?
7; 9; 12; 16; 21; 28

A 28
B 21
C 16
D 12

(1)

NOR/Place Value/G5/K/E

What is the value of the underlined digit in 29 072?

A 7 thousand
B 7 hundred
C 7 units
D 7 tens

(1)

NOR/Whole Numbers/G6/K/M

Which one of the following numbers is bigger than 765 000 000?

- A 766 000 000
- B 765 000 000
- C 756 000 000
- D 764 000 000

(1)

NOR/Rounding Off/G5/R/M

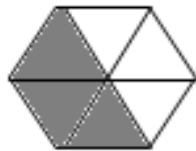
Was 39 569 rounded off to the nearest 5, 10, 100 or 1000 to give an answer of 40 000?

- A 1 000
- B 100
- C 10
- D 5

(1)

NOR/Common Fractions/G6/K/M

What fraction of the following 2-D shape is shaded?



- A $\frac{3}{3}$
- B $\frac{3}{3}$
- C $\frac{6}{3}$
- D $\frac{1}{2}$
- $\frac{2}{1}$

(1)

NOR/ Ratio/G6/R/M

What is the ratio of the number of black balls to the number of white balls?



- A 4:8
- B 2:1
- C 4:1
- D 1:2 (1)

NOR/Number Operations/G6/R/M

Which number sentence below has the same value as $5 \times (6 + 2)$?

- A $(5 \times 6) + 2$
- B $(5 \times 2) + 6$
- C $(6 + 2) \times 5$
- D $(5 + 2) \times 6$ (1)

NOR/Word Sum/G6/R/M

There are 5 boxes, each containing 125 apples. What is the total number of apples?

- A 600
- B 625
- C 130
- D 25 (1)

NOR/Word Sum/G6/P/D

Faiza opens a book. She multiplies the two consecutive page numbers and gets 1 332. What is the left-hand page number?

- A 666
- B 667
- C 36
- D 37

(1)

NOR/Word Sum/G6/P/M

Tozi saves R440. Charlene saves double the amount. Charlene then spends R100. How much does Charlene have now? Choose the number sentence that can help you find the answer.

- A $440 + 440 - 100$
- B $440 + 440 + 100$
- C $440 + 100$
- D $440 - 100$

(1)

NOR/ Multiples/G4/K/M

Which one of the number patterns below contains multiples of 6?

- A 1; 2; 3; 4; 5; 6
- B 6; 12; 18; 24
- C 6; 9; 12; 15
- D 1; 2; 3; 6

(1)

NOR/ Number Operations/G6/R/M

Which operation sign should replace the * to make the number sentence true?

$$8 \times 7 = 67 * 11$$

- A \times
- B $-$
- C \div
- D $+$

(1)

NOR/Ratio/G7/R/M

Complete: The simplest form of writing the ratio 9:39 is ...

- A 3:13
- B 3:12
- C 1: 4
- D 1: 6

(1)

NOR/Factors/G7/R/D

Which one of the following is the product of prime factors of 36?

- A $2 \times 2 \times 3 \times 3$
- B $3 \times 3 \times 4$
- C $2 \times 2 \times 9$
- D $2 \times 3 \times 6$

(1)

PFA/Numerical Patterns/G6/R/E

Which rule would best describe the number sequence below?

2 525; 2 550; 2 600; 2 625; 2 675; 2 700; _.

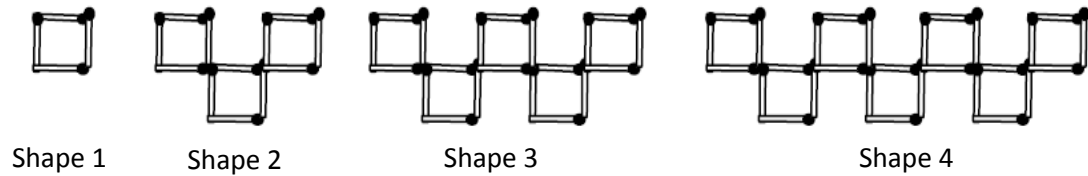
- A Add 50 and then add 25
- B Add 25 and then add 50
- C Add 50
- D Add 25

(1)

PFA/Geometrical Patterns/G6/R/M

Jani builds shapes with matchsticks.

How many matchsticks does she use to build the shape in the 20th position if the pattern continues?

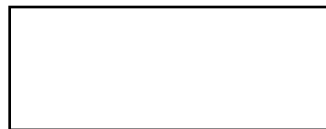


- A 160
- B 164
- C 158
- D 156

(1)

SS/Symmetry/G5/K/E

How many lines of symmetry does the rectangle below have?

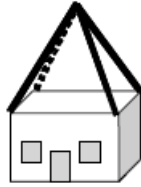


- A 6
- B 4
- C 2
- D 1

(1)

SS/3–D Object/G6/K/M

Look at the picture of the house below.
Which shape describes the shape of the roof?



- A A rectangular-based pyramid
- B A rectangular prism
- C A cylinder
- D A cone

(1)

SS/3–D Objects/G6/K/M

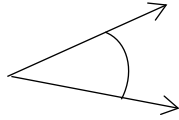
Which one of the following is a net of a square-based pyramid?

- A
- B
- C
- D

(1)

SS/Angles/G6/K/M

Identify the kind of angle shown below. Complete: It is ...

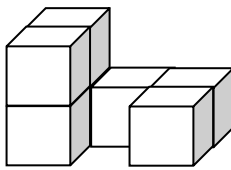


- A an obtuse angle.
- B an acute angle.
- C a right angle.
- D a reflex angle.

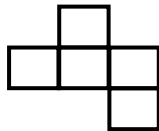
(1)

SS/Views/G6/K/M

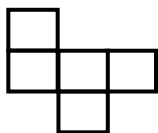
Which one of the following diagrams shows the top view of the given 3-D object?



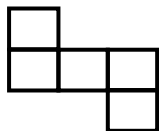
A



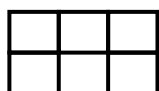
B



C



D



(1)

M/Time/G4/R/E

23. Dix wants to watch a film that is between $1\frac{1}{2}$ and 2 hours long. Which one of the following films should she choose? A ...

- A 102 - minute film
- B 121 - minute film
- C 150 - minute film
- D 59 - minute film

(1)

M/Capacity/G5/R/E

24. A glass has a capacity of 250 millilitres. How many glasses can be filled from a litre bottle of cool drink?

- A 25 glasses
- B 10 glasses
- C 4 glasses
- D 1 glasses

(1)

M/Time/G6/R/M

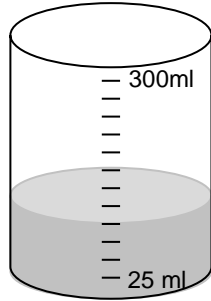
How many decades are there in 2 150 years?

- A 21 500
- B 2 150
- C 21,5
- D 215

(1)

M/Capacity/G6/R/M

How much water is shown in the given figure?

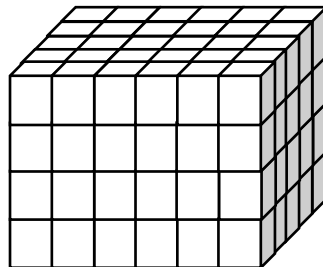


- A 250 mℓ
- B 100 mℓ
- C 300mℓ
- D 275mℓ

(1)

M/Volume/G6/R/M

How many cubes were used to build the 3-D object shown below?



- A 120 cubes
- B 24 cubes
- C 60 cubes
- D 30 cubes

(1)

DH/Mode/G5/K/E

What is the mode of the following data set?

4 4 5 5 5 6 6 7 7 7 7 7 8

- A 5
- B 6
- C 7
- D 8

(1)

DH/Median/G6/K/M

What is the median of the following masses?

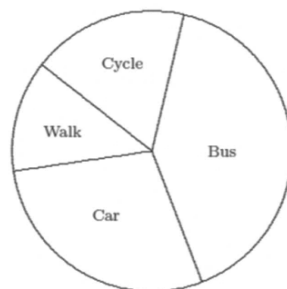
39 kg 40 kg 42 kg 45 kg 46 kg 50 kg 60 kg

- A 46 kg
- B 60 kg
- C 45 kg
- D 39 kg

(1)

DH/Interpretation/G6/P/D

30. The Pie chart below shows how the children in a class travel to school. Which one of the statements below is true?



- A More than half the learners either take the bus or cycle to school.
- B More than a quarter of the learners walk to the school.
- C More than half the learners either walk or cycle to school.
- D More learners walk to school than come by car.

(1)

SECTION B

NOR/Rounding Off/G4/R/E

1. Complete: 1 369 rounded off to the nearest 10 is ... (1)

NOR/Operations/G5/K/E

2. Complete:
 $2 \times (3 \times 4) = (2 \times 3) \times (\underline{\quad})$ (1)

NOR/Operations/G6/R/M

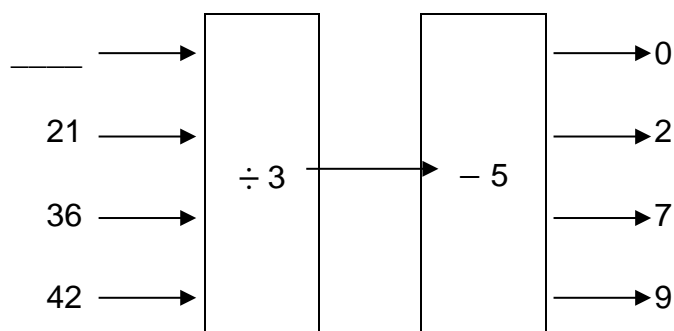
3. What is the value of $(6250 \div 125) \times 0 + 14$? (1)

NOR/Operations/G6/R/D

4. Insert brackets to make the following statement true.
 $4 + 3 \times 7 - 10 = 39$ (1)

NOR/Flow Diagrams/G6/R/M

5. Complete the flow diagram by filling in the missing number. (1)



NOR/ Whole Numbers/G5/K/E

6. Write the biggest number that can be made using each of the digits 5, 9, 6, 1, 7, 2 only once. (1)

NOR/Operations/G6/K/M

7. Complete: If $387 \times 24 = 9\,288$, then $9\,288 \div 24 = \dots$ (1)

NOR/Factors/G7/K/D

8. List all the factors of 625. (1)

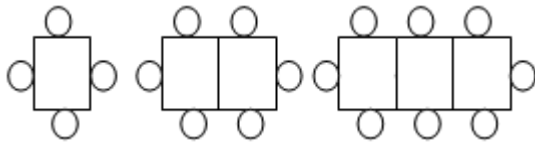
PFA/Number Patterns/G6/R/M

9. Balls are arranged in groups as indicated in the table below. Complete the table by filling in the missing number in the shaded block. (1)

Group	1	2	3	9	
Number of balls	3	5	7	19	51

PFA/Geometric Patterns G4/R/M

10. Draw the next figure in the diagram pattern. (1)

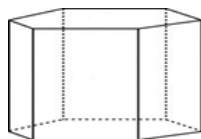


PFA/Number Patterns/G6/P/D

11. If we write the natural numbers from 1 to 100, then how many times will we write the digit 5? (1)

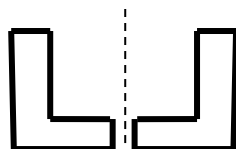
SS/Properties of Prisms/G6/K/M

12. How many edges does a hexagonal prism have? (1)



SS/Transformation/G6/K/E

13. Study the shapes below and name the kind of transformation. (1)

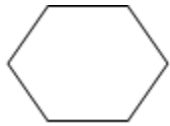


SS/Properties of a 2-Shape/G6/K/M

14. Name the 2-D shape that has the following properties:
Two pairs of opposite sides are equal, one angle is equal to 90° and has four lines of symmetry. (1)

SS/ Polygons/G4/K/E

15. Name the 2-D shape illustrated in the diagram below?



(1)

M/Conversion/G4/K/E

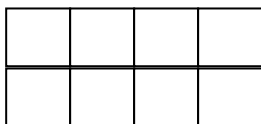
16. Complete: 1 000 m = ... km (1)

M/Temperature/G5/K/E

17. Which one of the following temperatures would you consider as very cold?
 22°C , 12°C , 2°C (1)

M/Perimeter/Area/G5/R/E

18. The length of the side of each square is 1 cm.



Calculate:

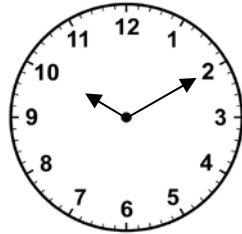
- 18.1 the perimeter of the shape above. (1)
18.2 the area of the shape above. (1)

M/Time/G7/P/M

19. An adult's heart beats about 78 beats per minute.
How many times will a heart beat in one hour? (1)

M/Time/G6/K/M

20. The analogue clock face below shows the time after sunset on a particular day.
Write the time in digital form (1)



M/Time/G6/R/M

21. Use the times listed in the frame to answer the questions that follow.

Times of cities in different time zones.	
Name of city	Time
Paris	13:57
London	12:57
New York	07:57
San Francisco	04:57

- 21.1 What is the time difference between London and New York? (1)
- 21.2 What time will it be in Paris if it is 13:45 in San Francisco? (1)

M/Length/G6/R/M

22. Below are the results in the school's final long-jump challenge.

Peggy	4,95 m
Zanele	4,29 m
Busi	4,08 m
Laetitia	4,87 m

Who came second? (1)


DH/ ProbabilityG6/CR/D






















23. The likelihood of getting heads when flipping a coin is 1 out of 2. The likelihood of tossing a die and getting a 3 is 1 out of 6.

