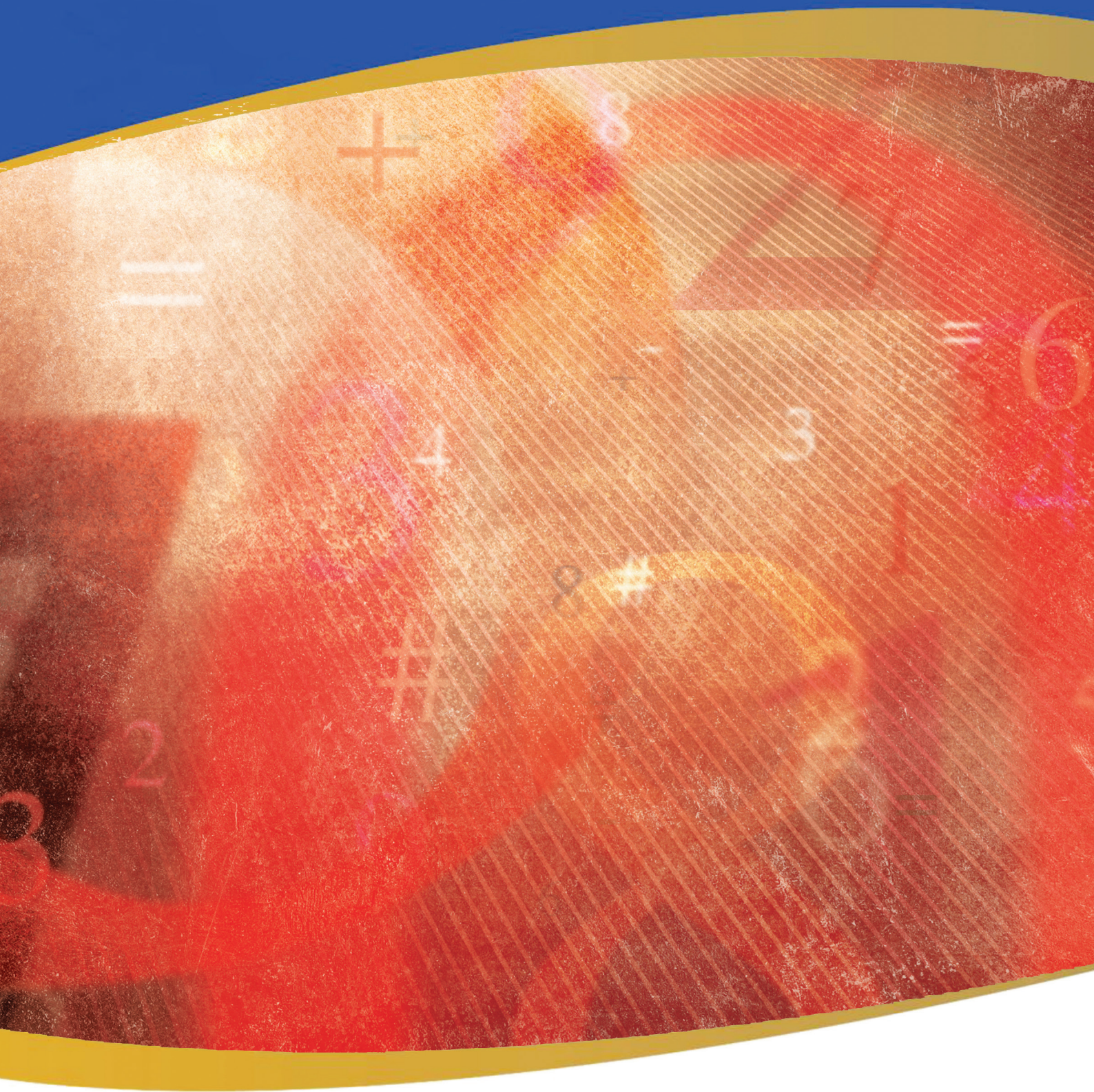


# Senior Phase Mathematics

## Grade 8–9

### Assessment Participants Manual



**GAUTENG PROVINCE**  
EDUCATION  
REPUBLIC OF SOUTH AFRICA







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# 1. Introduction

In this training we will be dealing with Assessment as an integral part of Mathematics Teaching. As stated in Section 4 of the Curriculum and Assessment Policy Statement (CAPS) Senior Phase (Grade 7 – 9) Mathematics, ‘Assessment is a continuous planned process of identifying, gathering and interpreting information regarding the performance of learners, using various forms of assessment’.

This training seeks to empower you, as a Mathematics educator, in understanding the types and forms of assessment, when to use them effectively and how to use the information gathered to improve the quality of teaching and learning in the classroom.

**DISCUSSION:** What is the difference between a ‘type of assessment’ and a ‘form of assessment’?

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## 2. English Across the Curriculum

- Learning in all subjects is dependent upon language, and as a result effective language development facilitates the learning of content subjects.
- As the learners’ Mathematical vocabulary is developing through topics, we must ensure that we provide clear definitions to support the learners understanding.
- Use correct Mathematical language when we give verbal and written instructions so that the use of the word becomes familiar to the learner as well. When the learner sees these words in an assessment, he will not feel overwhelmed by the vocabulary if he has been exposed to it throughout the topics (including informal activities).
- Using Mathematical dictionaries in the classroom is a good way to help learners remember the terminology.
- Having a word wall in the classroom with terminology relevant to the topic will help learners with remembering how to spell the word and when to use it.
- Create a table of terminology that is suitable and relevant to the learners’ age, language and life-experiences of your school environment. It should be user-friendly and relatable to the learner. This can be done gradually per topic to ensure the learner is not over-whelmed by all concepts at the beginning of the year. You can include pictures, examples and diagrams to help with understanding of words, to cater for concrete learning.
- It is also important to remember that many of the learners in our classrooms are learning in a language that is not their home language.
- This compounds the problem of terminology, especially when the mathematical meaning is different from the usual or language meaning. Learners who are still trying to learn LOLT need to have these differences highlighted and explained.
- In the same way, it is important for both educators and learners to understand the different types and forms of assessment, why they are conducted and what the expectations of each are.

The table below gives a brief overview of the types of assessment. They will be unpacked in further detail during the training:

Type of Assessment	Purpose	When it should be used
<b>Baseline Assessment</b>	To determine what the learners already know. To establish a starting point for continued learning.	At the beginning of a new year or term. Before introducing a new concept or topic.
<b>Diagnostic Assessment</b>	To identify misconceptions or misinterpretations in a learners understanding of a topic or mathematical method used.	At any time during a lesson or set of lessons.
<b>Formative Assessment</b>	To aid the teaching process. Used to determine to extent to which a learner has mastered the concepts being taught. Often referred to as <b>Assessment for Learning</b> .	Usually at the end of a lesson or set of lessons focusing on a particular topic of concept.
<b>Summative Assessment</b>	Used for promotion purposes. Formal Assessment with recorded results and is often referred to as the <b>Assessment of Learning</b> .	After the completion of a cluster of related topics. Typically, but not restricted to the end of the term.

The table below gives a brief overview of the forms of assessment as stipulated in CAPS for Mathematics, and aligned to the Recovery ATPs (2021 – 2023). They will be unpacked in further detail during the training:

Form of Assessment	Requirements of the assessment	When it is used
<b>Test</b>	Individualised assessments designed to demonstrate a learners full understanding of the Mathematical content (single or multiple concepts) taught in a short period of time. It comprises of a variety of question types and techniques and the marks or points are usually broken down according to a taxonomy, i.e. the Levels of Mathematical Demand.	Term 1 Term 3
<b>Examination/School-Based Test</b>	Individualised assessment designed to demonstrate a learners full understanding of the Mathematical content covering all concepts taught. This too comprises of a variety of question types and techniques and the marks or points are usually broken down according to a taxonomy, i.e. the Levels of Mathematical Demand.	Term 2 Term 4

Form of Assessment	Requirements of the assessment	When it is used
Assignment	Individual assessment that makes use of multiple sources of additional resource material. This is well structured and considers the relevant skills, knowledge and values that learners need to demonstrate competence against.	Term 1
Investigation	Used to discover rules or concepts. Makes use of inductive reasoning to draw conclusions or test patterns and relationships.	Term 2
Project	Used to assess a range of skills and competencies. Learners are required to demonstrate their abilities and understanding by either designing, constructing, creating, synthesising or using all or a combination of these.	Term 3

Number of Tasks per year = *7			
Weighting:	SBA	80%	100% for the year-end report mark
	Year-End School-Based Test	20%	

**DISCUSSION:** The marking or evaluation of an assessment is essential. Which of the following marking tools could be used when marking the five forms of assessment mentioned above? (You are not restricted to just one form per tool)

Marking Memo:

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Check-list:

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Rubric:

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## 3. Topic 1: The Purpose and Types of Assessment

### 3.1: The Purpose of Assessment

The core purpose of assessment is to determine the success of any teaching-learning experience. It is through assessment that we can improve the quality of the teaching-learning experience. Assessment allows us, as educators, to reflect on the success and impact of our teaching. It also aids us in identifying problem areas, gaps and possible improvements in our methodology and techniques used in the classroom.

Assessment is also used to assess the level of the learners understanding of concepts taught. Assessment gives learners the opportunity to demonstrate the skills and abilities they have learned during the course of the lessons.

CAPS relies on a continuous assessment approach. This includes informal or daily assessment as well as formal assessment.

**DISCUSSION:** What are some of the techniques educators can use as informal assessment?

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**Informal assessment** forms the base for educators to collect information about the learners performance. This information is then used to improve the learning experience. This is done through observations, discussions, demonstrations and classroom exercises.

**Self-assessment, peer assessment** and educator assessments are all used in this process. Educator-learner feedback is essential during this process.

**Formal assessment** comprises of School-Based Assessment (SBA) and Year-End Examination/ School-Based Test. Formal assessment tasks must be marked and formally recorded by the educator for promotional purposes.

### 3.2: Baseline Assessment

As mentioned previously, baseline assessment is to be used to establish a base for learning. Before starting a new year or section of work it is important for educators to know to what extent the learners have retained what they have learned in the past. In order for baseline assessment to be worthwhile it is important for the educator to take into consideration what was taught in the previous grade as well as what is to be taught in the current grade.

For this reason it is important for Senior Phase educators to know what the learners are taught in the Foundation and Intermediate phases as well as what they are teaching towards in the senior phase. Baseline assessments help the educator to establish the starting point for the lessons.



**DISCUSSION:** What should learners be able to do and understand regarding fractions when they enter into Grades 8 and 9? What do they already know? What do they need to learn?

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Below is a table showing what is taught in Grade 8 and what is to be taught in Grade 9 on the topic of ‘whole numbers’. When setting a baseline assessment educators need to cover what was previously learned and what is still to be taught.

GRADE 8	GRADE 9
<b>Calculations with integers</b> Revise: <ul style="list-style-type: none"> <li>• Addition and subtraction with integers</li> <li>• Multiply and divide with integers</li> <li>• Perform calculations involving all four operations with integers</li> <li>• Perform calculations involving all four operations with numbers that involve squares, cubes, square roots and cube roots of integers</li> </ul>	<b>Calculations with integers</b> Revise: <ul style="list-style-type: none"> <li>• Addition and subtraction with integers</li> <li>• Multiplication and division with integers</li> <li>• Perform calculations involving all four operations with integers</li> <li>• Perform calculations involving all four operations with numbers that involve the squares, cubes, square roots and cube roots of integers</li> </ul>
<b>Properties of integers</b> <ul style="list-style-type: none"> <li>• Recognize and use commutative, associative and distributive properties of addition and multiplication for integers</li> <li>• Recognize and use additive and multiplicative inverses for integers</li> <li>• Count forwards and backwards in integers for any interval</li> <li>• Recognize, order and compare integers</li> <li>• Add and subtract with integers</li> <li>• Recognize and use commutative and associative properties of addition and multiplication for integers</li> <li>• Solve problems in contexts involving addition and subtraction of integers</li> </ul>	<b>Properties of integers</b> Revise: <ul style="list-style-type: none"> <li>• Commutative, associative and distributive properties of addition and multiplication for integers</li> <li>• Additive and multiplicative inverses for integers</li> </ul>

## SAMPLE OF A GRADE 9 BASELINE ASSESSMENT

### Question 1: Adding and Subtracting Integers

- 1.1 Evaluate the following: (6)
- a)  $(-16) - (2) = \underline{\hspace{2cm}}$                       b)  $(-20) + (-30) = \underline{\hspace{2cm}}$
- c)  $9 + (-9) + 5 = \underline{\hspace{2cm}}$                       d)  $(-34) - (-6) = \underline{\hspace{2cm}}$
- e)  $(-12) - 7 = \underline{\hspace{2cm}}$                       f)  $70 + 12 - (-32) = \underline{\hspace{2cm}}$

### Question 2: Multiplying and Dividing Integers

- 2.1 Evaluate the following: (6)
- a)  $6 \times (-4) = \underline{\hspace{2cm}}$                       b)  $(-105) \div 7 = \underline{\hspace{2cm}}$
- c)  $117 \div 13 = \underline{\hspace{2cm}}$                       d)  $(-2) \times (-10) = \underline{\hspace{2cm}}$
- e)  $(-11) \times 5 = \underline{\hspace{2cm}}$                       f)  $108 \div (-9) = \underline{\hspace{2cm}}$

### Question 3

- 3.1 Complete the following table, by classifying each of the given numbers. (17)

Number	$\mathbb{R}$	Non-real	$\mathbb{Q}$	$\mathbb{Q}'$	$\mathbb{Z}$	$\mathbb{N}_0$	$\mathbb{N}$
$\sqrt{49}$							
1,07							
$\sqrt{-2}$							
4,778...							
15							
$0,\dot{3}$							

### Question 4

- 4.1 Calculate the following:  $[(3)^2 \times (-2)^3] + \sqrt[3]{-216}$  (3)

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**DISCUSSION:** Which questions or parts of questions are on a Grade 8 level? How could the results of the test above assist the educator?

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### 3.3: Diagnostic Assessment

As the name suggests, diagnostic assessment is used to diagnose the learner's abilities, misconceptions and misunderstanding of a topic. This assessment is done informally through discussion, oral questioning, classroom exercises or short, quick tests to help the educator understand where the learners are having difficulties and what those difficulties are.

Multiple-choice questions with a carefully selected group of distractors can help educators to discover what the learners have misunderstood. In order to do this successfully we first need to look at the rationale behind multiple-choice questions and how to use them effectively.

According to Brigham Young University, (<https://testing.byu.edu/handbooks/14%20Rules%20for%20Writing%20Multiple-Choice%20Questions.pdf>) the following 14 rules must be taken into consideration:

In order for Multiple-Choice questions to be efficient and effective you need to:

- Use plausible distractors
- Use a 'question-type' format
- Know what cognitive level you are targeting
- Keep option lengths similar
- Balance the placement of the correct answer
- Focus on your wording and grammar
- Avoid giving clues to the correct answer
- Avoid using negative questions
- Use only one correct option
- Give clear instructions at the start
- Use only a single, clearly-defined problem in the question
- Avoid the 'ALL OF THE ABOVE' or 'NONE OF THE ABOVE' options
- Don't use multiple-choice questions when other methods may be more appropriate

For the purposes of diagnostic assessment, the multiple-choice option is a quick and efficient means to determine the level of learners understanding.

Through the correct selection of distractors learners errors and misconceptions can easily be identified. This will assist the educator in addressing the misconceptions before they become entrenched in the learners mind. According to research done by WITS School of Educations DIPIP (Data-Informed Practice Improvement Project), "Misconceptions are learners' conceptual ideas that explain why they (learners) might produce in a particular error or set of errors." By using multiple-choice questions we can determine what these misconceptions are, identify how they came about and address them in order to improve learner understanding.

**DISCUSSION:** Learners often struggle with conversion of common fractions to decimal fractions. List 4 errors or mistakes often made by learners.

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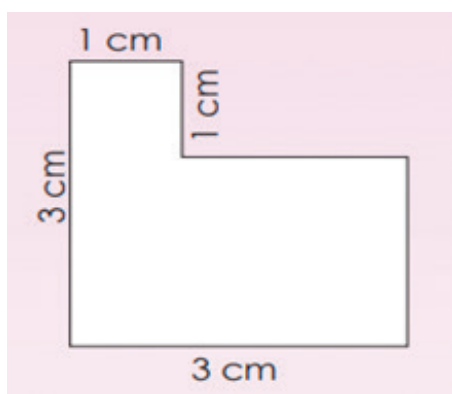
Using the information from above look at a possible multiple-choice question that could assist us in identifying the misconception the learner has:

**Question:**  $\frac{3}{4}$  in decimal form would be shown as...

- a) 3,4 (learner has simply replaced the fraction line with a comma – understanding of decimals as multiples of 10 is lacking)
- b) 0,3 (learner has ignored the denominator and placed the numerator as a tenth – possibly because all examples have been working with tenths or hundredths and it may look ‘right’:  $\frac{3}{10} = 0,3$  and  $\frac{7}{10} = 0,7$ . This makes it appear that all you need to do is ‘put the numerator behind the comma’.)
- c) 0,75 (CORRECT ANSWER)
- d) 0,34 (the learner understands that as a decimal fraction the digits will be ‘behind the comma’, they also know that you need to look at both the numerator and the denominator but do not understand what to do with after that.)

**DISCUSSION:** Look at the question below regarding perimeter.

Determine the perimeter of the shape below:



- a) 8 cm                      b) 9 cm                      c) 12 cm                      d) 6 cm

1. Identify the correct answer: \_\_\_\_\_

2. Discuss each distractor, what does it reveal about the learners understanding or misconceptions.

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3. What, in your teaching, may have led to the learners’ misconception?

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### 3.4: Formative Assessment

As stipulated in CAPS, formative assessment is used to aid the teaching and learning processes, hence assessment for learning. It is the most commonly used type of assessment because it can be used in different forms at any time during a mathematics lesson.

**DISCUSSION:** Give some examples of the different forms, mentioned above that can be used during a lesson.

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The fundamental distinguishing characteristic of formative assessment is constant feedback to learners, particularly with regard to learners' learning processes. Feedback must be constructive and based on mathematical knowledge. Avoid phrases like 'try harder' or 'pull-up your socks'. Your feedback can be done verbally or in writing but must explain where the learner's error occurred and how to correct it. For example: a learner adds  $137 + 25$  and gets 387 your feedback should include information regarding place value and how the add units with units and tens with tens. You could also suggest different methods to try and avoid the error. The information provided by formative assessment can also be used by teachers to inform their methods of teaching. As mentioned above, class exercises, short tests and oral questioning are all used as part of the teaching process to assess to what extent the learners have mastered and understood the content being taught. A key component of formative assessment is that learners must be provided with feedback.

**DISCUSSION:** How can an educator's feedback be provided during the formative assessment process?

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This is usually done through the marking process. Corrections must be given and discussed with the learners to show where the errors are and how to correct or address them. Unlike diagnostic assessment, formative assessment can make use of self or peer marking provided the educator monitors this and gives feedback. Formative assessment is used constantly throughout the teaching and learning process. Class tests can also be used for formative assessment at the end of a topic or group of topics as a way to determine if concepts and topics have been understood and mastered before moving on to the next section of work.



### 3.5: Summative Assessment

Summative assessment is used, in CAPS, as a formal assessment for promotion purposes. As such, it forms the base for determining whether or not a learner has met the requirements for the term or year. Section 4 of CAPS gives clear guidelines on when to conduct summative assessments, how they should be conducted and what form of assessment should be used. It also provides guidelines on the types and levels of questioning to be used as well as in which proportions.

When setting summative assessments, it is important to take into consideration not only the cognitive levels, level of difficulty, but also the weighting of topics in the assessment.

Description and examples of cognitive levels		
Cognitive levels	Description of skills to be demonstrated	Examples
<b>Knowledge (25%)</b>	<ul style="list-style-type: none"> <li>Estimation and appropriate rounding of numbers</li> <li>Straight recall</li> <li>Identification and direct use of correct formula</li> <li>Use of mathematical facts</li> <li>Appropriate use of mathematical vocabulary</li> </ul>	<ol style="list-style-type: none"> <li>Estimate the answer and then calculate with a calculator:  <math display="block">\frac{62\,816}{325 + 279} \cdot [\text{Grade 7}]</math> </li> <li>Use the formula <math>A = \pi r^2</math> to calculate the area of a circle, if the diameter is 10 cm. [Grade 8]</li> <li>Write down the <math>y</math>-intercept of the function <math>y = 2x + 1</math>. [Grade 9]</li> </ol>
<b>Routine procedures (45%)</b>	<ul style="list-style-type: none"> <li>Perform well-known procedures</li> <li>Simple applications and calculations which might involve many steps</li> <li>Derivation from given information may be involved</li> <li>Identification and use (after changing the subject) of correct formula</li> <li>Generally similar to those encountered in class</li> </ul>	<ol style="list-style-type: none"> <li>Determine the mean of 5 Grade 7 learner's marks, if they have respectively achieved 25; 40; 21; 35; 14 out of 50. [Grade 7]</li> <li>Solve <math>x</math> in <math>x - 6 = 9</math>. [Grade 8]</li> <li>R600 invested at <math>r\%</math> per annum for a period of 3 years yields R150 interest. Calculate the value of <math>r</math>, if <math>SI = \frac{Prt}{100}</math>. [Grade 9]</li> </ol>
<b>Complex procedures (20%)</b>	<ul style="list-style-type: none"> <li>Problems involving complex calculations and/or higher order reasoning</li> <li>Investigate elementary axioms to generalise them into proofs for straight line geometry, congruence and similarity</li> <li>No obvious route to the solution</li> <li>Problems not necessarily based on real world contexts</li> <li>Making significant connections between different representations</li> <li>Require conceptual understanding</li> </ul>	<ol style="list-style-type: none"> <li>Mr Mnisi pays R75 for a book which he marks up to provide 20% profit. He then sells it for cash at 4% discount. Calculate the selling price. [Grade 7]</li> <li>A car travelling at a constant speed travels 60 km in 18 minutes. How far, travelling at the same constant speed, will the car travel in 1 hour 12 minutes? [Grade 8]</li> <li>Use investigation skills to prove that the angles on a straight line are supplementary. [Grade 9]</li> </ol>

Description and examples of cognitive levels		
Cognitive levels	Description of skills to be demonstrated	Examples
<b>Problem solving (10%)</b>	<ul style="list-style-type: none"> <li>Unseen, non-routine problems (which are not necessarily difficult)</li> <li>Higher order understanding and processes are often involved</li> <li>Might require the ability to break the problem down into its constituents parts</li> </ul>	<ol style="list-style-type: none"> <li>The sum of three consecutive numbers is 87. Find the numbers. [Grade 7]</li> <li>Mary travels a distance of 120 km in 6 hours, if she travels at an average speed of 20 km/h on her bicycle. What should be her average speed, if she wants to cover the same distance in 5 hours? [Grade 8]</li> <li>The combined age of a father and son is 84 years old. In 6 years time, the father will be twice as old as the son was 3 years ago. How old are they now? [<b>Grade 9</b>]</li> </ol>

**DISCUSSION:** According to CAPS, as aligned to the Recovery ATPs (2021 – 2023), how many summative assessments are conducted for Mathematics in the Senior Phase?

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## 4. Topic 2: Forms of Assessment

### 4.1: General Instructions/Moderation/Quality Assurance

All summative assessments are used for promotion and progression purposes. As such, all forms of assessment must follow the moderation process. Moderation is conducted at school and or district level.

The first level of moderation is the pre-assessment moderation. At this level the assessment and marking tool are checked for technical irregularities, accuracy, distribution of content topics and distribution of cognitive levels. The moderation at school level should be conducted by either the HOD or a senior educator specialising in Mathematics. Adjustments and recommendations for improvement will be made by the moderator and the examiner or assessor will then action the recommendations. Once corrections and improvements have been affected the assessment will be returned to the moderator for final approval.

The second level of moderation is completed after the assessment has been conducted. It is usually referred to as post-assessment moderation. This is conducted by the same moderator and is concerned with the accuracy and consistency of the marking process. A sample of marked scripts will

be moderated and ‘remarked’ by the moderator to check for accuracy both in the marking and the calculation of final marks. If many errors are found during the process the moderator may request that the entire batch be remarked by a third party to ensure that no learner is disadvantaged.

The third and final level of moderation takes place after the post-assessment moderation. At this level the recording and capturing of marks and results is checked and verified for consistency.

All levels of the moderation process must be conducted for all assessments that are to be used for promotion and progression purposes. In Mathematics in the Senior Phase, this amounts to ‘approximately’ 7 formal summative assessment tasks in Grades 8 - 9 per year.

**DISCUSSION:** Name the five forms of summative assessment used for summative assessment according to CAPS Senior Phase.

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## 4.2: Tests and Examinations/SBTs

Tests and examinations/SBTs are individualised assessments which must be conducted under supervised examination conditions. They cover a large number of topics and content and are designed to demonstrate learner’s full skills and competencies of the Mathematical content taught. Tests are to be administered in Terms 1 and 3 with examinations/SBTs administered in Terms 2 and 4. Tests and examinations are assessed using a marking guideline and memorandum which must include a variety of methods of calculation, breakdown of how marks are to be awarded as well as explanations for marking using consistent accuracy.