What is the likelihood of drawing one card from a 52 card deck and getting a two? (1)

DH/Pictograph/G6/R/M

24. Study the following pictograph and then answer the question.

Key: Each  represents 10 glasses of juice.

Number of glasses of juice sold each day	
Monday	  
Tuesday	   
Wednesday	    
Thursday	   
Friday	    

How many glasses were sold on Friday? (1)

DH/Data/G6/P/D

25. Leon interviewed 50 Grade 6 learners about their kind of TV show ,41 said they like comedy, 35 said they enjoy action films and 30 said they like both.

How many of the learners like neither? (1)

SECTION C

Show all the calculation steps.

NOR/Addition/G4/R/M

1. $6\,254 + 3\,874$ (2)

NOR/Subtraction/G5/R/M

2. $69\,157 - 17\,239$ (2)

NOR/Common Fractions/G5/R/M

3. $5\frac{1}{8} + 3\frac{3}{8}$ (2)

NOR/Multiplication/G6/R/M

4. $6\,907 \times 28$ (3)

NOR/Division/G6/R/D

5. $8\,775 \div 26$ (3)

NOR/Common Fractions/G6/R/D

6. $5\frac{11}{12} - 3\frac{5}{6}$ (3)

NOR/Percentage/G7/C/M

7. What is the amount of profit made when a car is bought for R120 000 and sold at a profit of 30%. (3)



**DIAGNOSTIC RESOURCE BANK: MARKING GUIDELINE
MATHEMATICS: ENGLISH
GRADE 6**

This marking guideline consists of 11 pages.

Sections	Levels of difficulty	Cognitive levels
A: multiple-choice questions	E: easy	K: knowledge
B: short answer questions	M: moderate	R: routine procedure
C: multiple step questions	D: difficult	C: complex procedure
		P: problem solving

Levels of understanding
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.

SECTION A

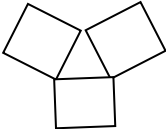
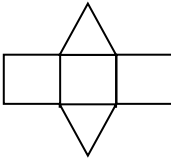
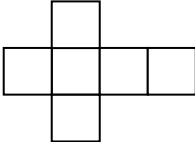
1 mark per answer.

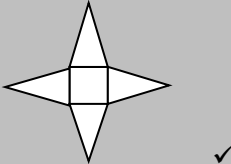
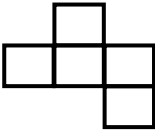
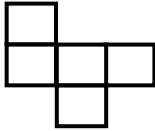
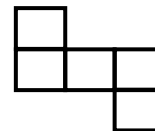
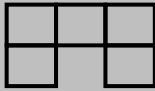
No.	Expected answer	Level of understanding	Cognitive level	Level of difficulty	Grade
1.	A 7 562	1 lacks knowledge of place value	K	E	4
	B 6 275	1 lacks knowledge of place value			
	C 5 726 ✓	4 correct response arrange from thousand to units			
	D 2 756	1 lacks knowledge of place value			
2.	A 28 ✓	4 correct response starting from 2, the difference between consecutive numbers is increased by 1.	R	E	5
	B 21	1 Identified the incorrect number in the pattern			
	C 16	1 Identified the incorrect number in the pattern			
	D 12	1 Identified the incorrect number in the pattern			

No.		Expected answer		Level of understanding	Cognitive level	Level of difficulty	Grade
3.	A	7 thousand	1	lacks knowledge of place value	K	E	5
	B	7 hundred	1	lacks knowledge of place value			
	C	7 units	1	lacks knowledge of place value			
	D	7 tens ✓	4	correct response the tens digit underlined			
4.	A	766 000 000 ✓	4	correct response 766 000 000 is bigger	K	M	6
	B	765 000 000	1	lacks knowledge of comparing numbers			
	C	756 000 000	1	lacks knowledge of comparing numbers			
	D	764 000 000	1	lacks knowledge of comparing numbers			
5.	A	1 000✓	4	correct response rounded off to the nearest 1 000	R	M	5
	B	100	1	lacks knowledge of rounding off			
	C	10	1	lacks knowledge of rounding off			
	D	5	1	lacks knowledge of rounding off			
6.	A	$\frac{3}{3}$	1	counted the number of shaded parts only			
	B	$\frac{6}{3}$	2	swopped the numerator and denominator			
	C	$\frac{1}{2}$ ✓	4	correct response $\frac{3}{6}$ simplified	K	M	6
	D	$\frac{2}{1}$	2	swopped the numerator and the denominator and simplified			
7.	A	4:8	3	the ratio of white to black balls was chosen			
	B	2:1 ✓	4	correct response 8:4 simplified	R	M	6
	C	4:1	1	simplified the ratio incorrectly			

No.		Expected answer		Level of understanding	Cognitive level	Level of difficulty	Grade
	D	1:2	3	the ratio of white to black balls was chosen and simplified			
8.	A	$(5 \times 6) + 2$	1	used associative property incorrectly			
	B	$(5 \times 2) + 6$	1	used associative property incorrectly			
	C	$(6 + 2) \times 5$ ✓	4	correct response applied commutative property correctly	R	M	6
	D	$(5 + 2) \times 6$	1	confused commutative property			
9.	A	600	2	incorrectly multiplied			
	B	625 ✓	4	correct response 125×5	R	M	6
	C	130	1	added the 2 numbers			
	D	25	2	divided the numbers			
10.	A	666	1	divided by 2 - page on left			
	B	667	4	divided by 2 - page on right			
	C	36✓	1	correct response calculation by estimation 36×37	P	D	6
	D	37	3	page on right			
11.	A	$440 + 440 - 100$ ✓	4	correct response 440 doubled -100	P	M	6
	B	$440 + 440 + 100$	3	mixed the 2 operations			
	C	$440 + 100$	1	just added the numbers			
	D	$440 - 100$	1	just subtracted the numbers			
12.	A	1; 2; 3; 4; 5; 6	1	numbered from 1 to 6			
	B	6; 12; 18. 24 ✓	4	correct response multiples of 6	K	M	6
	C	6; 9; 12; 15	1	multiples of 3			

No.		Expected answer		Level of understanding	Cognitive level	Level of difficulty	Grade
	D	1; 2; 3; 6	1	factors of 6			
13.	A	\times	1	used the same operation as the one given			
	B	$- \checkmark$	4	correct response	R	M	6
	C	\div	1	incorrect operation sign due to incorrect calculation on the left of the equal sign			
	D	$+$	1	incorrect operation sign due to incorrect calculation on the left of the equal sign			
14.	A	3:13 \checkmark	4	correct response simplest form	R	M	7
	B	3:12	2	unable to identify the correct factors of 9 and 39			
	C	1: 4	1	unable to identify the correct factors of 9 and 39			
	D	1: 6	1	unable to identify the correct factors of 9 and 39			
15.	A	$2 \times 2 \times 3 \times 3 \checkmark$	4	correct response all prime factors	R	D	7
	B	$3 \times 3 \times 4$	2	4 is not a prime number			
	C	$2 \times 2 \times 9$	2	9 is not a prime number			
	D	$2 \times 3 \times 6$	2	6 is not a prime number			
16.	A	add 50 and then 25	3	incorrect addition			
	B	add 25 and then 50 \checkmark	4	correct response	R	E	6
	C	add 50	2	only found the common difference between the second and third number			
	D	add 25	2	only found the common difference between the first and second number			

No.		Expected answer		Level of understanding	Cognitive level	Level of difficulty	Grade
17.	A	160	1	did not subtract the 4 given the rule $8n - 4$			
	B	164	1	added the 4 given the rule $8n - 4$			
	C	158	1	calculation error			
	D	156 ✓	4	correct response applied the rule $8n - 4$	R	M	6
18.	A	6	1	counted the 4 sides and added two diagonals			
	B	4	1	assumed that the rectangle has the same number as a square			
	C	2✓	4	correct response	K	E	5
	D	1	1	gave one vertical line of symmetry			
19.	A	a rectangular-based pyramid ✓	4	correct response	K	M	6
	B	a rectangular prism	2	looked at the base of the pyramid			
	C	a cylinder	1	unable to identify properties of 3-D objects			
	D	a cone	2	confused the pyramid with the cone			
20.	A		1	unable to identify the appropriate net			
	B		3	confused a pyramid with a prism			
	C		1	unable to identify the appropriate net			

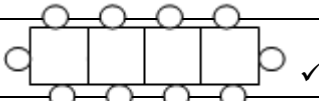
No.		Expected answer	Level of understanding		Cognitive level	Level of difficulty	Grade
	D		4	correct response correct net	K	M	6
21.	A	An obtuse angle	2	incorrect naming of angles			
	B	An acute angle ✓	4	correct response correct name	K	M	6
	C	A right angle	1	incorrect naming of angles			
	D	A reflex angle	2	incorrect naming of angles			
22.	A		1	unable to visualise and identify views			
	B		1	unable to visualise and identify views			
	C		2	displayed partial knowledge to identify views			
	D		4	correct response	K	M	6
23.	A	a 102 - minute film ✓	4	correct response between 9 and 120 minutes	R	E	4
	B	a 121 - minute film	3	incorrect conversion			
	C	a 150 - minute film	2	incorrect conversion			
	D	a 59 - minute film	1	incorrect conversion			
24.	A	25 glasses	2	divided by 10			
	B	10 glasses	2	divided by 25			
	C	4 glasses ✓	4	correct response first convert 1 l to 1 000 m l	R	E	5

No.		Expected answer		Level of understanding	Cognitive level	Level of difficulty	Grade
				then divide 1 000 m ℓ by 250 m ℓ			
	D	1 Glass	1	unable to convert			
25.	A	21 500	3	multiplied by ten instead of dividing			
	B	2 150	1	the number of years were given			
	C	21,5	2	confused decades with centuries			
	D	215 ✓	4	correct response divide 2 150 by 10	R	M	6
26.	A	250 mℓ	1	multiplied by ten			
	B	100 mℓ ✓	4	correct response 4 x 25 mℓ	R	M	6
	C	300 mℓ	1	read off the maximum volume			
	D	275 mℓ	1	subtracted 25 from the maximum volume			
27.	A	120 cubes✓	4	correct response 4 x 5 x 6 = 120 cubes	R	M	6
	B	24 cubes	2	counted the front blocks only			
	C	60 cubes	2	counted all the visible blocks			
	D	30 cubes	2	Counted the top blocks			
28.	A	5	1	counted the total number of 7	K	E	5
	B	6	2	confused mode and median			
	C	7 ✓	4	correct response the number that appears the most			
	D	8	1	chose the largest number			
29.	A	46 kg	2	counted number of items incorrectly			
	B	60 kg	1	chose the largest number			
	C	45 kg ✓	4	correct response the median	K	M	6
	D	39 kg	1	no knowledge of the meaning of median			
30.	A	More than half the students either take the bus or cycle to school. ✓	4	correct response	P	D	6

No.	Expected answer	Level of understanding	Cognitive level	Level of difficulty	Grade
	B More than a quarter of the students walk to school.	1 cannot read a pie chart			
	C More than half the students either walk or cycle.	1 cannot read a pie chart			
	D More students walk to school than come by car	1 cannot read a pie chart			

SECTION B: one mark per answer

- Accept any alternative correct solution that may not be included in the memorandum unless otherwise stated.
- Penalise only once for the same error where applicable.
- Ignore minor spelling errors.
- Accept answers that may be in any official language i.e. if it is a word.

No.	Expected answer	Clarification	Mark	Cognitive level	Level of difficulty	Grade
1.	1 370 ✓		1	R	E	4
2.	4 ✓		1	K	E	5
3.	14 ✓		1	R	M	6
4.	$(4 + 3) \times 7 - 10 = 39$ ✓		1	R	D	6
5.	15 ✓	$0 + 5 \times 3 = 15$	1	R	M	6
6.	976 521 ✓		1	K	E	5
7.	387 ✓		1	K	M	6
8.	625, 125, 25, 5, 1 ✓	Do not have to be in order.	1	K	D	7
9.	25 ✓	Rule $3 = 2 \times 1 + 1$ $5 = 2 \times 2 + 1$ $7 = 2 \times 3 + 1$ $19 = 2 \times 9 + 1$ $51 = 2 \times 25 + 1$	1	R	M	6
10.			1	R	M	4

No.		Expected answer	Clarification	Mark	Cognitive level	Level of difficulty	Grade
11.		20✓	1 – 49 :5 times 60 – 100:4 times 50 – 59:11 times	1	P	D	6
12.		18 Edges ✓		1	K	M	6
13.		Reflection or Flipping ✓		1	K	E	6
14.		A square ✓		1	K	M	6
15.		Hexagon ✓		1	K	E	4
16.		1 km ✓		1	K	E	4
17.		2°C ✓		1	K	E	5
18.	18.1	12 cm ✓		1	R	E	5
	18.2	8 squares✓		1	R	E	5
19.		4680 ✓	60 x 78	1	P	M	7
20.		22:10 ✓		1	K	M	6
21.	21.1	5 hours✓		1	R	M	6
	21.2	22:45 ✓	9h later	1	R	M	6
22.		Laetitia ✓		1	R	M	6
23.		4 out of 52 or ✓ 1 out of 13		1	C	D	6
24.		45 ✓		1	R	M	6
25.		4✓	50 – 30 – 11 – 5	1	P	D	6

SECTION C

Keys for marking	
A	Accuracy
CA	Consistent Accuracy
M	Method

- This is a marking guideline. In instances where learners have used different but mathematically sound strategies to solve the problems they (learners) should be credited.
- 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	Grade
1.	$\begin{array}{r} 6\ 254 \\ + 3\ 874 \\ \hline 10\ 128 \\ \checkmark\ \checkmark \end{array}$	Correct answer :2 marks 128 :1 mark 10 :1 mark Mark each one as a unit Any method may be used	2	R	M	4
2.	$\begin{array}{r} 69\ 157 \\ -17\ 239 \\ \hline 51\ 918 \\ \checkmark\ \checkmark \end{array}$	Correct answer :2 marks 918 :1 mark 51 :1 mark Mark each one as a unit Any method may be used	2	R	M	5
3.	$5\frac{1}{8} + 3\frac{3}{8}$ $= 8\frac{4}{8} \checkmark\checkmark \text{ or } 8\frac{1}{2}$	Correct answer: 2 marks 8: 1 mark $\frac{4}{8}$: 1 mark	2	R	E	5

No.	Expected answer	Clarification	Mark	Cognitive level	Level of difficulty	Grade
4.	$\begin{array}{r} 6907 \\ \times \quad 28 \\ \hline 55256 \checkmark \\ +138140 \checkmark \\ \hline 193396 \checkmark \end{array}$ <p>or</p> 6907×28 $= 6907 \times 7 \times 4 \checkmark$ $= 48349 \times 4 \checkmark$ $= 193396 \checkmark$ <p>or</p> 6907×28 $= 6907 \times 4 \times 7 \checkmark$ $= 27628 \times 7 \checkmark$ $= 193396 \checkmark$	<p>Example of CA:</p> $\begin{array}{r} 6907 \\ \times \quad 28 \\ \hline 55256 \checkmark \\ +138140 \checkmark \\ \hline 193396 \checkmark \end{array}$ $\begin{array}{r} 6907 \\ \times \quad 28 \\ \hline 55256 \checkmark \\ +138145 \times \\ \hline 193401 \checkmark \end{array}$ $\begin{array}{r} 6907 \\ \times \quad 28 \\ \hline 55156 \times \\ +138140 \checkmark \\ \hline 193296 \checkmark \end{array}$ $\begin{array}{r} 6907 \\ \times \quad 28 \\ \hline 55256 \checkmark \\ +138140 \checkmark \\ \hline 194296 \times \end{array}$	3	R	M	6
5.	$\begin{array}{r} \checkmark \checkmark \checkmark \\ 26 \overline{) 8775} \\ \underline{- 78} \\ 97 \\ \underline{- 78} \\ 195 \\ \underline{- 182} \\ 13 \end{array}$	<p>Correct answer: 3 marks 337: 1 mark rem13: 1 mark Method : 1 mark</p>	3	R	D	6
6.	$5\frac{11}{12} - 3\frac{5}{6}$ $= 2\frac{11}{12} - \frac{10}{12} \checkmark \checkmark$ $= 2\frac{1}{12} \checkmark$	<p>Correct answer: 3 marks 2: 1 mark $\frac{10}{12}$: 1 mark $2\frac{1}{12}$</p>	3	R	D	6

7.		Profit = $\frac{30}{100} \checkmark \times \text{R}120\,000$ = 30 x R1200 \checkmark or 3 x R12 000 = R36 000 \checkmark	1 hundredth of R120 000 = R1 200; 30 hundredths (or 30%) is R36 000	3	R	M	7
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GRADE 9 MATHEMATICS ENGLISH

DIAGNOSTICS QUESTIONS & MEMO



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

DIAGNOSTIC TEST ITEMS MATHEMATICS: ENGLISH GRADE 9

Note to the teacher

1. The test is designed as a diagnostic assessment tool.
2. Study the teacher guideline provided before you administer/select questions.
3. Administer the questions according to the sections/difficulty/topics/content area/cognitive levels or grade(s).
4. You may further break down the questions from the different sections/learning area content/difficulty/cognitive levels or grade(s).
5. The selection of questions will depend on the purpose of the assessment. E.g.
 - You may want to check whether the Grade 9 learners in your class are competent in certain Grade 7 and 8 topics. Hence you will select all the Grade 7 and 8 questions of the chosen content area from the different sections.
 - This may form a baseline assessment which can be administered at the beginning of the year.
 - You can then plan your lessons for your Grade 9 learners based on your diagnostic analysis of the baseline assessment.
 - In a similar manner you can select questions according to the different topics in the CAPS and the purpose of your assessment.
6. Where necessary answers should be rounded off to **two** decimal places, unless otherwise stated.

Please note the following keys:

	Content Area	Levels of difficulty	Cognitive levels
NOR	Numbers, Operations and Relationships	E: easy	K: knowledge
PFA	Patterns, Functions and Algebra	M: moderate	R: routine procedure
SS	Space and Shape (Geometry)	D: difficult	C: complex procedure
M	Measurement		P: problem solving
DH	Data Handling		
G (9)	Grade 9		

Please note that the tag above each question, as shown below, provides the following information in this order: content area, topic, grade level of the question, cognitive level and difficulty level e.g.:

Content area	Topic	Grade 7	Cognitive level	Level of difficulty
NOR	Common fractions	G7	R	E

Hereafter it is written in the format: **NOR/common fractions/G7/R/E** above each question.

SECTION A

Circle the letter next to the correct answer from question 1 to question 50.

NOR/common fractions/G7/R/E

31. What is $\frac{3}{10} + \frac{5}{8}$ equal to?

- A $\frac{8}{18}$
- B $\frac{37}{40}$
- C $\frac{8}{40}$
- D $\frac{15}{80}$

(1)

NOR/decimal fractions/G8/K/E

32. Write the value of $\sqrt[3]{0,008}$.

- A 0,024
- B 0,002
- C 0,24
- D 0,2

(1)

NOR/whole numbers/G8/R/E

33. Decrease R126,00 in the ratio 3 : 7.

- A R37,80
- B R12,60
- C R294
- D R54

(1)

NOR/common fractions/G9/R/M

34. Calculate: $\frac{3}{5} - \frac{1}{2} \times \frac{1}{3}$.

- A $\frac{13}{2}$
- B $\frac{30}{2}$
- C $\frac{30}{1}$
- D $\frac{10}{2}$

(1)

NOR/common fractions/G9/R/M

35. Calculate $\sqrt{\frac{9}{16}} \div \sqrt{\frac{1}{4}}$.

- A $\frac{9}{4}$
- B $\frac{4}{3}$
- C $\frac{2}{2}$
- D $\frac{3}{3}$

(1)

NOR/exponents/G9/K/E

36. What is the product of 3^3 and 3^{-1} ?

- A 3^{-3}
- B 9^{-3}
- C 3^2
- D 9^2

(1)

NOR/decimal fractions/G9/K/E

37. What kind of number is $-0.\dot{2}$?

- A A natural number.
- B An irrational number.
- C A rational number.
- D An integer.

(1)

NOR/exponents/G9/K/E

38. Write 0,00578 in scientific notation.

A $57,8 \times 10^{-3}$

B $5,78 \times 10^{-3}$

C $5,78 \times 10^{-4}$

D $5,78 \times 10^3$

(1)

NOR/whole numbers/G10/R/M

39. Complete: $\sqrt{\sqrt{400} + \sqrt{100} + 6} = \dots$

A 506

B 416

C 256

D 6

(1)

NOR/common fractions/G7/K/E

40. Write $\frac{2}{5}$ as a percentage.

A 20 %

B 40 %

C 50 %

D 70 %

(1)

NOR/whole numbers/G7/R/M

41. A cell phone which cost R1 200 is sold at a loss of 20 %.

Calculate the selling price of the cell phone.

A R60

B R240

C R960

D R1440

(1)

NOR/whole numbers/G8/C/M

42. Mary bought a dress for R395,00 and sold it for R250,00. Calculate the percentage loss correct to one decimal place.

- A 169,3 %
- B 145,0 %
- C 36,7 %
- D 58 %

(1)

NOR/whole numbers/G7/R/E

43. Janet travelled a total distance of 540 km by car at an average speed of 120 km/h. How long did she travel?

- A 13,3 hours
- B 11 hours
- C 7 hours
- D 4,5 hours

(1)

NOR/whole numbers/G8/C/M

44. If it takes 4 hours to travel 380 km, how long will it take to travel 570 km at the same average speed?

- A 1,5 hours
- B 2,4 hours
- C 2,7 hours
- D 6 hours

(1)

NOR/whole numbers/G9/C/M

45. A bus driver covers a certain distance in 3 hours at an average speed of 80 km/h. How long will it take to cover the same distance if the average speed is 50 km/h?