When setting tests and examinations the following steps should be followed:

- Identify the contents to be assessed. Your Recovery ATP and what was taught in class will guide you
- Determine the number of questions to be included and calculate the weighting of the cognitive levels according to CAPS requirements, as aligned to the Recovery ATPs.
- Determine which content and question type would be best suited to the required cognitive level

Examples of cognitive question types:

### 1. Knowledge (lower order or simple recall):

- Match the terminology with the definitions

a. improper fraction	1. A whole number with a fraction
b. proper fraction	2. The numerator is larger than the denominator
c. mixed number	3. The denominator is larger than the numerator

## 2. Routine procedures:

- Calculate the following using any method:

$$189\,212 + 456\,987$$

$$4\,288 \times 21$$

$$5682 \div 12$$

## 3. Complex procedures:

- If the rule for finding  $y$  in the table below is  $y = 3x - 1$ , find  $y$  for the given  $x$  values:

$x$	0	1	2	5	10	50	100
$y$							

## 4. Problem solving:

The sum of 3 consecutive numbers is 825. How would you determine what the numbers are?

Complete the calculation and explain the process you have used.

**DISCUSSION:** What is the difference between a marking guideline and a memorandum?

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## 4.3: Projects

Projects are used to assess the learner's skills and competencies in a topic or group of topics. As with tests and examinations/SBTs, this is an individual activity which must be conducted during teaching time and should not be completed at home. The strict examination conditions are not necessarily adhered to; however, all learners must produce their own work. The assessment criteria should be clearly indicated on the project specification and should focus on the Mathematics involved and not on duplicated pictures and facts copied from reference material. Good projects contain the collection and display of real data, drawings or constructions followed by deductions that can be substantiated using the information collected. Projects are usually marked using a rubric or a combination of a rubric and a memorandum.

Criteria	1 Mark	2 Marks	3 Marks	4 Marks	5 Marks
<b>Terminology</b>	No terms correctly defined	1 or 2 terms correctly defined	2 terms correctly defined	4 terms correctly defined	All terms correctly defined
<b>Drawing shapes</b>	No drawings correct and accurate	1 or 2 shapes drawn correct and accurate	3 or 4 shapes drawn correct and accurate	5 shapes drawn correct and accurate	All shapes correct and accurate

**DISCUSSION:** What must be included in a rubric for it to be an effective marking tool?

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According to [www.teachonline.asu.edu](http://www.teachonline.asu.edu) 'a rubric is an evaluation tool that has three distinguishing features: evaluative criteria, quality definitions, and a scoring strategy (Popham, 2000).

Your rubric must contain information on what will be assessed, what quality is expected and a breakdown of what scores to give for each criteria. If your rubric is not clearly defined it could result in learners achieving 100% for the project.

#### **4.4: Assignments**

Assignment, as with tests and examinations/SBTs, is mainly an individualised task. It can be a collection of past questions, but should focus on the more demanding work as any resource material can be used, which is not the case in a task that is done in class under supervision.

**DISCUSSION:** Name some of the resource materials that could be used when completing an assignment.

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Assignments are set in a similar way to tests and as such need to follow the same criteria. They can, in certain instances be referred to as an 'open-book' test. Although the learners are allowed to use resources in the completion of an assignment this does not mean that the learners should not be prepared. Unlike examinations/SBTs, assignments may also be completed over a number of sessions as opposed to one seating. Your assignment may be broken down into sections where learners complete a different section each day. These assessments are generally marked using a marking memorandum and marking guideline.



## 4.5: Investigations

Investigations promote critical and creative thinking. They are often used to discover rules or concepts and may involve inductive reasoning. As with projects, investigations require learners to draw conclusions based on the information discovered during the course of the investigation. Whilst initial investigations can be done at home the final write-up and conclusions should be done under supervision, in class and without assistance.

Investigations should focus on the following four skills:

- Organizing and recording ideas and discoveries, e.g. diagrams and tables
- Communicating ideas with appropriate explanations
- Calculations showing clear understanding of mathematical concepts and procedures
- Generalizing and drawing conclusions

**DISCUSSION:** Which marking tool or combination of marking tools might best suit an investigation?

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#### 4.6: Exemplars of the 5 Forms of Summative Assessment, in Mathematics Grade 8, according to Senior Phase CAPS

(School Name)  
(District)

**Task:** Assignment Term 1:  
Whole numbers and Integers

**Grade:** 8

**Examiner:**  
**Moderator:**

**Total:** 40  
**Time:** 2 Periods

**Name:** \_\_\_\_\_ **Class:** \_\_\_\_\_ **Date:** \_\_\_\_\_

#### Instructions and information

- ✓ This is a fill in question paper. You will need no extra paper for this assignment.
- ✓ This question paper consists of 2 pages.
- ✓ Answer ALL the questions.
- ✓ Show ALL of the working you use in order to obtain the correct answers.
- ✓ You are allowed to use a non-programmable scientific calculator where necessary and appropriate, unless the question states otherwise.
- ✓ Answers only will NOT necessarily be awarded full marks.
- ✓ If necessary round off to TWO decimal places.
- ✓ Write neatly and legibly.

#### Question 1 [6]

Complete the following table by classifying each of the numbers.

Number	$\mathbb{R}$	Non-real	$\mathbb{Q}$	$\mathbb{Q}'$	$\mathbb{Z}$	$\mathbb{N}_o$	$\mathbb{N}$
Ex. 0,4	×		×				
$\sqrt{49}$							
1,07							
$\sqrt{-2}$							
4,778...							
15							
$0,\dot{3}$							

## Question 2 [22]

Ratio shows the relationship between two or more amounts (remember the amounts must be in the same units).

Rate indicates the relationship between two or more quantities with different units.

2.1 Write the following ratios in their simplest form:

a) 90: 125

(1)


b) 6 *hours*: 30 *min*

(2)


2.2 Answer the following increasing and decreasing ratios:

a) Increase 11,47kg in the ratio of 11:7

(2)


b) Decrease R2 980 in the ratio of 5:6

(2)


2.3 Answer the following questions on the division of quantities in a given ratio:

a) Divide 2 100 in the ratio of 3:4 (3)


b) Divide R2 400 in the ratio of 1:2:3 (4)


2.4 Answer the following questions about rate:

a) Which is fastest; 664km travelled in 6 hours or 421km in 4 hours? (5)


b) Lebo buys seven ice creams for R37,65. How much will five ice creams cost? (3)


### Question 3 [12]

3.1 Complete the following by inserting  $<$ ,  $>$  or  $=$  (3)

a)  $-67\,133 \square -177\,988$

b)  $-8^{\circ}\text{C} \square -12^{\circ}\text{C}$

c)  $0 \square -397$

3.2 Simplify:

a)  $146 - (-67)$  (2)


b)  $(-15) + (-12) + 14$  (1)


c)  $-12 \times -7 - 24 \div 4$  (3)


d)  $3^3 - 2^3 + 6^2 - (-5)^2$  (3)


Total: 40



**(School Name)**  
**(District)**

**Task:** Assignment Term 1:  
Whole numbers and Integers  
**Grade:** 8

**Examiner:**  
**Moderator:**  
**Total:** 40  
**Time:** 2 Periods

**Name:** Memorandum

**Class:** \_\_\_\_\_

**Date:** \_\_\_\_\_

**Instructions and information**

- ✓ This is a fill in question paper. You will need no extra paper for this iassignment.
- ✓ This question paper consists of 2 pages.
- ✓ Answer ALL the questions.
- ✓ Show ALL of the working you use in order to obtain the correct answers.
- ✓ You are allowed to use a non-programmable scientific calculator where necessary and appropriate, unless the question states otherwise.
- ✓ Answers only will NOT necessarily be awarded full marks.
- ✓ If necessary round off to TWO decimal places.
- ✓ Write neatly and legibly.

**Question 1 [6]**

Complete the following table by classifying each of the numbers.

Number	$\mathbb{R}$	Non-real	$\mathbb{Q}$	$\mathbb{Q}'$	$\mathbb{Z}$	$\mathbb{N}_o$	$\mathbb{N}$
Ex. 0,4	×		×				
$\sqrt{49}$	×		×		×	×	×
1,07	×		×				
$\sqrt{-2}$		×					
4,778...	×			×			
15	×		×		×	×	×
$0,\dot{3}$	×		×				

## Question 2 [22]

Ratio shows the relationship between two or more amounts (remember the amounts must be in the same units).

Rate indicates the relationship between two or more quantities with different units.

2.1 Write the following ratios in their simplest form:

a) 90: 125

(1)

$= 18:25$

b) 6 *hours*: 30 *min*

(2)

$= 360:30$
$= 12:1$

2.2 Answer the following increasing and decreasing ratios:

a) Increase 11,47kg in the ratio of 11:7

(2)

$= 11,47 \times \frac{11}{7}$
$= 18,02 \text{ kg}$

b) Decrease R2 980 in the ratio of 5:6

(2)

$= 2980 \times \frac{5}{6}$
$= R2483,33$

2.3 Answer the following questions on the division of quantities in a given ratio:

- a) Divide 2 100 in the ratio of 3:4 (3)

$3 + 4 = 7$	
$\frac{3}{7} \times 2100$	$\frac{4}{7} \times 2100$
$= 900$	$= 1200$

- b) Divide R2 400 in the ratio of 1:2:3 (4)

$1 + 2 + 3 = 6$		
$\frac{1}{6} \times 2400$	$\frac{2}{6} \times 2400$	$\frac{3}{6} \times 2400$
$= 400$	$= 800$	$= 1200$

2.4 Answer the following questions about rate:

- a) Which is fastest; 664km travelled in 6 hours or 421km in 4 hours? (5)

$s = \frac{d}{t}$	
$s = \frac{d}{t}$	$s = \frac{d}{t}$
$s = \frac{664}{6}$	$s = \frac{421}{4}$
$= 110,67 \text{ km/h} \leftarrow \text{Faster}$	$= 105,25 \text{ km/h}$

- b) Lebo buys seven ice creams for R37,65. How much will five ice creams cost? (3)

$7 \times \text{cost} = 37,65$
$\text{cost} = 37,65 \div 7$
$= R5,38$
For five: $5 \times 5,38 = R26,90$

### Question 3 [12]

3.1 Complete the following by inserting  $<$ ,  $>$  or  $=$  (3)

- a)  $-67\,133 < -177\,988$       b)  $-8^{\circ}\text{C} < -12^{\circ}\text{C}$       c)  $0 < -397$

3.2 Simplify:

a)  $146 - (-67)$  (2)

$= 146 + 67$
$= 213$

b)  $(-15) + (-12) + 14$  (1)

$= -15 - 12 + 14$
$= -13$

c)  $-12 \times -7 - 24 \div 4$  (3)

$= 84 - 6$
$= 78$

d)  $3^3 - 2^3 + 6^2 - (-5)^2$  (3)

$= 27 - 8 + 36 - 25$
$= 30$

Total: 40

(School Name)  
(District)

**MATHEMATICS**

**GRADE 8 CONTROL TEST**

**TERM 1**

**(Date)**

**MARKS: 50**

**TIME : 1 HOUR**

**LEARNER NAME:** \_\_\_\_\_

**LEARNER CLASS:** \_\_\_\_\_

**EXAMINER:** \_\_\_\_\_

**MODERATOR:** \_\_\_\_\_

**INSTRUCTIONS**

1. Show ALL calculations clearly.
2. Round off ALL the final answers to TWO decimal places, unless stated otherwise.
3. Units of measurement MUST be indicated, where applicable.
4. Diagrams are NOT necessarily drawn to scale, unless stated otherwise.
5. Write neatly and legibly.
6. This paper consists of 9 pages and is a fill-in paper. No extra pages will be necessary.
7. This paper consists of 3 sections. All sections must be answered.
8. You are allowed to use a scientific, non-programmable calculator unless stated otherwise.



## Question 1 – Multiple Choice [10]

For each of the following questions, choose the correct answer. Circle or highlight the answer you chose.

1.1 Which of the following is a composite number?

- |       |       |     |
|-------|-------|-----|
| a) 1  | b) 39 |     |
| c) 23 | d) 17 | (2) |

1.2 Which of the following are real numbers?

- |                   |                      |     |
|-------------------|----------------------|-----|
| a) $\frac{22}{7}$ | b) $\sqrt{3}$        |     |
| c) $\sqrt{16}$    | d) All of the above. | (2) |

1.3 Calculate the answer to:

$$(-7) - 7 - (-7)$$

- |       |        |     |
|-------|--------|-----|
| a) +7 | b) +21 |     |
| c) -7 | d) -21 | (2) |

1.4 Simplify the ratio:

$$15:90$$

- |         |        |     |
|---------|--------|-----|
| a) 3:18 | b) 1:3 |     |
| c) 1:6  | d) 6:1 | (2) |

1.5 Simplify the following:  $-5 - 4^2$

- |        |        |     |
|--------|--------|-----|
| a) -21 | b) 11  |     |
| c) 21  | d) -11 | (2) |

## Question 2 – Whole Numbers and Integers [27]

2.1 Which properties of numbers are used in the following equations? (3)

2.1.1  $(12 \times 13) \times 14 = 12 \times (13 \times 14)$

---

2.1.2  $21 + 11 = 21 + 11$

---

2.1.3  $2(35 + 11) = (2 \times 35) + (2 \times 11)$

---

2.2 Calculate the following:

2.2.1  $3^3 + 3 \times 3 - 3$

(3)

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2.2.2 The temperature recorded in Oymyakon in Russia on 21 Nov. 2016, was  $-40^{\circ}\text{C}$ . On the same day, the temperature in Buena Vista in Mexico, was  $24^{\circ}\text{C}$ . What is the difference in temperature between these two places?