- A 0,2 hours
- B 0,6 hours
- C 1,9 hours
- D 4,8 hours

(1)

NOR/whole numbers/G8/R/M

46. Calculate the interest earned on an investment of R3 200 at 12,5 % simple interest after 3 years.

A R40 000
B R9 600
C R1 200
D R400

(1)

NOR/whole numbers/G8/R/E

47. What will R4 500,00 amount to if it is invested for 4 years at 13 % per annum simple interest?

A R6 840,00
B R5 085,00
C R4 499,48
D R2 340,00

(1)

NOR/whole numbers/G9/C/M

48. Calculate how long it will take for an investment of R4 000 at 3 % per annum simple interest to earn an interest of R840.

A 14,3 years
B 7 years
C 63 years
D 1,59 years

(1)

NOR/whole numbers/G9/R/M

49. Calculate the final amount in my savings account if I invest R600 for 2 years at a rate of 6 % per annum compound interest.

A R72,00
B R530,16
C R674,16
D R1 272,00

(1)

PFA/algebraic equations/G8/R/E

50. Calculate the value of x if $2(3 - x) = 8$.

- A -7
- B -3
- C -2
- D -1

(1)

PFA/algebraic expressions/G7/K/E

51. Complete: In the expression $2x - 4$ the variable and constant are respectively: ...

- A 2 and -4
- B x and -4
- C x and 4
- D 2 and 4

(1)

PFA/numeric patterns/G7/R/M

52. Complete: The rule for the sequence 4 ; 7 ; 10 ; 13 is ...

- A $3n - 1$, where n is the position of the term.
- B $n + 3$, where n is the position of the term.
- C add three to the previous term.
- D $3n + 3$, where n is the position of the term.

(1)

PFA/exponents/G8/K/E

53. Complete: $(a + b)^0 = \dots$

- A $a + b$
- B 2
- C 1
- D 0

(1)

PFA/functions and relationships/G8/R/M

54. What is the relationship between x and y in the table below?

x	1	2	3	4
y	1	5	9	13

- A $y = 4x - 3$
 B $y = 3x - 2$
 C $y = 2x - 1$
 D $y = x + 4$

(1)

PFA/algebraic expressions/G7/R/E

55. Complete: If $x = 3$ the value of y in the equation $y = 4x - 3$ is ...

- A 40
 B 9
 C 4
 D 0

(1)

PFA/algebraic expressions/G8/K/E

56. What is the coefficient of c in the expression

$$7a + 6b - c?$$

- A 4
 B 3
 C 2
 D 1

(1)

PFA/algebraic equations/G8/R/M

57. Write the algebraic expression which matches the statement:
The sum of half a number and another number.

- A $\frac{1}{2}(x + y)$
B $\frac{1}{2}x + y$
C $\frac{1}{2} + x$
D $\frac{1}{2}x + y$

(1)

PFA/algebraic equations/G9/R/M

58. Complete: The values of x in the equation $(x + 1)(2x - 1) = 0$ are ...

- A -1 or $-\frac{1}{2}$
B -1 or $\frac{1}{2}$
C 1 or 2
D 1 or $\frac{1}{2}$

(1)

PFA/algebraic equations/G9/R/M

59. What is the value of x if $3^x = \frac{1}{9}$?

- A -3
B -2
C 2
D 3

(1)

PFA/algebraic expressions/G9/C/M

60. Complete: $\frac{x}{y} - 1 = \dots$

- A $x - y$
B $\frac{y-x}{y}$
C $\frac{y}{x-y}$
D $\frac{y}{x-1}$

(1)

PFA/algebraic equations/G9/C/M

61. Complete: If $x = 3$ in the equation $x^2 + x + t = 0$, then the value of t is ...

A -12
B -9
C 12
D 9

(1)

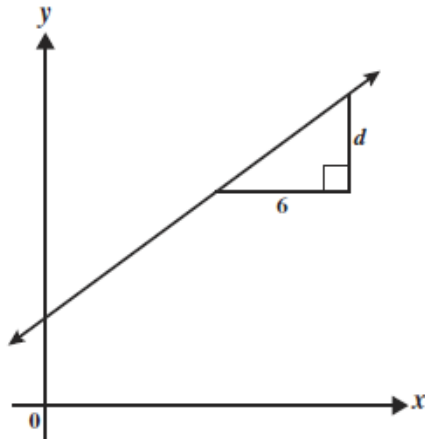
PFA/graphs/G9/R/M

62. What is the y -intercept of the graph defined by $4x + 2y = 12$?

A -6
B 12
C 6
D 3

(1)

63.



The gradient of the line shown above is $\frac{2}{3}$. What is the value of d ?

- A 9
- B 4
- C 2
- D $\frac{1}{9}$

(1)

SS/geometry of 2-D shapes/G7/K/E

64. Complete: A ... is a quadrilateral where each vertex angle is a right angle.

- A rectangle
- B trapezium
- C rhombus
- D kite

(1)

SS/geometry of 2-D shapes/G7/K/E

65. Complete: The line segment that divides a circle into 2 equal parts is called a ...

- A circumference.
- B diameter.
- C radius.
- D chord.

(1)

SS/geometry of 3-D objects/G8/K/M

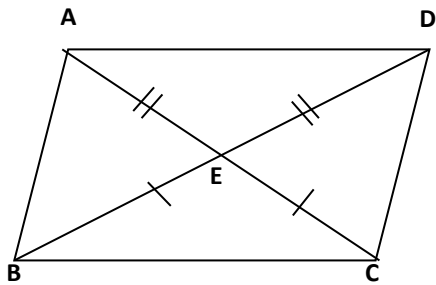
66. A platonic solid with 8 faces is called ...

- A a dodecahedron.
- B an octahedron.
- C a hexahedron.
- D a tetrahedron.

(1)

SS/geometry of 2-D shapes/G9/R/M

67. Complete: In quadrilateral $ABCD$, $AE = ED$ and $BE = EC$, therefore ...



- A $\triangle AEB \parallel \triangle CED$.
- B $\triangle AED \parallel \triangle BEC$.
- C $\triangle AEB \cong \triangle DEC$.
- D $\triangle AED \cong \triangle BEC$.

(1)

SS/geometry of 3-D objects/G9/K/M

68. What is the size of each interior angle in a regular hexagon?

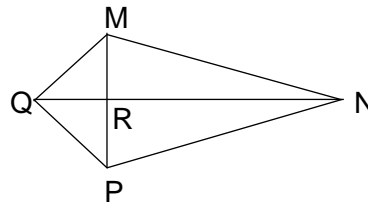
- A 120°
- B 108°
- C 100°
- D 90°

(1)

SS/geometry of 2-D shapes/G9/C/M

69. Complete: In kite $MNPQ$, $MQ = PQ$, $MN = PN$ and $\widehat{MQP} = 30^\circ$,

means $\widehat{QMR} = \dots$



- A 90°
- B 75°
- C 30°
- D 15°

(1)

SS/geometry of 3-D objects/G8/K/E

70. Complete:

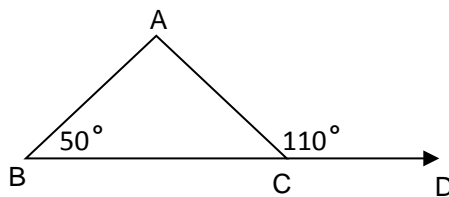
A 3-D object which ONLY has all faces of a square is called a ...

- A cylinder
- B pyramid
- C sphere
- D cube

(1)

SS/geometry of straight lines/G8/C/E

71. In the figure below, $\widehat{B} = 50^\circ$ and $\widehat{ACD} = 110^\circ$.



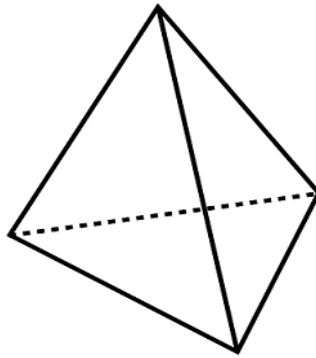
Complete: The size of \widehat{A} is ...

- A 160°
- B 110°
- C 80°
- D 60°

(1)

SS/geometry of 3-D objects/G7/K/E

72. Identify the 3-D object shown in the diagram.



- A A rectangular prism
- B A triangular prism
- C A pyramid
- D A cube

(1)

SS/geometry of 3-D objects/G7/K/E

73. Complete: A hexagonal prism has ... edges.

- A 6
- B 8
- C 12
- D 18

(1)

SS/transformation geometry/G9/R/M

74. Point $B(-2; 3)$ is translated 3 units to the right and 4 units down.

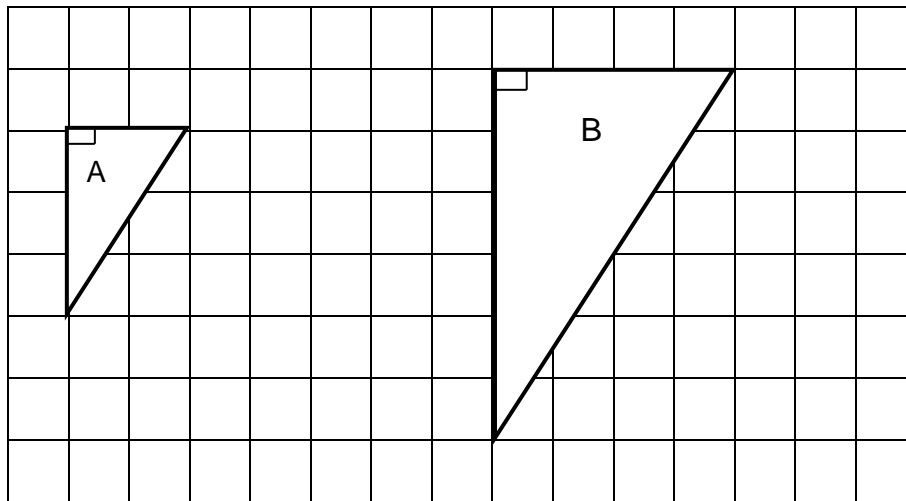
Complete: The co-ordinates of its image B' are ...

- A $B'(-2; -3)$
- B $B'(1; -1)$
- C $B'(-5; 7)$
- D $B'(2; 3)$

(1)

SS/transformation geometry/G7/K/E

75. Complete: The transformation of figure A to figure B is called ...



- A a reflection.
- B a reduction.
- C an enlargement.
- D a rotation.

(1)

DH/analyse data/G7/R/M

76. Calculate the mean of the following test scores.

11 12 12 12 13 15 17 18 25

- A 14
- B 13
- C 15
- D 12

(1)

DH/analyse data/G8/K/M

77. Calculate the median of the following test scores.

18 11 12 13 15 17 12 25 12

- A 14
- B 13
- C 15
- D 12

(1)

DH/probability/G7/R/E

78. What is the probability of drawing a red ACE from a pack of 52 playing cards?

A $\frac{13}{52} = \frac{1}{4}$
B $\frac{2}{52} = \frac{1}{26}$
C $\frac{4}{52} = \frac{1}{13}$
D $\frac{26}{52} = \frac{1}{2}$

(1)

DH/probability/G8/K/M

79. Determine the probability of getting an odd square number when throwing a dice once.

A $\frac{2}{6} = \frac{1}{3}$
B $\frac{1}{6}$
C $\frac{3}{6} = \frac{1}{2}$
D $\frac{1}{6}$

(1)

DH/probability/G9/P/M

80. There are 4 kings in a pack of 52 playing cards A king is taken out of a deck of playing cards and is not replaced before taking out another card. What is the probability of drawing another king?

A $\frac{3}{51}$
B $\frac{4}{52}$
C $\frac{3}{52}$
D $\frac{4}{51}$

(1)

SECTION B

NOR/common fractions/G7/K/E

1. Write the ratio $\frac{4}{13} : \frac{7}{13}$ in the simplest form. (1)

NOR/whole numbers/G7/R/E

2. Two numbers are given in factorised form as follows:
 $2 \times 2 \times 3 \times 5 \times 7$ and $2 \times 3 \times 7 \times 7$. What is the HCF of the two numbers? (1)

NOR/exponents/G8/K/E

3. Write 7 530 000 in scientific notation. (1)

NOR/common fractions/G8/R/E

4. Complete: $0,01 \times 10^2 \times \frac{1}{3} = \dots$ (1)

NOR/whole numbers/G7/R/E

5. Complete : The HCF of 24 and 32 is ... (1)

NOR/whole numbers/G7/R/E

6. Simplify the ratio R250: R150: R100. (1)

NOR/whole numbers/G9/R/M

7. What is 100 % of a mass if 35 % of the mass is 140 g? (1)

NOR/common fractions/G8/C/M

8. Calculate $8 \left(\frac{1}{8} - \sqrt{\frac{1}{16}} \right)$ (1)

NOR/exponents/G9/R/E

9. Write $6,7 \times 10^{-3}$ in the standard form. (1)

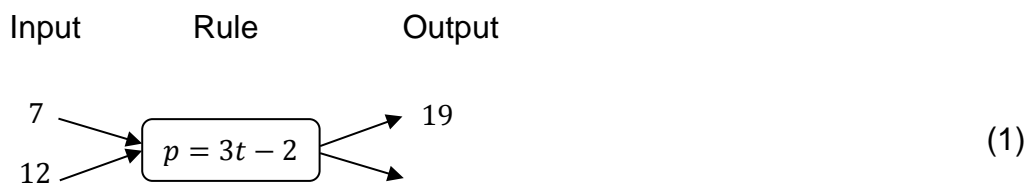
NOR/whole numbers/G9/K/E

10. Which one of the given numbers is irrational?
 $\sqrt{25}$; $\sqrt{5}$; 3,15 ; $\frac{2}{3}$ (1)

NOR/exponents/G10/R/M

11. Complete: $\left(6^{2/3} \right)^3 = \dots$ (1)

12. Complete the flow diagram by using the given rule.



PFA/algebraic equations/G7/R/E

13. Solve the following equation by inspection: $7x = 91$ (1)

PFA/algebraic expressions/G7/R/E

14. Calculate the value of $a + 12$, if $a = 13$. (1)

PFA/algebraic expressions/G8/K/E

15. Write down the coefficient of x in the expression $-6x + 4$. (1)

PFA/algebraic expressions/G8/K/E

16. Complete: $2x^2 + 3x^2 = \dots$ (1)

PFA/algebraic expressions/G8/C/M

17. Complete: $(7x)^2 + 11x^2 = \dots$ (1)

PFA/exponents/G8/K/E

18. Complete: $x^3 \times x^2 = \dots$ (1)

PFA/exponents/G9/K/M

19. Complete: $4^x \times 4^x = \dots$ (1)

PFA/numeric patterns/G8/R/E

20. Complete the following number sequence.
1 ; -3 ; 9 ; -27 ; ____ . (1)

PFA/graphs/G8/K/E

21. State whether the following statement is true or false.
The point A(-1; -2) lies in the 3rd quadrant. (1)

PFA/numeric patterns/G7/R/M

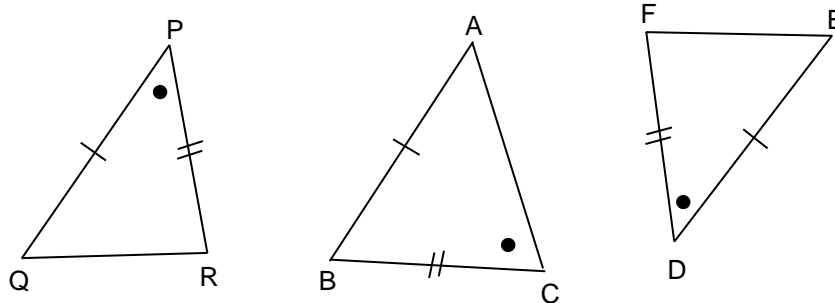
22. Complete the following number sequence.
3 ; 9 ; 27 ; 81 ; ____ . (1)

SS/geometry of 2-D shapes/G8/K/E

23. Complete: The sum of the interior angles of a triangle is equal to ... (1)

SS/geometry of 2-D shapes/G7/K/M

24.



- Complete: The triangle which is congruent to $\triangle PQR$ is ... (1)

SS/geometry of 2-D shapes/G8/K/E

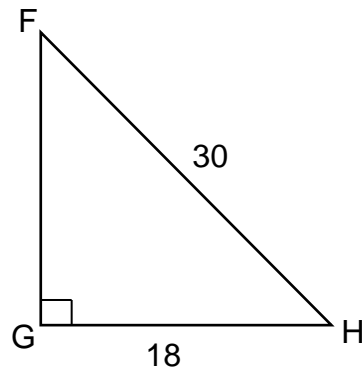
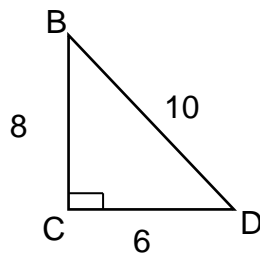
25. Complete: In $\triangle ABC$, $AB = AC$ means that $\hat{B} = \dots$ (1)

SS/geometry of 2-D shapes/G8/R/E

26. Complete: In $\triangle ABC$, $\hat{A} = 40^\circ$ and $\hat{C} = 30^\circ$ means that $\hat{B} = \dots$ (1)

SS/geometry of 2-D shapes/G9/R/M

27. In $\triangle BCD$ and $\triangle FGH$, $BC = 8$ cm, $CD = 6$ cm, $BD = 10$ cm, $GH = 18$ cm and $FH = 30$ cm.



- Are the triangles congruent or similar? (1)

M/area and perimeter of 2-D shapes/G7/R/E

28. What is the area of a rectangle if the length = 17 cm and the breadth = 12 cm? (1)

M/area and perimeter of 2-D shapes/G9/K/E

29. The length of the sides of a square is doubled. Write down the value of k if the perimeter of the enlarged square $= k \times$ the perimeter of the original square. (1)

DH/probability/G8/K/E

30. A box contains 3 blue, 4 white and 5 green marbles of the same size. What is the probability that one randomly can take out a green marble? (1)

SECTION C

Show all the calculation steps.

NOR/whole numbers/G8/C/M

1. Calculate without using a calculator. Show the calculation steps.
 $-4^3 \div \sqrt{64}$ (3)

NOR/exponents/G9/R/M

2. Calculate without using a calculator. Show your calculation steps.
$$\frac{2 \times 3^2 \times 5^4}{5^3 \times 8^0}$$
 (3)

NOR/exponents/G10/R/E

3. Calculate $3^{\frac{1}{2}} \times 3^{\frac{1}{2}} \times 3^0$. (2)

PFA/algebraic expressions/G10/R/M

4. Calculate the product of $2x - 1$ and $x^2 + 2x - 3$. (3)

PFA/algebraic expressions/G9/R/M

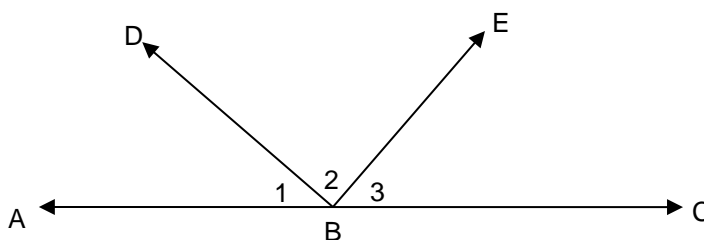
5. Factorise fully:
- 5.1 $10t^2 - 5t$ (2)
- 5.2 $81 - 100a^2$ (2)
- 5.3 $x^2 + 5x + 6$ (2)

PFA/graphs/G9/R/M

6. On the same set of axes, draw and label the graphs defined by $y = -\frac{2}{3}x + 1$ and $y = \frac{3}{2}x - 1$. Clearly mark the points where each graph cuts the X-axis and the Y-axis. (7)

SS/geometry of straight lines/G8/R/E

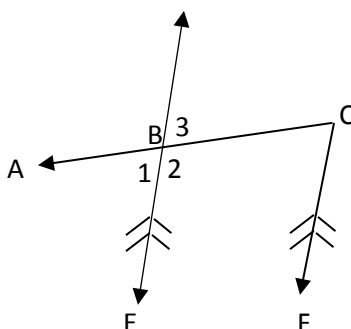
7. In the diagram below, ABC is a straight line, $\hat{B}_2 = 75^\circ$ and $\hat{B}_3 = 55^\circ$.



Determine, with reasons, the size of \hat{B}_1 . (3)

SS/geometry of straight lines/G8/K/E

8. In the figure, $\hat{B}_3 = 35^\circ$ and $BE \parallel CF$.



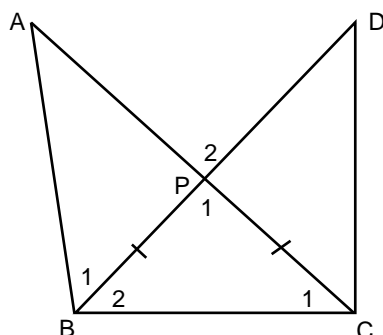
Calculate, with reasons, the size of:

8.1 \hat{B}_1 (2)

8.2 \hat{C} (2)

SS/geometry of 2D shapes/G9/C/M

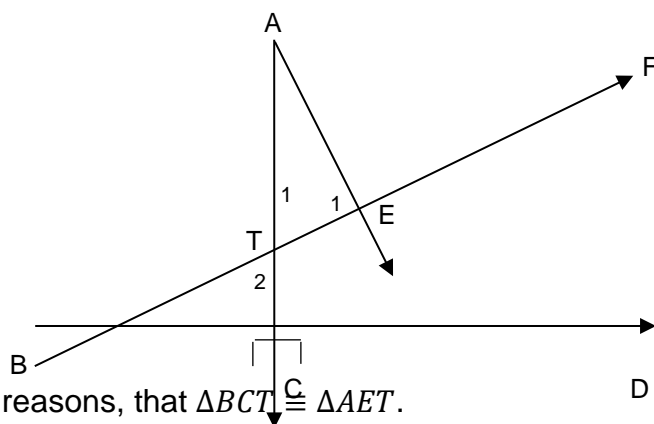
9. In the figure, $BP = PC$ and $\hat{P}_2 = 80^\circ$.



Calculate, with reasons, the size of \hat{B}_2 . (6)

SS/geometry of 2D shapes/G9/P/M

10. In the figure below, $AE \perp BTF$, $ATC \perp BD$ and $BC = AE$.

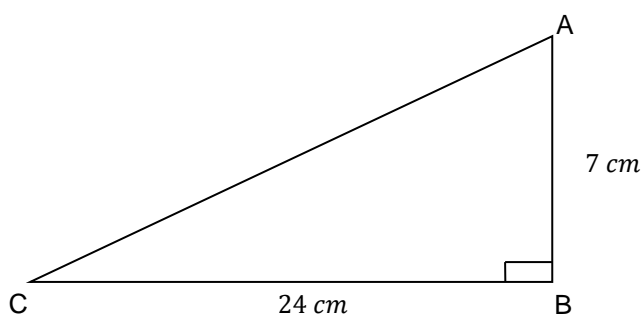


Prove, with reasons, that $\triangle BCT \cong \triangle AET$.

(5)

M/Theorem of Pythagoras/G8/R/M

11. In $\triangle ABC$, $\hat{B} = 90^\circ$, $AB = 7$ cm and $BC = 24$ cm.



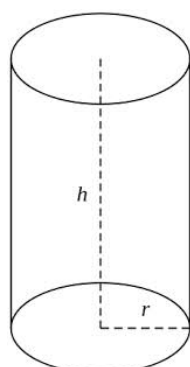
Calculate the length of AC .

(3)

M/surface area and volume of 3D objects/G9/R/M

12. A solid cylinder has a base with the radius = 7 cm, the height = 16 cm

and $\pi = \frac{22}{7}$.



Calculate the surface area of the cylinder.