(2)

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2.3 Complete the following table by classifying each of the given numbers.

(6)

Number	$\mathbb{R}$	Non-real	$\mathbb{Q}$	$\mathbb{Q}'$	$\mathbb{Z}$	$\mathbb{N}_0$	$\mathbb{N}$
$\sqrt{49}$							
1,07							
$\sqrt{-2}$							
4,778...							
15							
$0,\dot{3}$							

2.4.1 Divide 210 in the ratio 3:4.

(3)

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2.4.2 Which is a better buy: A – 1 litre of milk at R13,50 or B – 5 litre at R62? (2)

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2.5 Using prime factors, find the **HCF** and **LCM** of: 175, 245 and 1225.

(8)

—	—	—
—	—	—
—	—	—
—	—	—
—	—	—
—	—	—

### Question 3 – Fractions, Decimals, Percentages [13]

3.1 Calculate the following:

$$\left(4\frac{2}{3} + \frac{1}{5}\right) \div 1\frac{1}{3}$$

(4)

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3.2 Express the following as a percentage:

$\frac{1}{4}$  of 200 apples

(2)

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3.3 Give the equivalent form of 0,2% as:

3.3.1 a common fraction:

(2)

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3.3.2 a decimal fraction:

(2)

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3.4 Calculate the following:

$\sqrt{1,21} + \sqrt[3]{0,064}$

(3)

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**Total 50**

(School Name)  
(District)

**MATHEMATICS**

**GRADE 8 CONTROL TEST**

**TERM 1**

**(Date)**

**MARKS: 50**

**TIME : 1 HOUR**

**LEARNER NAME: Memorandum**

**LEARNER CLASS: \_\_\_\_\_**

**EXAMINER: \_\_\_\_\_**

**MODERATOR: \_\_\_\_\_**

**INSTRUCTIONS**

1. Show ALL calculations clearly.
2. Round off ALL the final answers to TWO decimal places, unless stated otherwise.
3. Units of measurement MUST be indicated, where applicable.
4. Diagrams are NOT necessarily drawn to scale, unless stated otherwise.
5. Write neatly and legibly.
6. This paper consists of 9 pages and is a fill-in paper. No extra pages will be necessary.
7. This paper consists of 3 sections. All sections must be answered.
8. You are allowed to use a scientific, non-programmable calculator unless stated otherwise.

### Question 1 – Multiple Choice [10]

For each of the following questions, choose the correct answer. Circle or highlight the answer you chose.

1.1 Which of the following is a composite number?

- a) 1                      b) 39  
c) 23                     d) 17
- (2)

1.2 Which of the following are real numbers?

- a)  $\frac{22}{7}$
- b)  $\sqrt{3}$
- c)  $\sqrt{16}$
- d) All of the above.
- (2)

1.3 Calculate the answer to:

$$(-7) - 7 - (-7)$$

- a) +7  
b) +21  
c) -7  
d) -21
- (2)

1.4 Simplify the ratio:

15:90

- a) 3:18                      b) 1:3  
c) 1:6                         d) 6:1                          (2)

1.5 Simplify the following:  $-5 - 4^2$

- a) -21                      b) 11  
c) 21                        d) -11                      (2)

## Question 2 – Whole Numbers and Integers [27]

2.1 Which properties of numbers are used in the following equations? (3)

2.1.1  $(12 \times 13) \times 14 = 12 \times (13 \times 14)$

## Associative

### 2.1.2 $21 + 11 = 21 + 11$

## Commutative

2.1.3  $2(35 + 11) = (2 \times 35) + (2 \times 11)$

## Distributive

2.2 Calculate the following:

2.2.1  $3^3 + 3 \times 3 - 3$  (3)

$$= 27 + 9 - 3$$

$$= 33$$

2.2.2 The temperature recorded in Oymyakon in Russia on 21 Nov. 2016, was  $-40^{\circ}\text{C}$ . On the same day, the temperature in Buena Vista in Mexico, was  $24^{\circ}\text{C}$ . What is the difference in temperature between these two places? (2)

$$24 - (-40)$$

$$= 64^{\circ}\text{C}$$

2.3 Complete the following table by classifying each of the given numbers. (6)

Number	$\mathbb{R}$	Non-real	$\mathbb{Q}$	$\mathbb{Q}'$	$\mathbb{Z}$	$\mathbb{N}_0$	$\mathbb{N}$
$\sqrt{49}$	×		×		×	×	×
1,07	×		×				
$\sqrt{-2}$		×					
4,778...	×			×			
15	×		×		×	×	×
0,3	×		×				



2.4.1 Divide 210 in the ratio 3:4.

(3)

$$3 + 4 = 7$$

$$\frac{3}{7} \times 210$$

$$\frac{4}{7} \times 210$$

$$= 90$$

$$= 120$$

2.4.2 Which is a better buy: A – 1 litre of milk at R13,50 or B – 5 litre at R62? (2)

$$A - 13,50 \text{ p/l}$$

$$B - 62 \div 5$$

$$= R12,40 \text{ p/l}$$

$\therefore$  B is the better buy

2.5 Using prime factors, find the **HCF** and **LCM** of: 175, 245 and 1225. (8)

175	5
35	5
7	7
1	

$$\text{LCM} = 5 \times 7$$

245	5
49	7
7	7
1	

$$\text{HCF} = 5^2 \times 7^2$$

$$= 1225$$

1225	5
245	5
49	7
7	7
1	

### Question 3 – Fractions, Decimals, Percentages [13]

3.1 Calculate the following:

$$\left(4\frac{2}{3} + \frac{1}{5}\right) \div 1\frac{1}{3}$$

(4)

$$= \left(\frac{14}{3} + \frac{1}{5}\right) \div \frac{4}{3}$$

$$= \left(\frac{70}{15} + \frac{3}{15}\right) \times \frac{3}{4}$$

$$= \frac{73}{15} \times \frac{3}{4}$$

$$= \frac{73}{20}$$

3.2 Express the following as a percentage:

$\frac{1}{4}$  of 200 apples

(2)

$$\frac{1}{4} \times 200$$

50 apples

3.3 Give the equivalent form of 0,2% as:

3.3.1 a common fraction:

(2)

$$\frac{2}{10} \div 100$$

$$= \frac{2}{10} \times \frac{1}{100}$$

$$= \frac{1}{500}$$

3.3.2 a decimal fraction:

(2)

$$0,2 \div 100$$

$$= 0,002$$

3.4 Calculate the following:

$$\sqrt{1,21} + \sqrt[3]{0,064}$$

(3)

$$= 1,1 + 0,4$$

$$= 1,5$$

**Total 50**

**(School Name)**  
**(District)**

**Task:** Investigation Term 2: Factorising

**Examiner:**

**Moderator:**

**Grade:** 9

**Total:**

50

**Time:**

2 Periods

**Name:** \_\_\_\_\_ **Class:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Instructions and information**

- ✓ This is a fill in question paper. You will need no extra paper for this assignment.
- ✓ This question paper consists of pages.
- ✓ Answer ALL the questions.
- ✓ Show ALL of the working you use in order to obtain the correct answers.
- ✓ You are allowed to use a non-programmable scientific calculator where necessary and appropriate, unless the question states otherwise.
- ✓ Answers only will NOT necessarily be awarded full marks.
- ✓ If necessary round off to TWO decimal places.
- ✓ Write neatly and legibly.
- ✓ The use of Tippex or any other correction fluid is NOT allowed.

**Question 1 [30]**

1.1 Multiply the following binomials:

a)  $(a + 2)(a + 10)$

(3)

b)  $(m + 5)(m - 3)$

(3)



c)  $(a - 5)(a + 1)$  (3)


d)  $(m - 7)(4 + m)$  (3)


e)  $(x - 7)(1 + x)$  (3)



Look very carefully at your answers in each of the questions above. What relationship do you see between the coefficients and/or constants in the brackets and the coefficients of the final answer? (2)


1.3 Find the products of the following binomials:

a)  $(p - 1)(p + 1)$  (2)


b)  $(m + n)(m - n)$  (2)


c)  $(x^2 + 2)(x^2 - 2)$   
(2)


d)  $(1 - x^3)(1 + x^3)$  (3)


e)  $(2m + 3n)(2m - 3n)$  (2)



Look very carefully at your answers for the above products. What do you notice about the middle term? Why do you think this happens every time?  
(2)


### Question 2 [20]

Based on what you found in Question 1, factorise the following:  
Match Column A to Column B.

Column A	Column B	Answer
a) $k^2 - 16k + 64$	i) $(2x + 3y)(2x - y)$	a)
b) $m^2 + 7m - 18$	ii) $(2 + 7p)(2 - 7p)$	b)
c) $4x^2 + 4xy - 3y^2$	iii) $(z + x)(x + z)$	c)
d) $2x^2 + 4xy - 6y^2$	iv) $(x + 2y)(x - 2y)$	d)
e) $x^2 + 2xz + z^2$	v) $(1 - x)(1 + x)$	e)
f) $1 - x^2$	vi) $(k - 8)(k - 8)$	f)
g) $4t^2 - 25$	vii) $(3 - x)(3 + x)$	g)
h) $4 - 49p^2$	viii) $(x - y)(2x + 6y)$	h)
i) $9 - x^2$	ix) $(m + 9)(m - 2)$	i)
j) $x^2 - 4y^2$	x) $(2t + 5)(2t - 5)$	j)

**Total [50]**

**(School Name)**  
**(District)**

**Task:** Investigation Term 2: Factorising

**Examiner:**

**Moderator:**

**Grade:** 9

**Total:**

50

**Time:**

2 Periods

**Name:** Memorandum

**Class:** \_\_\_\_\_

**Date:** \_\_\_\_\_

**Instructions and information**

- ✓ This is a fill in question paper. You will need no extra paper for this assignment.
- ✓ This question paper consists of pages.
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- ✓ Answers only will NOT necessarily be awarded full marks.
- ✓ If necessary round off to TWO decimal places.
- ✓ Write neatly and legibly.
- ✓ The use of Tippex or any other correction fluid is NOT allowed.

**Question 1 [30]**

1.1 Multiply the following binomials:

a)  $(a + 2)(a + 10)$

(3)

b)  $(m + 5)(m - 3)$

(3)

$= a^2 + 10a + 2a + 20$
$= a^2 + 12a + 20$

$= m^2 - 3m + 5m - 15$
$= m^2 + 2m - 15$



c)  $(a - 5)(a + 1)$  (3)

$= a^2 + a - 5a - 5$
$= a^2 - 4a - 5$

d)  $(m - 7)(4 + m)$  (3)

$= 4m + m^2 - 28 - 7m$
$= m^2 - 3m - 28$

e)  $(x - 7)(1 + x)$  (3)

$= x + x^2 - 7 - 7x$
$= x^2 - 6x - 7$


Look very carefully at your answers in each of the questions above. What relationship do you see between the coefficients and/or constants in the brackets and the coefficients of the final answer? (2)

Learner must mention the coefficients and constants are factors of the
coefficient of $x^2$ and the constant in each answer. In addition to that they must
see that the middle term is equal to the sum of the constants in the original
brackets. Each of these will earn 1 Mark.

1.3 Find the products of the following binomials:

a)  $(p - 1)(p + 1)$  (2)

$= p^2 + p - p - 1$
$= p^2 - 1$

b)  $(m + n)(m - n)$  (2)

$= m^2 - mn + mn - n^2$
$= m^2 - n^2$

c)  $(x^2 + 2)(x^2 - 2)$   
(2)

$= x^4 - 2x^2 + 2x^2 - 4$
$= x^4 - 4$

d)  $(1 - x^3)(1 + x^3)$  (3)

$= 1 + x^3 - x^3 - x^6$
$= 1 - x^6$

e)  $(2m + 3n)(2m - 3n)$  (2)

$= 4m^2 - 6mn + 6mn - 9n^2$
$= 4m^2 - 9n^2$


Look very carefully at your answers for the above products. What do you notice about the middle term? Why do you think this happens every time?  
(2)

Learner should mention that the middle term goes away or gets cancelled
every time. The cause should mention the different signs in the sets of
brackets. Each mention can earn only 1 Mark.