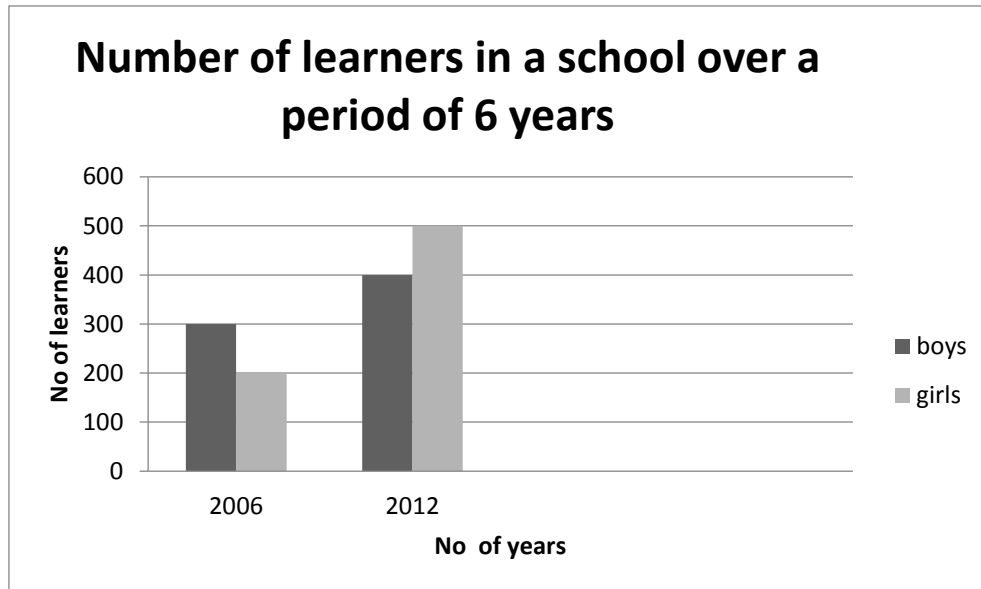
(4)

M/surface area and volume of 3D objects/G9/R/M

13. The volume of a rectangular tank is 7000 m^3 , the length = 25 m and the breadth = 80 m. Calculate the height. (3)

DH/interpretation/G7/K/E

14. Study the following graph.



- 14.1 What was the total number of learners in 2006? (1)
- 14.2 What was the increase in the number of girls from 2006 to 2012? (1)
- 14.3 What was the difference between the number of boys and girls in 2012? (1)

DH/interpretation/G7/R/E

15. The stem-and-leaf display below represents ages, in years, of a group of teachers.

Stem	Leaves							
2	5	8						
3	4	5	5	5				
4	0	0	2	7	9			
5	0	0	0	0	5	5	8	

- 15.1 Determine the average age of the teachers. (3)
- 15.2 What is the mode of the ages of the teachers? (1)
- 15.3 Determine the median of the ages of the teachers. (2)



**DIAGNOSTIC TEST ITEMS: MARKING GUIDELINE
MATHEMATICS: ENGLISH
GRADE 9**

This marking guideline consists 15 pages.

Sections	Levels of difficulty	Cognitive levels
A: multiple-choice questions	E: easy	K: knowledge
B: short answer questions	M: moderate	R: routine procedure
C: multiple step questions	D: difficult	C: complex procedure
		P: problem solving

Levels of understanding
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.

SECTION A

One mark per answer.

No.	Expected answer	Level of understanding or error analysis	Cognitive level	Level of difficulty	Grade
12.	A $\frac{8}{18}$	1 Added numerators and denominators together.	R	E	7
	B $\frac{37}{40}$ ✓	4 Correct response: $\frac{3}{10} \times \frac{4}{4} + \frac{5}{8} \times \frac{5}{5} = \frac{12}{40} + \frac{25}{40} = \frac{37}{40}$			
	C $\frac{8}{40}$	2 Correct LCM but added numerators.			
	D $\frac{15}{80}$	1 Multiplied 3 by 5 and 10 by 8			
13.	A 0,024	1 Multiplied 0,008 by 3	K	E	8
	B 0,002	2 $\sqrt[3]{8} = 2, \therefore \sqrt[3]{0,008} = 0,002$			
	C 0,24	1 $8 \times 3 = 24$ an incorrect place value.			

No.		Expected answer		Level of understanding or error analysis	Cognitive level	Level of difficulty	Grade
	D	0,2 ✓	4	Correct response: $\sqrt[3]{\frac{8}{1000}} = \frac{2}{10} = 0,2$			
14.	A	R37,80	1	Added 3 and 7 and decreased by 3: 10	R	E	8
	B	R12,60	1	Added 3 and 7 and divided R126,00 by 10			
	C	R294	2	Increased in the ratio 7: 3			
	D	R54 ✓	4	Correct response: $126 \times \frac{3}{7}$			
15.	A	$\frac{13}{30}$ ✓	4	Correct response: $\frac{3}{5} - \frac{1}{2} \times \frac{1}{3} = \frac{3}{5} - \frac{1}{6} = \frac{18-5}{30}$	R	M	9
	B	$\frac{2}{30}$	1	$\frac{3-1 \times 1}{5 \times 2 \times 3} = \frac{2}{30}$			
	C	$\frac{1}{10}$	1	$\frac{3}{5} - \frac{1}{2} \times \frac{1}{3} = \frac{3}{5} - \frac{1}{2} \times \frac{1}{1} = \frac{1 \times 1}{5 \times 2} = \frac{1}{10}$			
	D	$\frac{2}{9}$	1	$\frac{3-1}{5-2 \times 3} \neq \frac{2}{3 \times 3} = \frac{2}{9}$			
16.	A	$\frac{9}{4}$	1	Ignored the square root sign	R	M	9
	B	$\frac{3}{2}$ ✓	4	Correct response: $\frac{3}{4} \div \frac{1}{2} = \frac{3}{4} \times \frac{2}{1} = \frac{3}{2}$			
	C	$\frac{2}{3}$	2	$\frac{1}{2} \div \frac{3}{4} = \frac{1}{2} \times \frac{4}{3} = \frac{2}{3}$			
	D	$\frac{3}{8}$	3	$\frac{3}{4} \div \frac{1}{2} = \frac{3}{4} \times \frac{1}{2} = \frac{3}{8}$			
17.	A	3^{-3}	1	Multiplied the exponents	K	E	9
	B	9^{-3}	1	Multiplied the bases and exponents			
	C	3^2 ✓	4	Correct response: $5^{6+(-2)}$			
	D	9^2	2	Multiplied the bases			
18.	A	A natural number	1	No understanding	K	E	9
	B	An irrational number					
	C	A rational number ✓	4	Correct response			
	D	An integer	2	Negative led to incorrect answer			
19.	A	$57,8 \times 10^{-3}$	1	Not 1 digit before decimal comma and incorrect exponent	K	E	9

No.		Expected answer		Level of understanding or error analysis	Cognitive level	Level of difficulty	Grade
	B	$5,78 \times 10^{-3}$ ✓	4	Correct response: $\frac{578}{100000} = \frac{578}{10^5} = 5,78 \times 100 \times 10^{-5} = 5,78 \times 10^2 \times 10^{-5}$			
	C	$5,78 \times 10^{-4}$	2	Exponent incorrect			
	D	$5,78 \times 10^3$	2	Incorrect sign of exponent			
20.	A	506	1	Added 400, 100 and 6	R	M	10
	B	416	2	Added 400, 10 and 6			
	C	256	1	Added 200, 50 and 6			
	D	6 ✓	4	Correct response: $\sqrt{20 + 10 + 6} = \sqrt{36} = 6$			
21.	A	20 %	1	Used the numerator 2	K	E	7
	B	40 % ✓	4	Correct response: $\frac{2}{5} \times 100$			
	C	50 %	1	Used the denominator 5			
	D	70 %	1	Used the sum of numerator and denominator			
22.	A	R60	1	Divided R1 200 by 20	R	M	7
	B	R240	2	Calculated 20 % of R1 200			
	C	R960 ✓	4	Correct response: $\frac{80}{100} \times 1200$			
	D	R1440	2	Calculated the profit instead of loss			
23.	A	169,3 %	1	Calculated the profit instead of loss	C	M	8
	B	145,0 %	2	Calculated the difference			
	C	36,7 % ✓	4	Correct response: $\frac{395-250}{395} \times 100$			
	D	58 %	1	$\frac{145}{250} \times 100$			
24.	A	13,3 hours	1	Calculated: $\frac{120 \times 60}{540}$	R	E	7
	B	11 hours	1	Calculated: $\frac{540+120}{60}$			
	C	7 hours	1	Calculated: $\frac{540-120}{60}$			
	D	4,5 hours ✓	4	Correct response: $\frac{540}{120}$			
25.	A	1,5 hours	1	Divided 570 by 380	C	M	8

No.		Expected answer		Level of understanding or error analysis	Cognitive level	Level of difficulty	Grade
	B	2,4 hours	1	Calculated: $\frac{570}{4 \times 60}$			
	C	2,7 hours	2	Calculated: $\frac{380 \times 4}{570}$			
	D	6 hours ✓	4	Correct response: $570 \div \frac{380}{4}$			
26.	A	0,2 hours	1	Calculated: $50 \div 240$	C	M	9
	B	0,6 hours	1	Calculated: $50 \div 80$			
	C	1,9 hours	3	Calculated: $(3 \times 50) \div 80$			
	D	4,8 hours ✓	4	Correct response: $\frac{3 \times 80}{5}$			
27.	A	R 40 000	1	Calculated: $R3\ 200 \times 12,5$	R	M	8
	B	R 9 600	3	Calculated: $R3\ 200 \times 3$			
	C	R 1 200 ✓	4	Correct response: $\frac{12,5 \times 3200 \times 3}{100}$			
	D	R 400	1	Calculated: $R3\ 200 \times 12,5\%$			
28.	A	R 6 840,00 ✓	4	Correct response: $4500 + \frac{13}{100} \times 4500 \times 4$	R	E	8
	B	R 5 085,00	3	$\frac{13}{100} \times 4\ 500 + 4\ 500$			
	C	R 4 499,48	2	Used incorrect formula $A = P(1 - ni)$			
	D	R 2 340	3	Calculated interest only and did not add R4 500			
29.	A	14,3 years	1	Used: $\frac{4000 \times 3}{840}$	C	M	9
	B	7 years ✓	4	Correct response: $840 = \frac{4000 \times n \times 3}{100}$			
	C	63 years	2	Used: $\frac{840 \times 3}{4000} \times 100$			
	D	1,59 years	1	Used: $\frac{4\ 000}{840 \times 3}$			
30.	A	R 72,00	1	Used $A = \frac{Pnr}{100}$	R	M	9
	B	R 672,00	2	Added R600 to an incorrect formula, $A = \frac{Pnr}{100}$			
	C	R 674,16 ✓	4	Correct response: $A = 600(1 + 0,06)^2$			

No.		Expected answer		Level of understanding or error analysis	Cognitive level	Level of difficulty	Grade
	D	R 1 272,00	2	Used incorrect formula: $A = 600 \times 2(1 + 0,06)$			
31.	A	-2	1	Multiplied 2 by 3 only: $6 - x = 8 \Rightarrow x = -2$	R	E	8
	B	-3	2	2 + 3 instead of 2×3 : $5 - x = 8 \Rightarrow x = -3$			
	C	-7	2	$6x - 2x = 8 \Rightarrow -2x = 8 + 6$ $\Rightarrow x = -7$			
	D	-1 ✓	4	Correct response $6 - 2x = 8 \Rightarrow$ $-2x = 8 - 6 \Rightarrow -2x = 2$ $\Rightarrow x = -1$			
32.	A	2 and -4	2	Identified the variable incorrectly	K	E	7
	B	x and -4 ✓	4	Correct response			
	C	x and 4	2	Identified the constant incorrectly			
	D	2 and 4	1	Lacks basic knowledge			
33.	A	$3n - 1$, where n is the position of the term.	3	Subtracted 1 instead of adding 1	R	M	7
	B	$n + 3$, where n is the position of the term.	2	The rule must apply for all terms not just the first term			
	C	add three to the previous term. ✓	4	Correct response			
	D	$3n + 3$, where n is the position of the term.	1	Added 3 instead of adding 1			
34.	A	$a + b$	1	Handled 'to the power of zero' the same as 'to the power of 1'	K	E	8
	B	2	3	$a^0 + b^0 = 1 + 1 = 2$			
	C	1 ✓	4	Correct response			
	D	0	1	$(a + b) \times 0 = 0$			
35.	A	$y = x + 4$	2	Learner identified the constant difference as 4 but added x	R	M	8
	B	$y = 3x - 2$	3	Lacks understanding that a pattern must be true for all values			
	C	$y = 4x - 3$ ✓	4	Correct response			