### Question 2 [20]

Based on what you found in Question 1, factorise the following:  
Match Column A to Column B.

Column A	Column B	Answer	
a) $k^2 - 16k + 64$	i) $(2x + 3y)(2x - y)$	a)	vi
b) $m^2 + 7m - 18$	ii) $(2 + 7p)(2 - 7p)$	b)	ix
c) $4x^2 + 4xy - 3y^2$	iii) $(z + x)(x + z)$	c)	i
d) $2x^2 + 4xy - 6y^2$	iv) $(x + 2y)(x - 2y)$	d)	viii
e) $x^2 + 2xz + z^2$	v) $(1 - x)(1 + x)$	e)	iii
f) $1 - x^2$	vi) $(k - 8)(k - 8)$	f)	v
g) $4t^2 - 25$	vii) $(3 - x)(3 + x)$	g)	x
h) $4 - 49p^2$	viii) $(x - y)(2x + 6y)$	h)	ii
i) $9 - x^2$	ix) $(m + 9)(m - 2)$	i)	vii
j) $x^2 - 4y^2$	x) $(2t + 5)(2t - 5)$	j)	iv

Total [50]

(School Name)  
(District)

**MATHEMATICS**

**GRADE 8 CONTROL TEST**

**TERM 2**

**(Date)**

**MARKS: 75**

**TIME : 1 HOUR 30 MIN**

**LEARNER NAME:** \_\_\_\_\_

**LEARNER CLASS:** \_\_\_\_\_

**EXAMINER:** \_\_\_\_\_

**MODERATOR:** \_\_\_\_\_

**INSTRUCTIONS**

1. Show ALL calculations clearly.
2. Round off ALL the final answers to TWO decimal places, unless stated otherwise.
3. The use of Tippex or any other correction fluid is NOT allowed.
4. Write neatly and legibly.
5. This paper consists of pages and is a fill-in paper. No extra pages will be necessary.
6. This paper consists of questions. All must be answered.
7. You are allowed to use a scientific, non-programmable calculator unless stated otherwise.

## Question 1 – Multiple Choice [10]

For each of the following questions, choose the correct answer. Circle or highlight the answer you chose.

- 1.1 The order of the numbers is not important when we add or multiply two numbers. What is this property called?
- a) Associative property.                      b) Bodmas property.  
c) Commutative property.                    d) Distributive property.                    (2)
- 1.2 For which operation is the number, one, the identity element?
- a) Multiplication                                  b) Subtraction  
c) Addition    d) Scientific notation.                    (2)
- 1.3 Which of the following numbers would be the additive inverse of  $-21$ ?
- a)  $-7 + 3$     b)  $-3 + 7$   
c)  $-31 + 10$                                       d) 21    (2)
- 1.4 In the term,  $a^5$ , the “a” is referred to as the . . .
- a) power    b) coefficient  
c) index    d) base    (2)
- 1.5 The general rule of a pattern, is given as  $y = 3n + 1$ . What does the variable,  $n$ , indicate?
- a) represents the value  
b) the position of a term in a pattern.  
c) the rule to determine  $y$ .  
d) a constant.                                      (2)

## Question 2 – [32]

- 2.1 Maxine has to mix her baby’s milk powder in the ratio of one part of milk powder to four parts of water.
- 2.1.1 Give the ratio of this mix for milk powder: water.                                      (1)

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2.1.2 If she had to prepare a bottle containing 30ml of milk, how many millilitres of powder will she require? (3)

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2.1.3 Her baby consumes six of these 30ml bottles of milk per day. How many days will a 500ml tin of milk powder last her? Round your answer off to the nearest whole number. (3)

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2.2 Calculate the following:

2.2.1  $\left[\frac{-39}{-13} - (-11)\right] \div (-2)$  (3)

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2.2.2  $-76 - (5)(-8)$  (2)

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2.3 Calculate the following:

2.3.1  $\frac{1}{2}$  of  $\frac{3}{4} + \frac{1}{5}$  (4)

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2.3.2  $7\frac{1}{3} - 2\frac{5}{7}$  (5)

---

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---

---

2.3.3  $5\frac{1}{3} \div \frac{4}{9}$  (3)

---

---

---

---

2.4 Write the following in exponential form.

2.4.1  $\frac{3 \times 3 \times 3}{2 \times 2 \times 2}$  (2)

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---

$$2.4.2 \quad \frac{89 \times 89}{100 \times 100 \times 100} \quad (2)$$

---



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---

2.5 Calculate the following:

$$2.5.1 \quad \sqrt{\frac{49}{121}} \quad (2)$$

---



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---



---

$$2.5.2 \quad \sqrt[3]{\frac{64}{125}} \quad (2)$$

---



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### Question 3 – [10]

Simplify the following:

$$3.1 \quad a^3 \times a^2 \times a \quad (2)$$

---



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3.2  $(t^3)^3$  (2)

---

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3.3  $\frac{x^7}{x^2}$  (2)

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3.4  $\sqrt[3]{125y^{18}}$  (2)

---

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---

3.5  $\sqrt[3]{0,064t^6}$  (2)

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#### Question 4 – [23]

4.1 Complete the next two terms in each of the following number sequences:

4.1.1 11 ; 7 ; 3 ; ... ; ... ; (2)

4.1.2 29 ; 19 ; 9 ; ... ; ... ; (2)

4.1.3 -12 ; -7 ; -2 ; ... ; ... ; (2)

4.2 The following formula is given:

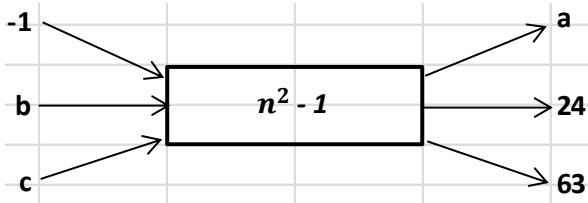
$$T_n = 4n - 1$$

Complete the following table:

$n$	-1	1	3	5
$T_n$				

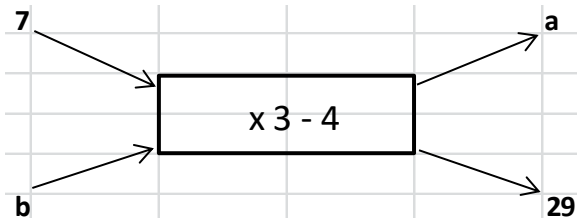
(4)

4.3 Determine the value of  $a$ ,  $b$  and  $c$  in the following flow diagram:



(6)

4.4 The following flow diagram is given:



4.4.1 If the input value of the above diagram is  $n$  and the output value is  $y$ , then write an equation for this diagram in the form  $y = \dots$

(2)

4.4.2 Use your equation to complete the following table:

<b>Input</b>	<b>7</b>		<b>13</b>	<b>15</b>
<b>Output</b>		<b>29</b>		

(5)

**Total 75**

(School Name)  
(District)

**MATHEMATICS**

**GRADE 8 CONTROL TEST**

**TERM 2**

**(Date)**

**MARKS: 75**

**TIME : 1 HOUR 30 MIN**

**LEARNER NAME: Memorandum**

**LEARNER CLASS: \_\_\_\_\_**

**EXAMINER: \_\_\_\_\_**

**MODERATOR: \_\_\_\_\_**

**INSTRUCTIONS**

1. Show ALL calculations clearly.
2. Round off ALL the final answers to TWO decimal places, unless stated otherwise.
3. The use of Tippex or any other correction fluid is NOT allowed.
4. Write neatly and legibly.
5. This paper consists of \_\_\_\_\_ pages and is a fill-in paper. No extra pages will be necessary.
6. This paper consists of \_\_\_\_\_ questions. All must be answered.
7. You are allowed to use a scientific, non-programmable calculator unless stated otherwise.

## Question 1 – Multiple Choice [10]

For each of the following questions, choose the correct answer. Circle or highlight the answer you chose.

- 1.1 The order of the numbers is not important when we add or multiply two numbers. What is this property called?
- a) Associative property.                      b) Bodmas property.  
c) Commutative property.                      d) Distributive property.                      (2)
- 1.2 For which operation is the number, one, the identity element?
- a) Multiplication                                  b) Subtraction  
c) Addition    d) Scientific notation.                      (2)
- 1.3 Which of the following numbers would be the additive inverse of  $-21$ ?
- a)  $-7 + 3$     b)  $-3 + 7$   
c)  $-31 + 10$                                       d) 21    (2)
- 1.4 In the term,  $a^5$ , the “a” is referred to as the . . .
- a) power    b) coefficient  
c) index    d) base    (2)
- 1.5 The general rule of a pattern, is given as  $y = 3n + 1$ . What does the variable,  $n$ , indicate?
- a) represents the value  
b) the position of a term in a pattern.  
c) the rule to determine  $y$ .  
d) a constant.                                      (2)

## Question 2 – [32]

- 2.1 Maxine has to mix her baby’s milk powder in the ratio of one part of milk powder to four parts of water.
- 2.1.1 Give the ratio of this mix for milk powder: water.                      (1)

1: 4

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- 2.1.2 If she had to prepare a bottle containing 30ml of milk, how many millilitres of powder will she require? (3)

$$1 + 4 = 5$$

$$\frac{1}{5} \times 30 = 6ml$$

- 2.1.3 Her baby consumes six of these 30ml bottles of milk per day. How many days will a 500ml tin of milk powder last her? Round your answer off to the nearest whole number. (3)

$$1 \text{ day} \times 6 \text{ bottles} \times 6ml = 36 \text{ ml per day}$$

$$500 \div 36 = 13.89 \text{ days}$$

$$\therefore 13 \text{ full days}$$

- 2.2 Calculate the following:

2.2.1  $\left[\frac{-39}{-13} - (-11)\right] \div (-2)$  (3)

$$= [3 + 11] \div (-2)$$

$$= 14 \div (-2)$$

$$= -7$$

2.2.2  $-76 - (5)(-8)$  (2)

$$= -76 + 40$$

$$= -36$$

2.3 Calculate the following:

2.3.1  $\frac{1}{2}$  of  $\frac{3}{4} + \frac{1}{5}$  (4)

$$= \frac{1}{2} \times \frac{3}{4} + \frac{1}{5}$$

---

$$= \frac{3}{8} + \frac{1}{5}$$

---

$$= \frac{15}{40} + \frac{8}{40}$$

---

$$= \frac{23}{40}$$

---

2.3.2  $7\frac{1}{3} - 2\frac{5}{7}$  (5)

$$= \frac{22}{3} - \frac{19}{7}$$

---

$$= \frac{154}{21} - \frac{57}{21}$$

---

$$= \frac{97}{21}$$

---

$$= 4\frac{13}{21}$$

---

2.3.3  $5\frac{1}{3} \div \frac{4}{9}$  (3)

$$= \frac{16}{3} \times \frac{9}{4}$$

---

$$= 12$$

---

---

---

2.4 Write the following in exponential form.

2.4.1  $\frac{3 \times 3 \times 3}{2 \times 2 \times 2}$  (2)

$$= \frac{3^3}{2^3}$$

---

---

---

---

$$2.4.2 \quad \frac{89 \times 89}{100 \times 100 \times 100} \quad (2)$$

$$= \frac{89^2}{100^3}$$


---



---



---

2.5 Calculate the following:

$$2.5.1 \quad \sqrt{\frac{49}{121}} \quad (2)$$

$$= \frac{7}{11}$$


---



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$$2.5.2 \quad \sqrt[3]{\frac{64}{125}} \quad (2)$$

$$= \frac{4}{5}$$


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### Question 3 – [10]

Simplify the following:

$$3.1 \quad a^3 \times a^2 \times a \quad (2)$$

$$= a^{3+2+1}$$

$$= a^6$$


---



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$$3.2 \quad (t^3)^3 \quad (2)$$

$$= t^{3 \times 3}$$

$$= t^3$$

$$3.3 \quad \frac{x^7}{x^2} \quad (2)$$

$$= x^{7-2}$$

$$= x^5$$

$$3.4 \quad \sqrt[3]{125y^{18}} \quad (2)$$

$$= 5y^{18 \div 3}$$

$$= 5y^6$$

$$3.5 \quad \sqrt[3]{0,064t^6} \quad (2)$$

$$= 0,4t^{6 \div 3}$$

$$= 0,4t^2$$

#### Question 4 – [23]

4.1 Complete the next two terms in each of the following number sequences:

$$4.1.1 \quad 11; 7; 3; -2; -7; \quad (2)$$

$$4.1.2 \quad 29; 19; 9; -1; -11; \quad (2)$$

$$4.1.3 \quad -12; -7; -2; 3; 8; \quad (2)$$



4.2 The following formula is given:

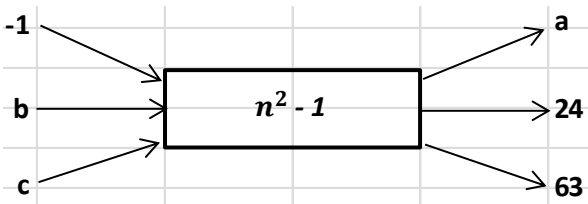
$$T_n = 4n - 1$$

Complete the following table:

(4)

$n$	-1	1	3	5
$T_n$	-5	3	11	19

4.3 Determine the value of  $a$ ,  $b$  and  $c$  in the following flow diagram:



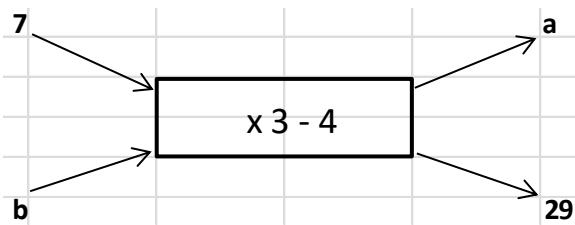
(6)

$$a = (-1)^2 - 1 \quad b^2 - 1 = 24 \quad c^2 - 1 = 63$$

$$a = 0 \quad b^2 = 25 \quad c^2 = 64$$

$$b = 5 \quad c = 8$$

4.4 The following flow diagram is given:



4.4.1 If the input value of the above diagram is  $n$  and the output value is  $y$ , then write an equation for this diagram in the form  $y = . . .$

(2)

$$y = 3x - 4$$

4.4.2 Use your equation to complete the following table:

<b>Input</b>	<b>7</b>	<b>11</b>	<b>13</b>	<b>15</b>
<b>Output</b>	<b>17</b>	<b>29</b>	<b>35</b>	<b>41</b>

(5)

Total 75

(School Name)  
(District)

**MATHEMATICS**

**GRADE 8 GEOMETRY PROJECT**

**TERM 3**

**(Date)**

**MARKS: 50**

**TIME: 2 Periods**

**LEARNER NAME:** \_\_\_\_\_

**LEARNER CLASS:** \_\_\_\_\_

**EXAMINER:** \_\_\_\_\_

**MODERATOR:** \_\_\_\_\_

**Summer Sun Town Development**

**Job Title: Urban Planner**

Welcome to the Urban Planning Consulting Group. You have been hired as our lead Urban Planner for our exciting new project: Summer Sun Town! Your focus in this position will be to design the new town Summer Sun on an empty piece of land.

You will use your knowledge of lines, angles and triangles to plan Summer Sun Town. Lines will represent the roads. Triangles will represent buildings or parcels of land (land that is formed by boundaries created from the roads).

You will use a ruler to draw all of the straight lines on your map. Use the checklist below to ensure that you include everything required in Summer Sun Town. Use the attached sheet provided for your project. Do not exceed the space provided.

## Checklist:

You must include the following:

- a) One pair of streets that are **parallel** (draw in BLUE and label them Lake Lane and Blue Sky Street. (5)
- b) A second pair of streets that are **parallel** that run in a different direction than the first pair (draw in PURPLE and label them Picnic Palace and Popsicle Parkway). (5)
- c) 1 Street that is **perpendicular** to Lake Lane (draw in GREEN and label it Green Grass Street) (3)
- d) 1 Street that is **perpendicular** to Picnic Palace (draw in RED and label it Rose Road). (3)
- e) Use a **protractor** to draw two transversal streets:
  - One forming an acute angle of **40 degrees** (draw in ORANGE and label it Sunset Street).
  - One forming an obtuse angle of **135 degrees** (draw in BROWN and label it Sandcastle Crescent) (4)
- f) Three triangle shaped buildings or fields:
  - One **scalene** triangle (draw in BLUE and label angles and sides)
  - One **equilateral** triangle (draw in GREEN and label angles and sides)
  - One **isosceles** triangle (draw in RED and label angles and sides) (9)
- g) At least one additional **quadrilateral** (draw in BLACK and label it City Hall. Indicate any properties of the quadrilateral that you notice) (5)
- h) Label as many angles as you can **without using a protractor**. Use your knowledge of parallel lines. (6)
- i) Add any other details to the map. (E.g. Title, north arrow, scale, additional buildings/streets – include angles and any relationships that you find.) (10)

**Total 50**

(School Name)  
(District)

**MATHEMATICS**

**GRADE 8 GEOMETRY PROJECT**

**TERM 3**

**(Date)**

**MARKS: 50**

**TIME: 2 Periods**

**LEARNER NAME:** **Marking Guidelines**

**LEARNER CLASS:** \_\_\_\_\_

**EXAMINER:** \_\_\_\_\_

**MODERATOR:** \_\_\_\_\_

**Summer Sun Town Development**

**Job Title: Urban Planner**

Welcome to the Urban Planning Consulting Group. You have been hired as our lead Urban Planner for our exciting new project: Summer Sun Town! Your focus in this position will be to design the new town Summer Sun on an empty piece of land.

You will use your knowledge of lines, angles and triangles to plan Summer Sun Town. Lines will represent the roads. Triangles will represent buildings or parcels of land (land that is formed by boundaries created from the roads).

You will use a ruler to draw all of the straight lines on your map. Use the checklist below to ensure that you include everything required in Summer Sun Town. Use the attached sheet provided for your project. Do not exceed the space provided.

## Checklist:

You must include the following:

- a) One pair of streets that are **parallel** (draw in BLUE and label them Lake Lane and Blue Sky Street. (5)

2 Mark for parallel lines, 1 Mark correct colour, 2 Mark for labelling correctly

- b) A second pair of streets that are **parallel** that run in a different direction than the first pair (draw in PURPLE and label them Picnic Palace and Popsicle Parkway). (5)

2 Mark for parallel lines, 1 Mark correct colour, 2 Mark for labelling correctly

- c) 1 Street that is **perpendicular** to Lake Lane (draw in GREEN and label it Green Grass Street) (3)

1 Mark for perpendicular, 1 Mark for colour, 1 Mark for labelling correctly

- d) 1 Street that is **perpendicular** to Picnic Palace (draw in RED and label it Rose Road). (3)

1 Mark for perpendicular, 1 Mark for colour, 1 Mark for labelling correctly

- e) Use a **protractor** to draw two transversal streets:

- One forming an acute angle of **40 degrees** (draw in ORANGE and label it Sunset Street).
- One forming an obtuse angle of **135 degrees** (draw in BROWN and label it Sandcastle Crescent) (4)

1 Mark each for correct degrees and 1 Mark each for correct colour

- f) Three triangle shaped buildings or fields:

- One **scalene** triangle (draw in BLUE and label angles and sides)
- One **equilateral** triangle (draw in GREEN and label angles and sides)
- One **isosceles** triangle (draw in RED and label angles and sides) (9)

3 Marks each: 1 for correct shape, 1 for correct colour and 1 for labelling sides and angles

- g) At least one additional **quadrilateral** (draw in BLACK and label it City Hall. Indicate any properties of the quadrilateral that you notice) (5)

1 Mark for quadrilateral, 1 Mark for correct colour, 1 Mark for correct label, 2 Marks for indicated properties

- h) Label as many angles as you can **without using a protractor**.

Use your knowledge of parallel lines. (6)

Use your own discretion. In theory, it is possible to label all angles, but look at the effort the learner put into the project and be fair with this mark.

- i) Add any other details to the map. (E.g. Title, north arrow, scale, additional buildings/streets – include angles and any relationships that you find.) (10)

Look at creativity and effort. More extras warrant higher marks

**Total 50**

(School Name)  
(District)

**MATHEMATICS**

**GRADE 8 CONTROL TEST**

**TERM 3**

**(Date)**

**MARKS: 50**

**TIME : 1 HOUR**

**LEARNER NAME:** \_\_\_\_\_

**LEARNER CLASS:** \_\_\_\_\_

**EXAMINER:** \_\_\_\_\_

**MODERATOR:** \_\_\_\_\_

**INSTRUCTIONS**

1. Show ALL calculations clearly.
2. Round off ALL the final answers to TWO decimal places, unless stated otherwise.
3. The use of Tippex or any other correction fluid is NOT allowed.
4. Write neatly and legibly.
5. This paper consists of 6 pages and is a fill-in paper. No extra pages will be necessary.
6. This paper consists of 3 questions. All must be answered.
7. You are allowed to use a scientific, non-programmable calculator unless stated otherwise.

## QUESTION 1

- 1.1 What is the sum of the interior angles of a scalene triangle?
- |                |                |     |
|----------------|----------------|-----|
| a) $360^\circ$ | b) $180^\circ$ |     |
| c) $90^\circ$  | d) $185^\circ$ | (2) |
- 1.2 Which one of the following properties of a rhombus is correct?
- |  |     |
|--|-----|
| a) opposite angles are equal to $90^\circ$ |     |
| b) two opposite sides are equal in length. |     |
| c) opposite angles are equal.              |     |
| d) none of the above.                      | (2) |
- 1.3 By how many degrees does a revolution differ from a straight angle?
- |                |     |
|----------------|-----|
| a) $90^\circ$  |     |
| b) $180^\circ$ |     |
| c) $270^\circ$ |     |
| d) $360^\circ$ | (2) |
- 1.4 A shape which has its opposite sides both equal and parallel to each other, with angles  $\neq 90^\circ$  is called a ....
- |                  |     |
|------------------|-----|
| a) Square        |     |
| b) Rectangle     |     |
| c) Parallelogram |     |
| d) Kite          | (2) |

**TOTAL QUESTION 1: [8]**

## Question 2

- 2.1 Consider the following algebraic expression:

$$2x - 5 - 7x + 4x^2 - x$$

- 2.1.1 Identify the variable. (1)

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- 2.1.2 Identify the number of terms. (1)

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- 2.1.3 The coefficient of  $x^2$  (1)

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2.1.4 The constant term (1)

---

---

2.2 Simplify:

2.2.1  $-2x + 5 + 10x - 9$  (2)

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2.2.2  $5x^2 - 3x + 1 - (5x^2 - x + 6)$  (3)

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2.2.3  $3(x + 7) + 2(-x + 4) + 5x$  (3)

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2.2.4  $\sqrt[3]{\frac{8a^3}{27b^6}}$  (2)

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2.2.5  $\frac{36e^2f - 24ef^2 - 18ef}{-6ef}$  (3)

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2.3 Write the following as algebraic expressions:

2.3.1 Add  $3y$  to the sum of  $5y$  and  $4y$ . (2)

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2.4 Calculate the value of:

2.4.1  $8a^2bc$  if  $a = 2$ ;  $b = \frac{1}{2}$  and  $c = -3$  (2)

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2.4.2  $2mr^3 + 3mr^2$  if  $m = 3$  and  $r = 2$  (2)

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**TOTAL QUESTION 2: [23]**

### QUESTION 3

3.1 Are the following statements true or false? Justify your answer.

3.1.1  $x - 3 = 0$  if  $x = -3$  (2)

---

---

3.1.2  $x^3 = 8$  if  $x = -2$  (2)

---

---

3.1.3  $6x + 5 = 47$  if  $x = 7$  (2)

---

---

3.2 Solve the following. Show all calculations.

3.2.1  $11c - 4 = 2c + 5$  (2)

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3.2.2  $\frac{5x}{3} - 2 = 2x + 1$  (2)

---

---

---

---

3.2.3  $3(a + 3) = 2(2 - a)$  (3)

---

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---

---

3.2.4  $4(c - 3) + 2(c - 3) = 0$  (3)

---

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3.3 Tim's father is twice as old as he is. Together they are 63 years old.

3.3.1 If Tim is  $x$ -years old, write an expression for his father's age. (1)

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---

3.3.2 Work out how old Tim is. Show all your calculations. (2)

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**TOTAL QUESTION 3: [19]**

**MATHEMATICS**  
**GRADE 8**  
**TERM 3**  
**TEST**  
**MARKING GUIDELINES**

**Taxonomy level summary**

Question	Thinking Levels			
	Knowledge	Routine Procedure	Complex Procedure	Problem Solving
1.1	2			
1.2	2			
1.3	1	1		
1.4	2			
2.1.1	1			
2.1.2	1			
2.1.3	1			
2.1.4	1			
2.2.1	2			
2.2.2		3		
2.2.3		3		
2.2.4			2	
2.2.5		3		
2.3.1	1			
2.4.1		2		
2.4.2			2	
3.1.1	2			
3.1.2	2			
3.1.3		2		
3.2.1		2		
3.2.2		2		
3.2.3		3		
3.2.4			3	
3.2.5			3	
3.3.1			1	
3.3.2				2
<b>Total</b>	<b>18</b>	<b>21</b>	<b>11</b>	<b>2</b>
<b>%</b>	<b>36</b>	<b>42</b>	<b>22</b>	<b>4</b>

Question	Solution	Explanation		Marks
<b>Q1</b>				
1.1	B ✓	Answer	=2	(8)
1.2	C ✓	Answer	=2	
1.3	B ✓	Answer	=2	
1.4	C ✓	Answer	=2	
		<b>TOTAL</b>		<b>[8]</b>
<b>Q2</b>				
2.1.1	$x$ ✓	Answer	=1	(1)
2.1.2	5 terms ✓	Answer	=1	(1)
2.1.3	4 ✓	Answer	=1	(1)
2.1.4	-5 ✓	Answer	=1	(1)
2.2.1	$8x - 4$ ✓	Answer	=2	(2)
2.2.2	$5x^2 - 3x + 1 - 5x^2 + x - 6$ ✓ $= -2x + 7$ ✓	Change symbol Answer	=1 =2	(3)
2.2.3	$3x + 21 - 2x + 8 + 5x$ ✓ $= 6x + 29$ ✓	Method Answer	=1 =2	(3)
2.2.4	$\frac{2a}{3b^2}$ ✓	Answer	=2	(2)
2.2.5	$-6e + 4f + 3$ ✓	Answer	=3	(3)
2.3.1	$(5y + 4y) + 3y$ ✓	Answer	=2	(2)
2.4.1	$8(2)^2 \left(\frac{1}{2}\right)(-3)$ ✓ $= 8(-6)$ $= -48$ ✓	Substitution  Answer	=1  =1	(2)
2.4.2	$2(3)(2)^3 + 3(3)(2)^2$ ✓ $= 48 + 36$ $= 84$ ✓	Substitution  Answer	=1  =1	(2)
		<b>TOTAL</b>		<b>[23]</b>
<b>Q3</b>				
3.1.1	False ✓ LHS $\neq$ RHS ✓ $x = 3$	Answer Reason	=1 =1	(2)
3.1.2	False ✓ LHS $\neq$ RHS ✓ $x = 2$	Answer Reason	=1 =1	(2)
3.1.3	True ✓ LHS = RHS ✓	Answer Reason	=1 =1	(2)
3.2.1	$9c = 9$ ✓ $c = 1$ ✓	Method Answer	=1 =1	(2)

3.2.2	$5x - 6 = 6x + 3$ ✓ $-x = 9$ $x = -9$ ✓	Method	=1	(2)
		Answer	=1	
3.2.3	$3a + 9 = 4 - 2a$ ✓ $5a = -5$ ✓ $a = -1$ ✓	Method	=2	(3)
		Answer	=1	
3.2.4	$4c - 12 + 2c - 6 = 0$ ✓ $6c = 18$ ✓ $c = 3$ ✓	Method	=2	(3)
		Answer	=1	
3.3.1	$2x$ ✓	Answer	=1	(1)
3.3.2	$x + 2x = 63$ ✓ $x = 21$ ✓	Method	=1	(2)
		Answer	=1	
		<b>TOTAL</b>		<b>[19]</b>

**(School Name)**  
**(District)**

**MATHEMATICS**

**GRADE 8 CONTROL TEST**

**TERM 4**

**(Date)**

**MARKS: 60**

**TIME : 1,5 HOUR**

**LEARNER NAME:** \_\_\_\_\_

**LEARNER CLASS:** \_\_\_\_\_

**EXAMINER:** \_\_\_\_\_

**MODERATOR:** \_\_\_\_\_

**INSTRUCTIONS**

1. Show ALL calculations clearly.
2. Round off ALL the final answers to TWO decimal places, unless stated otherwise.
3. The use of Tippex or any other correction fluid is NOT allowed.
4. Write neatly and legibly.
5. This paper consists of 7 pages and is a fill-in paper. No extra pages will be necessary.
6. This paper consists of 4 questions. All must be answered.
7. You are allowed to use a scientific, non-programmable calculator unless stated otherwise.

## QUESTION 1

- 1.1 Refer to the following algebraic expression and answer the questions that follow:

$$-4 + 3t^2 - 2t(5 - t)$$

- 1.1.1 Name the type of expression (1)

---

---

- 1.1.2 What is the coefficient of  $t$  in the bracket? (1)

---

---

- 1.1.3 What is the constant term? (1)

---

---

- 1.1.4 Simplify the expression using the correct algebraic convention. (3)

---

---

- 1.1.5 Name the type of expression of your simplified answer. (1)

---

---

- 1.2 Write the following in algebraic language and solve for  $x$ : (2)

“ $x$  is doubled and the term is then squared, equals the cube root of the difference between sixty five and seven to the power of zero.”

---

---



1.3 Calculate each of the following:

1.3.1  $2(2p)^3 + (q - p)(-4p + q)$  IF  $p = 2$  and  $q = 5$  (3)

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1.3.2  $\frac{(3x-5y)}{(2x-y)} - y^1$  IF  $x = 6$  and  $y = -2$  (3)

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**TOTAL QUESTION 1: [15]**

**QUESTION 2**

2.1 Solve the following equations fully.

2.1.1  $\frac{5}{y} = 17 - 2$  (3)

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2.1.2  $8x - 4 = 2(3x + 5)$  (4)

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2.1.3  $3a + 4 = 25$  (2)

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2.1.4  $\frac{6x}{5} - 5 = 7$  (3)

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---

2.2 Simplify the following:

2.2.1  $a^3 \times a^2 \times a$  (2)

---

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2.2.2  $(t^3)^3$  (2)

---

---

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2.2.3  $\frac{x^7}{x^2}$  (2)

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**TOTAL QUESTION 2: [18]**

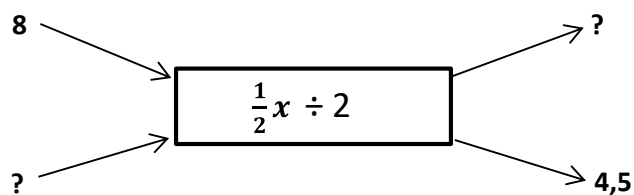
**QUESTION 3**

3.1 Complete the next 2 terms of the following number sequence:  
-12 ; -7 ; -2 ; ... ; ... ; (2)

---

---

3.2 Rewrite the following flow diagram in the form of an input  $x$ , output  $y$  table and calculate the missing values.



(4)

Input, $x$	8	
Output, $y$		4,5

3.3 Look at the following table:

$x$	2	5	8	11	14
$y$	1	7	13	-	-

3.3.1 Determine the general rule for the table.

(3)

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3.3.2 Complete the missing values in the table, using the rule.

(2)

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**TOTAL QUESTION 3: [11]**

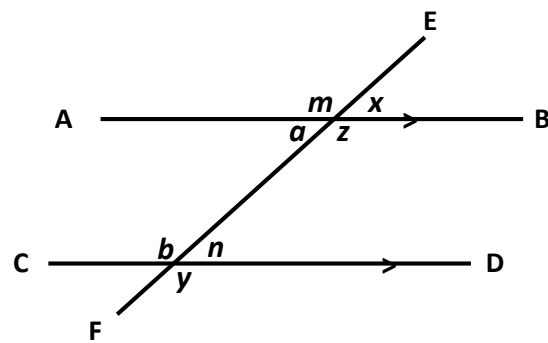
#### QUESTION 4

4.1 Complete the following table with all the values:

(6)

Type of Triangle	Number of Equal Angles	Number of Equal Sides	Size of the Exterior Angle
Equilateral			
Scalene			

- 4.2 Refer to the drawing below and answer True or False to each of the questions that follow. Reasons must be given for all your answers.



- 4.2.1  $\angle b + \angle z$  form complimentary angles. (2)

---



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- 4.2.2  $180^\circ - \angle b = \angle a$  (2)

---



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- 4.2.3  $\angle m = \angle z = \angle b$  (3)

---



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- 4.2.4 Line FE is called a vertex. (1)

---



---

- 4.2.5  $\angle n = \angle z$  (2)

---



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**TOTAL QUESTION 4 [16]**

**MATHEMATICS**  
**GRADE 8**  
**TERM 4**  
**TEST**  
**MARKING GUIDELINES**

**Taxonomy level summary**

Question	Thinking Levels			
	Knowledge	Routine Procedure	Complex Procedure	Problem Solving
1.1.1	1			
1.1.2	1			
1.1.3	1			
1.1.4		3		
1.1.5	1			
1.2				2
1.3.1			3	
1.3.2			3	
2.1.1		3		
2.1.2			4	
2.1.3		2		
2.1.4		3		
2.2.1		2		
2.2.2		2		
2.2.3		2		
3.1	2			
3.2			4	
3.3.1				3
3.3.2	2			
4.1	6			
4.2.1		2		
4.2.2		2		
4.2.3		3		
4.2.4	1			
4.2.5		2		
<b>Total</b>	<b>15</b>	<b>26</b>	<b>14</b>	<b>5</b>
<b>%</b>	<b>25</b>	<b>43.3</b>	<b>23.3</b>	<b>8.4</b>

Question	Solution	Explanation		Marks
<b>Q1</b>				
1.1.1	Trinomial ✓	Answer	= 1	(1)
1.1.2	Coefficient = -1 ✓	Answer	= 1	(1)
1.1.3	Constant = -4 ✓	Answer	= 1	(1)
1.1.4	$-4 + 3t^2 - 2t(5 - t)$ $= -4 + 3t^2 - 10t + 2t^2$ ✓ $= 5t^2 - 10t - 4$ ✓	Method Answer	= 2 = 1	(3)
1.1.5	Trinomial ✓	Answer	= 1	(1)
1.2	$(2x)^2 = \sqrt[3]{65 - 7^0}$ ✓	Answer	= 2	(2)
1.3.1	$2(2 \times 2)^3 + (5 - 2)(-4 \times 2 + 5)$ ✓ $= 2(4)^3 + 3(-3)$ $= 128 - 9$ ✓ $= 119$ ✓	Substitution Method  Answer	= 1 = 1  = 1	(3)
1.3.2	$\frac{3(b) - 5(-2)}{(2(6) - (-2))} - (-2)$ ✓ $= \frac{18 + 10}{12 + 2} + 2$ $= \frac{28}{14} + 2$ ✓ $= 4$ ✓	Substitution  Method  Answer	= 1  = 1  = 1	(3)
<b>[15]</b>				
<b>Q2</b>				
2.1.1	$17y - 2y = 5$ ✓ $\therefore 15y = 5$ ✓ $\therefore y = \frac{1}{3}$ ✓	Method Method Answer	= 1 = 1 = 1	(3)
2.1.2	$8x - 4 = 6x + 10$ ✓ $\therefore 8x - 6x = 10 + 4$ ✓ $\therefore 2x = 14$ ✓ $\therefore x = 7$ ✓	Remove brackets Method  Answer	= 1 = 2  = 1	(3)
2.1.3	$\therefore 3a = 21$ $\therefore a = 7$	Method Answer	= 1 = 1	(2)
2.1.4	$\therefore \frac{6x}{5} = 12$ $\therefore 6x = 60$ $\therefore x = 10$	Method  Answer	= 2  = 1	(3)
2.2.1	$= a^{3+2+1}$ ✓ $= a^6$ ✓	Add exponents Answer	= 1 = 1	(2)
2.2.2	$= t^{3 \times 3}$ ✓ $= t^9$ ✓	Multiply exponents Answer	= 1 = 1	(2)
2.2.3	$= x^{7-2}$ ✓ $= x^5$ ✓	Minus exponents Answer	= 1 = 1	(2)
<b>[18]</b>				

Q3							
3.1	3 ✓; 8 ✓;				One mark each	= 2	(2)
3.2	Input, $x$	8	18 ✓✓		Correct values two marks each	= 4	(4)
	Output, $y$	2 ✓✓	4,5				
3.3.1	$y = 2x - 3$				$y$ 2 −3	= 1 = 1 = 1	(3)
3.3.2	$2(11) - 3 = 19$ $2(14) - 3 = 25$				One mark each	= 2	(2)
[11]							
Q4							
4.1	Type of Triangle	Number of Equal Angles	Number of Equal Sides	Size of the Exterior Angle	One mark per answer	= 6	(6)
	Equilateral	3 ✓	3 ✓	120° ✓			
	Scalene	0 ✓	0 ✓	= sum int opp $\angle$ s ✓			
4.2.1	False They form alternate angles				Answer Reason	= 1 = 1	(2)
4.2.2	True $\angle a$ and $\angle b$ are supplementary angles				Answer Reason	= 1 = 1	(2)
4.2.3	True $\angle m$ and $\angle z$ are vertically opposite angles And $\angle z$ and $\angle b$ are alternate angles				Answer Reason Reasons	= 1 = 1 = 1	(3)
4.2.4	False It is a transversal				Answer	= 1	(2)
4.2.5	False $\angle n$ and $\angle z$ are complimentary $\therefore \angle n = 180^\circ - \angle z$				Answer Reason	= 1 = 1	(2)
[16]							
Grand Total [60]							



## 4.7: Exemplars of the 5 Forms of Summative Assessment, in Mathematics Grade 9, according to Senior Phase CAPS

**(School Name)**  
**(District)**

**Task:** Assignment Term 1:  
Whole numbers and Integers

**Grade:** 9

**Examiner:**

**Moderator:**

**Total:** 40

**Time:** 2 Periods

**Name:** \_\_\_\_\_ **Class:** \_\_\_\_\_ **Date:** \_\_\_\_\_

### Instructions and information

- ✓ This is a fill in question paper. You will need no extra paper for this iassignment.
- ✓ This question paper consists of 2 pages.
- ✓ Answer ALL the questions.
- ✓ Show ALL of the working you use in order to obtain the correct answers.
- ✓ You are allowed to use a non-programmable scientific calculator where necessary and appropriate, unless the question states otherwise.
- ✓ Answers only will NOT necessarily be awarded full marks.
- ✓ If necessary round off to TWO decimal places.
- ✓ Write neatly and legibly.