No.		Expected answer		Level of understanding or error analysis	Cognitive level	Level of difficulty	Grade
	D	$y = 2x - 1$	1	Lacks understanding that a pattern must be true for all values			
36.	A	40	1	$x = 3 \Rightarrow 4x = 43$ ($y = 43 - 3$)	R	E	7
	B	9 ✓	4	Correct response $y = 4(3) - 3 = 9$			
	C	4	1	$4x = 4 + 3$ ($y = 4 + 3 - 3$)			
	D	0	1	$y = 4(3 - 3) = 0$			
37.	A	0	1	Does not know the meaning of coefficient.	K	E	8
	B	-1 ✓	4	Correct response			
	C	1	3	Incorrect sign			
	D	7	1	Does not know the meaning of coefficient.			
38.	A	$\frac{1}{2}(x + y)$	3	Misread and wrote half the sum of 2 numbers	R	M	8
	B	$\frac{1}{2}xy$	1	Wrote half the product			
	C	$\frac{1}{2} + x$	2	Wrote the sum of half and a number.			
	D	$\frac{1}{2}x + y$ ✓	4	Correct response			
39.	A	-1 or $-\frac{1}{2}$	3	$2x - 1 = 0 \Rightarrow x = -\frac{1}{2}$	R	M	9
	B	-1 or $\frac{1}{2}$ ✓	4	Correct response $x + 1 = 0$ or $2x - 1 = 0$			
	C	1 or 2	1	Calculated both values incorrectly			
	D	1 or $\frac{1}{2}$	3	$x + 1 = 0 \Rightarrow x = 1$			
40.	A	-3	1	$\frac{1}{9} \neq 3^{-3}$	R	M	9
	B	-2 ✓	4	Correct response $3^x = 3^{-2} \Rightarrow x = -2$			
	C	2	2	Incorrectly calculated 3^2			
	D	3	1	Multiplication by 3 is not the same as raising to the power of 3. ($\frac{1}{9} \neq 3^3$)			
41.	A	$x - y$	1	Learner multiplied the expression by the LCM	C	M	9

No.	Expected answer	Level of understanding or error analysis		Cognitive level	Level of difficulty	Grade
	B $\frac{y-x}{y}$	3	Used the commutative property incorrectly			
	C $\frac{x-y}{y}$ ✓	4	Correct response $\frac{x}{y} - \frac{y}{y} = \frac{x-y}{y}$			
	D $\frac{x-1}{y}$	1	Doesn't understand subtraction of fractions			
42.	A -12 ✓	4	Correct response $9 + 3 + t = 0 \Rightarrow t = -12$	C	M	9
	B -9	2	$6 + 3 + t = 0 \Rightarrow t = -9$			
	C 12	3	$9 + 3 + t = 0 \Rightarrow t = 12$			
	D 9	1	$6 + 3 + t = 0 \Rightarrow t = 9$			

No.	Expected answer	Level of understanding or error analysis		Cognitive level	Level of difficulty	Grade
43.	A -6	3	Changed the sign when dividing by 2.	R	M	9
	B 12	2	Selected the given constant as the intercept			
	C 6 ✓	4	Correct response $x = 0 \Rightarrow 2y = 12 \Rightarrow y = 6$			
	D 3	1	$y = 0 \Rightarrow 4x = 12 \Rightarrow x = 3$			
33.	A 9	1	$6 \div \frac{2}{3}$	R	M	9
	B 4 ✓	4	Correct response: $\frac{d}{6} = \frac{2}{3}$			
	C 2	2	Identified d as the value of y in $\frac{2}{3}$			
	D $\frac{1}{9}$	1	$6 \times d = \frac{2}{3}$ (incorrect formula)			
34.	A rectangle ✓	4	Correct response	K	E	7
	B trapezium	1	Does not know the properties of quadrilaterals			
	C rhombus					
	D kite					

35.	A	circumference	1	Does not know the properties of a circle	K	E	7
	B	diameter ✓	4	Correct response			
	C	radius	1	Does not know the properties of a circle			
	D	chord	1	Does not know the properties of a circle			
36.	A	A dodecahedron	1	Lacks knowledge of platonic solids	K	M	8
	B	An octahedron ✓	4	Correct response			
	C	A hexahedron	1	Lacks knowledge of platonic solids			
	D	A tetrahedron	1				
37.	A	$\triangle AEB \parallel \triangle CED$	1	Does not know the difference between similarity and congruency	R	M	9
	B	$\triangle AED \parallel \triangle BEC$	1				
	C	$\triangle AEB \equiv \triangle DEC$ ✓	4	Correct response: $s\angle s$			
	D	$\triangle AED \equiv \triangle BEC$	2	Incorrect equal lines selected, $AE = BE$ and $DE = CE$			
No.		Expected answer	Level of understanding or error analysis		Cognitive level	Level of difficulty	Grade
38.	A	120° ✓	4	Correct answer: $\frac{(6-2)\times 180^\circ}{6}$	K	M	9
	B	108°	1	Lacks knowledge, each angle of polygon with n sides = $(n - 2) \times 180^\circ \div n$			
	C	100°	1				
	D	90°	1				
39.	A	90°	1	Does not know the properties of diagonals and angles of a kite	C	M	9
	B	75° ✓	4	Correct response, $\angle Q\hat{M}R = \angle Q\hat{P}M = 150^\circ \div 2 = 75^\circ$ or $90^\circ - 15^\circ = 75^\circ$			
	C	30°	1	Does not know the properties of diagonals and angles of a kite			
	D	15°	1	$\angle Q\hat{M}R = \angle M\hat{Q}R = 15^\circ$ (diagonal bisects angle)			
40.	A	cylinder	1	Lacks knowledge of the nets of 3-D objects	K	E	8
	B	pyramid	1				
	C	cube ✓	4	Correct response			

	D	sphere	1	Lacks knowledge of the nets of 3-D objects			
41.	A	160°	1	Added 50° + 110°	C	E	8
	B	110°	1	$\hat{A} = 110^\circ$ (used alternate angles)			
	C	80°	1	$\hat{A} + 50^\circ + 50^\circ = 180^\circ \Rightarrow \hat{A} = 80^\circ$			
	D	60° ✓	4	Correct response, $\hat{A} = 110^\circ - 50^\circ = 60^\circ$ or $\hat{A}\hat{C}B = 70^\circ$ and then $\hat{A} = 60^\circ$			
42.	A	rectangular prism	1	Lacks knowledge of 3-D objects	K	E	7
	B	triangular prism	1				
	C	pyramid ✓	4	Correct response			
	D	cube	1	Lacks knowledge of 3-D objects			
43.	A	18 ✓	4	Correct response	K	E	7
	B	12	1	Number of vertices instead of edges			
	C	8	1	Number of faces instead of edges			
	D	6	1	Number of sides instead of edges			

No.		Expected answer		Level of understanding or error analysis	Cognitive level	Level of difficulty	Grade
44.	A	$B'(-2; -3)$	1	Reflection in X -axis	R	M	9
	B	$B'(1; -1)$ ✓	4	Correct response: $(-2 + 3; 3 - 4)$			
	C	$B'(-5; 7)$	1	Translate 3 units left and 4 units upwards			
	D	$B'(2; 3)$	1	Reflection in Y-axis			
45.	A	a reflection	1	Lacks knowledge of transformation.	K	E	7
	B	a reduction	1				
	C	an enlargement ✓	4	Correct response			
	D	a rotation	1	Lacks knowledge of transformation.			
46.	A	14	1	Determined the range	R	M	7
	B	13	1	Determined the median			
	C	15 ✓	4	Correct response: $\frac{135}{9}$			

	D	12	1	Determined the mode			
47.	A	14	1	Calculated the range	K	M	8
	B	13 ✓	4	Correct response: ordered 11 12 12 12 13 15 17 18 25			
	C	15	2	Did not order the scores correctly			
	D	12	1	Selected the mode			
48.	A	$\frac{13}{52} = \frac{1}{4}$	1	Used only one red suit	R	E	7
	B	$\frac{2}{52} = \frac{1}{26}$ ✓	4	Correct response: 2 Aces			
	C	$\frac{4}{52} = \frac{1}{13}$	1	Used all the Aces			
	D	$\frac{26}{52} = \frac{1}{2}$	1	Used all the red cards			
49.	A	$\frac{2}{6} = \frac{1}{3}$	2	Used both square numbers	K	M	8
	B	1	1	Lacks knowledge of probability			
	C	$\frac{3}{6} = \frac{1}{2}$	2	Used the three odd numbers			
	D	$\frac{1}{6}$ ✓	4	Correct response			
50.	A	$\frac{3}{51}$ ✓	4	Correct response	P	M	9
	B	$\frac{4}{52}$	1	Did not realise that only 3 kings and 51 cards were left.			
	C	$\frac{3}{52}$	2	Did not realise that only 51 cards were left.			
	D	$\frac{4}{51}$	2	Did not realise that only 3 kings were left.			

SECTION B

One mark per answer.

- Ignore spelling errors.
- Accept answers that may be in any official language i.e. if it is a word.

No.	Expected answer	Clarification	Mark	Cognitive level	Level of difficulty	Grade
1.	4:7 ✓		1	K	E	7
2.	$2 \times 3 \times 7$ or 42 ✓		1	R	E	7
3.	$7,53 \times 10^6$ ✓		1	K	E	8
4.	$\frac{1}{3}$ ✓	$0,01 \times 10^2 = 1$ and $1 \times \frac{1}{3} = \frac{1}{3}$ or $\frac{1}{100} \times 100 \times \frac{1}{3}$	1	R	E	8
5.	8 ✓	$24 = 2^3 \times 3$ $32 = 2^5$ $\text{HCF} = 2^3$	1	R	E	7
6.	5:3:2 ✓	$250 : 150 : 100$ $= 5 : 3 : 2$	1	R	E	7
7.	400 ✓	$\frac{x}{140} = \frac{100}{35}$ $35x = 14000$ $x = 400$	1	R	M	9
8.	-1 ✓	$8\left(\frac{1}{8} - \frac{1}{4}\right) = (1 - 2) = -1$ or $8\left(\frac{1}{8} + \frac{1}{4}\right) = 8\left(\frac{-1}{8}\right) = -1$	1	C	M	8
9.	0,0067 ✓		1	R	E	9
10.	$\sqrt{5}$ ✓	$\sqrt{5}$ cannot be written in the form $\frac{\text{integer}}{\text{non-zero integer}}$	1	K	E	9
11.	36 ✓	$6^{2/3 \times 3} = 6^2 = 36$	1	R	M	10
12.	34 ✓	$p = 3 \times 12 - 2 = 36 - 2$	1	R	M	7
13.	13 ✓	Divided $7x$ and 91 each by 7	1	R	E	7
14.	25 ✓	$13 + 12$	1	R	E	7
15.	-6 ✓		1	K	E	8
16.	$5x^2$ ✓		1	K	E	8

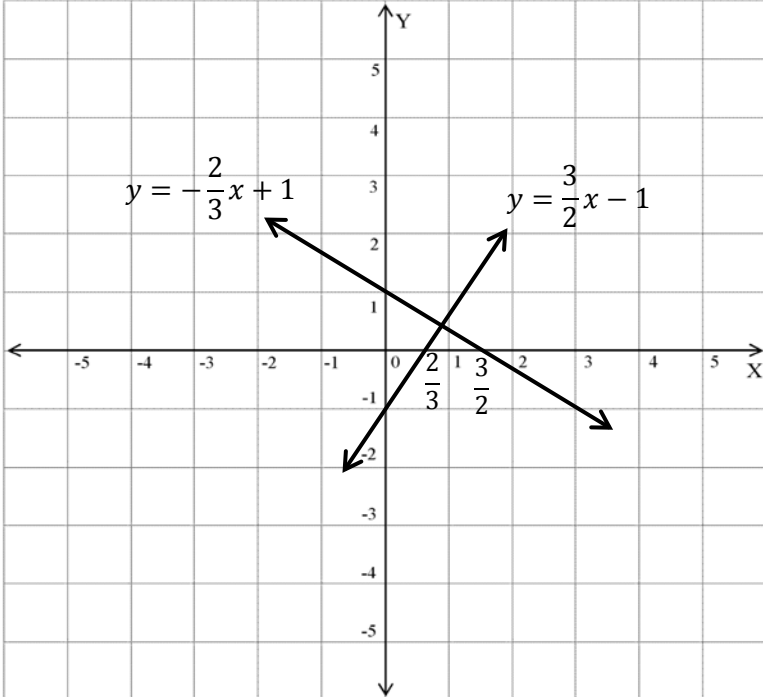
No.	Expected answer	Clarification	Mark	Cognitive level	Level of difficulty	Grade
17.	$60x^2$ ✓	$49x^2 + 11x^2$	1	C	M	8
18.	x^5 ✓	x^{3+2}	1	K	E	8
19.	4^{2x} ✓	4^{x+x}	1	K	M	9
20.	81 ✓	Multiplied by -3	1	R	E	8
21.	True ✓	Both x and y negative	1	K	E	8
22.	243 ✓	Multiply previous term by 3 to get the next term.	1	R	M	7
23.	180° ✓		1	K	E	8
24.	$\triangle DEF$ ✓	$s \angle s$ (Ls can be in any order)	1	K	M	7
25.	\hat{C} ✓	$\angle s$ opp. equal sides of \triangle	1	K	E	8
26.	110° ✓	$180^\circ - (40^\circ + 30^\circ) = 110^\circ$ $180^\circ - 70^\circ = 110^\circ$ (sum of $\angle s$ in \triangle)	1	R	E	8
27.	Similar ✓	$\frac{FH}{BD} = \frac{GH}{CD} = 3$ (prop. sides)	1	R	M	9
28.	204 cm^2 ✓	$17 \times 12 = 204 \text{ cm}^2$	1	R	E	7
29.	$k = 4$ ✓	Perimeter $= \ell \times b$ New perimeter $= 4(2\ell + 2b)$	1	K	E	9
30.	$P(\text{green}) = \frac{5}{12}$ ✓	5 green balls out of 12 balls in total	1	K	E	8

SECTION C

- This is a marking guideline. In instances where learners have used different but mathematically sound strategies to solve the problems they (learners) should be credited.
- Underline errors committed by learners and apply Consistent Accuracy (CA) marking.
- Penalise only once if learners e.g. leave out the angle- or the degree notation.
- The implementation of this marking guideline (memoranda) seeks to ensure that the marking yields feedback to learners that is accurate, consistent, reliable and fair.

Guide for marking	
Method mark (M)	<ul style="list-style-type: none"> • 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 answer.

No.		Expected answer	Clarification	Mark	Cognitive level	Level of difficulty	Grade
1.		$-4^3 \div \sqrt{64} = -64 \checkmark \div 8 \checkmark \mathbf{A}$ $= -8 \checkmark \mathbf{CA}$	-64 : 1 mark 8 : 1 mark Answer: 1 mark	3	C	M	8
2.		$\frac{2 \times 3^2 \times 5^4}{5^3 \times 1} \checkmark \mathbf{M}$ $= 2 \times 9 \times 5 \checkmark \mathbf{CA}$ $= 90 \checkmark \mathbf{CA}$	$8^0 = 1$: 1 mark Calculation: 1 mark Answer: 1 mark (Answer only: 1 mark)	3	R	M	9
3.		$3^{\frac{1}{2} + \frac{1}{2} + 0} \checkmark \mathbf{M}$ $= 3 \checkmark \mathbf{CA}$	$\frac{1}{2} + \frac{1}{2}$: 1 mark Answer: 1 mark	2	R	E	10
4.		$(2x - 1)(x^2 + 2x - 3)$ $= 2x^3 + 4x^2 - 6x - x^2 - 2x + 3$ $\checkmark \checkmark \mathbf{M}$ $= 2x^3 + 3x^2 - 8x + 3 \checkmark \mathbf{CA}$	$2x^3 + 4x^2 - 6x$: 1 mark $-x^2 - 2x + 3$: 1 mark Answer: 1 mark	3	R	M	10
5.	5.1	$10t^2 - 5t$ $= 5t(2t - 1) \checkmark \checkmark \mathbf{M}$	$5t$: 1 mark $2t - 1$: 1 mark	2	R	M	9
	5.2	$81 - 100a^2$ $= (9 + 10a)(9 - 10a) \checkmark \checkmark \mathbf{M}$	$9 + 10a$: 1 mark $9 - 10a$: 1 mark	2	R	M	9

No.	Expected answer	Clarification	Mark	Cognitive level	Level of difficulty	Grade
5.3	$x^2 + 5x + 6$ $\checkmark \quad \checkmark \text{ M}$ $= (x + 2)(x + 3)$	$x + 2$: 1 mark $x + 3$: 1 mark	2	R	M	9
6.	$y = -\frac{2}{3}x + 1$ On the X-axis: $y = 0$ $\frac{2}{3}x = 1$ $2x = 3$ $x = \frac{3}{2} \checkmark \text{ M}$ On the Y-axis: $x = 0$ $y = 1 \checkmark \text{ A}$	$y = \frac{3}{2}x - 1$ On the X-axis: $y = 0$ $-\frac{3}{2}x = -1$ $-3x = -2$ $x = \frac{2}{3} \checkmark \text{ M}$ On the Y-axis: $x = 0$ $y = -1 \checkmark \text{ A}$	4	R	M	9
						
$\checkmark \text{ A}$ Correct labelling of graphs: 1 mark Correct labelling of $\checkmark \text{ CA}$ X- intercepts: 1 mark Correct labelling of $\checkmark \text{ CA}$ Y- intercepts: 1 mark			3	K	E	9

No.		Expected answer	Clarification	Mark	Cognitive level	Level of difficulty	Grade
7.		$\hat{B}_1 + 75^\circ + 55^\circ = 180^\circ$ ✓ M (suppl. \angle s or \angle s on a straight line) ✓ A $\hat{B}_1 = 180^\circ - (75^\circ + 55^\circ)$ $= 180^\circ - 130^\circ$ $= 50^\circ$ ✓ CA	Statement: 1 mark Reason: 1 mark Answer: 1 mark	3	R	E	8
8.	8.1	$\hat{B}_1 = 35^\circ$ ✓ M (vert. opp. \angle s) ✓ A	Statement: 1 mark Reason: 1 mark	2	K	E	8
	8.2	$\hat{C} = \hat{B}_1 = 35^\circ$ ✓ CA (corr. \angle s and $BE \parallel CF$) ✓ A or $\hat{C} = \hat{B}_3 = 35^\circ$ (alt. \angle s and $BE \parallel CF$)	Statement: 1 mark Reason: 1 mark	2	K	E	8
9.		$\hat{P}_1 = \hat{P}_2 = 80^\circ$ ✓ M (vert. opp. \angle s) ✓ A $\hat{B}_2 = \hat{C}_1$ ✓ M (\angle s opp. equal sides of Δ) ✓ A $\hat{B}_2 + \hat{B}_2 + 80^\circ = 180^\circ$ (sum \angle s of Δ) ✓ A $2\hat{B}_2 = 100^\circ$ $\hat{B}_2 = 50^\circ$ ✓ CA or $D\hat{P}C = 180^\circ - \hat{P}_2$ ✓ M (suppl. \angle s or \angle s on a straight line) ✓ A $D\hat{P}C = 100^\circ$ or $A\hat{P}B = 100^\circ$ $\hat{B}_2 = \hat{C}_1$ ✓ M (\angle s opp. equal sides of Δ) ✓ A $2\hat{B}_2 = D\hat{P}C = 100^\circ$ (ext. \angle of Δ) $\hat{B}_2 = 50^\circ$ ✓ CA	Statement: 1 mark Reason: 1 mark Statement: 1 mark Reason: 1 mark Statement and reason: 1 mark Answer: 1 mark or Statement: 1 mark Reason: 1 mark Statement: 1 mark Reason: 1 mark Statement and reason: 1 mark Answer: 1 mark	6	C	M	9
10.		In ΔBCT and ΔAET : $B\hat{C}T = \hat{E}_1 = 90^\circ$ (given) ✓ A $\hat{T}_1 = \hat{T}_2$ ✓ M (vert. opp. \angle s) ✓ A $BC = AE$ (given) ✓ A $\therefore \Delta BCT \equiv \Delta AET$ ($\angle \angle s$) ✓ A	Statement and reason: 1 mark Statement: 1 mark Reason: 1 mark Statement and reason: 1 mark Statement and reason: 1 mark	5	P	M	9
11.		$AC^2 = AB^2 + BC^2$ $= (49 + 576) \text{ cm}^2$ (Pyth.) ✓ M $= 625 \text{ cm}^2$ ✓ A $AC = 25 \text{ cm}$ ✓ CA	Substitution in correct formula: 1 mark Calculation: 1 mark Answer: 1 mark	3	R	M	8

No.		Expected answer	Clarification	Mark	Cognitive level	Level of difficulty	Grade
12.		Surface area = $2\pi r^2 + 2\pi rh$ ✓M = $2\left(\frac{22}{7}\right)(7)^2 + 2\left(\frac{22}{7}\right)(7)(16)$ cm ² ✓✓ A = $(44)(7) + (44)(16)$ cm ² = 1012 cm ² ✓CA or Surface area = $2\pi r^2 + 2\pi rh$ ✓M = $2\pi r(r + h)$ ✓M = $2\left(\frac{22}{7}\right)(7)(23)$ cm ² ✓A = 1012 cm ² ✓CA	Formula: 1 mark Substitution: 2 marks Answer: 1 mark (Wrong formula: 0 marks) Formula: 1 mark $2\pi r(r + h)$: 1 mark Substitution: 1 mark Answer: 1 mark	4	R	M	9
13.		Volume = $l \times b \times h$ ✓M $7000 = 25 \times 80 \times h$ ✓M $h = \frac{7000}{2000}$ $h = 3,5$ m ✓CA	Formula: 1 mark Substitution: 1 mark Answer: 1 mark	3	R	M	9
14.	14.1	$300 + 200 = 500$ ✓A	Answer: 1 mark	1	K	E	7
	14.2	$500 - 200 = 300$ ✓A	Answer: 1 mark	1	K	E	7
	14.3	$500 - 400 = 100$ ✓A	Answer: 1 mark	1	K	E	7
15.	15.1	Average age $= \frac{25+28+34+35+35+35+40+40+42+47+49+50+50+50+50+55+55+58}{18}$ $= \frac{778}{18}$ ✓✓M = 43,22 ✓CA	Sum of ages: 1 mark Dividing by 18: 1 mark Answer: 1 mark	3	R	E	7
	15.2	Mode = 50 ✓A	Answer: 1 mark	1	K	E	7
	15.3	Median = $\frac{\text{score 9} + \text{score 10}}{2}$ = $\frac{42+47}{2}$ ✓M = 44,5 ✓CA	42 and 47: 1 mark Answer: 1 mark	2	R	E	7