### Question 1 [6]

Complete the following table by classifying each of the numbers.

Number	$\mathbb{R}$	Non-real	$\mathbb{Q}$	$\mathbb{Q}'$	$\mathbb{Z}$	$\mathbb{N}_o$	$\mathbb{N}$
Ex. 0,4	×		×				
$\sqrt{49}$							
1,07							
$\sqrt{-2}$							
4,778...							
15							
0,3							

## Question 2 [22]

Ratio shows the relationship between two or more amounts (remember the amounts must be in the same units).

Rate indicates the relationship between two or more quantities with different units.

2.1 Write the following ratios in their simplest form:

a) 90:125

(1)


b) 6 hours: 30 min

(2)


2.2 Answer the following increasing and decreasing ratios:

a) Increase 11,47kg in the ratio of 11:7

(2)


b) Decrease R2 980 in the ratio of 5:6

(2)


2.3 Answer the following questions on the division of quantities in a given ratio:

a) Divide 2 100 in the ratio of 3:4 (3)


b) Divide R2 400 in the ratio of 1:2:3 (4)


2.4 Answer the following questions about rate:

a) Which is fastest; 664km travelled in 6 hours or 421km in 4 hours? (5)


- b) Lebo buys seven ice creams for R37,65. How much will five ice creams cost? (3)


### Question 3 [12]

- 3.1 Complete the following by inserting  $<$ ,  $>$  or  $=$  (3)

a)  $-67\,133 \square -177\,988$

b)  $-8^{\circ}\text{C} \square -12^{\circ}\text{C}$

c)  $0 \square -397$

- 3.2 Simplify:

a)  $146 - (-67)$  (2)

b)  $(-15) + (-12) + 14$  (1)



c)  $-12 \times -7 - 24 \div 4$  (3)

d)  $3^3 - 2^3 + 6^2 - (-5)^2$  (3)



**Total: 40**

**(School Name)**  
**(District)**

**Task:** Assignment Term 1:  
Whole numbers and Integers  
**Grade:** 9

**Examiner:**  
**Moderator:**  
**Total:** 40  
**Time:** 2 Periods

**Name:** Memorandum

**Class:** \_\_\_\_\_

**Date:** \_\_\_\_\_

**Instructions and information**

- ✓ This is a fill in question paper. You will need no extra paper for this iassignment.
- ✓ This question paper consists of 2 pages.
- ✓ Answer ALL the questions.
- ✓ Show ALL of the working you use in order to obtain the correct answers.
- ✓ You are allowed to use a non-programmable scientific calculator where necessary and appropriate, unless the question states otherwise.
- ✓ Answers only will NOT necessarily be awarded full marks.
- ✓ If necessary round off to TWO decimal places.
- ✓ Write neatly and legibly.

**Question 1 [6]**

Complete the following table by classifying each of the numbers.

Number	$\mathbb{R}$	Non-real	$\mathbb{Q}$	$\mathbb{Q}'$	$\mathbb{Z}$	$\mathbb{N}_o$	$\mathbb{N}$
Ex. 0,4	×		×				
$\sqrt{49}$	×		×		×	×	×
1,07	×		×				
$\sqrt{-2}$		×					
4,778...	×			×			
15	×		×		×	×	×
0,3	×		×				

## Question 2 [22]

Ratio shows the relationship between two or more amounts (remember the amounts must be in the same units).

Rate indicates the relationship between two or more quantities with different units.

2.1 Write the following ratios in their simplest form:

a) 90:125

(1)

$= 18:25$

b) 6 hours: 30 min

(2)

$= 360:30$
$= 12:1$

2.2 Answer the following increasing and decreasing ratios:

a) Increase 11,47kg in the ratio of 11:7

(2)

$= 11,47 \times \frac{11}{7}$
$= 18,02 \text{ kg}$

b) Decrease R2 980 in the ratio of 5:6

(2)

$= 2980 \times \frac{5}{6}$
$= R2483,33$

2.3 Answer the following questions on the division of quantities in a given ratio:

a) Divide 2 100 in the ratio of 3:4 (3)

$3 + 4 = 7$	
$\frac{3}{7} \times 2100$	$\frac{4}{7} \times 2100$
$= 900$	$= 1200$

b) Divide R2 400 in the ratio of 1:2:3 (4)

$1 + 2 + 3 = 6$		
$\frac{1}{6} \times 2400$	$\frac{2}{6} \times 2400$	$\frac{3}{6} \times 2400$
$= 400$	$= 800$	$= 1200$

2.4 Answer the following questions about rate:

a) Which is fastest; 664km travelled in 6 hours or 421km in 4 hours? (5)

$s = \frac{d}{t}$	
$s = \frac{d}{t}$	$s = \frac{d}{t}$
$s = \frac{664}{6}$	$s = \frac{421}{4}$
$= 110,67 \text{ km/h} \leftarrow \text{Faster}$	$= 105,25 \text{ km/h}$

- b) Lebo buys seven ice creams for R37,65. How much will five ice creams cost? (3)

$7 \times \text{cost} = 37,65$
$\text{cost} = 37,65 \div 7$
$= R5,38$
For five: $5 \times 5,38 = R26,90$

### Question 3 [12]

3.1 Complete the following by inserting <, > or = (3)

- a)  $-67\ 133 < -177\ 988$       b)  $-8^{\circ}\text{C} < -12^{\circ}\text{C}$       c)  $0 < -397$

3.2 Simplify:

a)  $146 - (-67)$  (2)

$= 146 + 67$
$= 213$

b)  $(-15) + (-12) + 14$  (1)

$= -15 - 12 + 14$
$= -13$

c)  $-12 \times -7 - 24 \div 4$  (3)

$= 84 - 6$
$= 78$

d)  $3^3 - 2^3 + 6^2 - (-5)^2$  (3)

$= 27 - 8 + 36 - 25$
$= 30$

Total: 40



(School Name)  
(District)

**MATHEMATICS**

**GRADE 9 CONTROL TEST**

**TERM 1**

**(Date)**

**MARKS: 50**

**TIME : 1 HOUR 10 MIN**

**LEARNER NAME:** \_\_\_\_\_

**LEARNER CLASS:** \_\_\_\_\_

**EXAMINER:** \_\_\_\_\_

**MODERATOR:** \_\_\_\_\_

**INSTRUCTIONS**

1. Show ALL calculations clearly.
2. Round off ALL the final answers to TWO decimal places, unless stated otherwise.
3. Units of measurement MUST be indicated, where applicable.
4. Diagrams are NOT necessarily drawn to scale, unless stated otherwise.
5. Write neatly and legibly.
6. This paper consists of 9 pages and is a fill-in paper. No extra pages will be necessary.
7. This paper consists of 3 sections. All sections must be answered.
8. You are allowed to use a scientific, non-programmable calculator unless stated otherwise.

## Question 1 – Multiple Choice [10]

For each of the following questions, choose the correct answer. Circle or highlight the answer you chose.

1.1 Which of the following is a composite number?

- |       |       |     |
|-------|-------|-----|
| a) 1  | b) 39 |     |
| c) 23 | d) 17 | (2) |

1.2 Which of the following are real numbers?

- |                   |                      |     |
|-------------------|----------------------|-----|
| a) $\frac{22}{7}$ | b) $\sqrt{3}$        |     |
| c) $\sqrt{16}$    | d) All of the above. | (2) |

1.3 Calculate the answer to:

$$(-7) - 7 - (-7)$$

- |       |        |     |
|-------|--------|-----|
| a) +7 | b) +21 |     |
| c) -7 | d) -21 | (2) |

1.4 In the pattern, 1 ; 3 ; 5 ; 7 . . . , what would the value of  $n$  be in the equation  $T_n = 3n + 12$ ?

- |  |      |     |
|--|------|-----|
| a) 27  | b) 5 |     |
| c) 3   |      |     |
| d) This variable represents the term position. |      | (2) |

1.5 The answer to  $5^3 \times 5$  in exponential form is . . .

- |          |          |     |
|----------|----------|-----|
| a) $5^2$ | b) $5^3$ |     |
| c) $5^4$ | d) $5^1$ | (2) |

## Question 2 – Whole Numbers and Integers [29]

2.1 A 500ml bottle of fruit juice concentrate, is sold for R21,99.

2.1.1 Calculate the cost per liter of concentrate. (2)

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---

---

2.1.2 The instructions on the bottle state that it must be mixed in the ratio of one part of concentrate to seven parts of water. How many milliliters of concentrate will be needed to make one liter of fruit juice? (3)

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2.1.3 How many liters of fruit juice can be made from one bottle of concentrate? (2)

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2.1.4 Calculate the cost/liter of fruit juice mixture made from one bottle of concentrate. (2)

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---

---

2.2 Calculate the following:

2.2.1  $[(3)^2 \times (-2)^3] + \sqrt[3]{-216}$  (3)

---



---



---



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---

2.2.2 The temperature recorded in Oymyakon in Russia on 21 Nov. 2016, was  $-40^{\circ}\text{C}$ . On the same day, the temperature in Buena Vista in Mexico, was  $24^{\circ}\text{C}$ . What is the difference in temperature between these two places? (2)

---



---



---



---



---

2.3 Complete the following table by classifying each of the given numbers. (6)

Number	$\mathbb{R}$	Non-real	$\mathbb{Q}$	$\mathbb{Q}'$	$\mathbb{Z}$	$\mathbb{N}_o$	$\mathbb{N}$
$\sqrt{49}$							
1,07							
$\sqrt{-2}$							
4,778...							
15							
$0,\dot{3}$							

### Question 3 – Exponents [11]

Simplify the following:

3.1  $\frac{3^4 t^7}{2^4 t^4}$  (2)

---

---

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---

3.2  $5^0 \times 5^1 \times 5 \times 5 \times 5$  (2)

---

---

---

---

---

3.3  $(ab)^2 \times (ab)^3$  (2)

---

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3.4  $\frac{p^3}{(-q)^3}$  (2)

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3.5  $19x^0 + 7^1 - (-5x + 3)$  (3)

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#### Question 4 – Patterns [9]

4.1 The general term of a pattern is given as:

$$T_n = a n + c$$

4.1.1 Use this equation to determine the values of A and B in the following table.  
Calculations must be shown.

Term Number	1	2	3	4	5	6
Term Value	11	18	25	32	A	B

(6)

---



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4.1.2 Use the above information to determine the 25<sup>th</sup> term of this pattern. (3)

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**Total 50**

(School Name)  
(District)

**MATHEMATICS**

**GRADE 9 CONTROL TEST**

**TERM 1**

**(Date)**

**MARKS: 50**

**TIME : 1 HOUR 10 MIN**

**LEARNER NAME: Memorandum**

**LEARNER CLASS: \_\_\_\_\_**

**EXAMINER: \_\_\_\_\_**

**MODERATOR: \_\_\_\_\_**

**INSTRUCTIONS**

1. Show ALL calculations clearly.
2. Round off ALL the final answers to TWO decimal places, unless stated otherwise.
3. Units of measurement MUST be indicated, where applicable.
4. Diagrams are NOT necessarily drawn to scale, unless stated otherwise.
5. Write neatly and legibly.
6. This paper consists of 9 pages and is a fill-in paper. No extra pages will be necessary.
7. This paper consists of 3 sections. All sections must be answered.
8. You are allowed to use a scientific, non-programmable calculator unless stated otherwise.



### Question 1 – Multiple Choice [10]

For each of the following questions, choose the correct answer. Circle or highlight the answer you chose.

1.1 Which of the following is a composite number?

- a) 1                      b) 39  
c) 23                     d) 17
- (2)

1.2 Which of the following are real numbers?

- a)  $\frac{22}{7}$   
b)  $\sqrt{3}$   
c)  $\sqrt{16}$   
d) All of the above.

1.3 Calculate the answer to:

$$(-7) - 7 - (-7)$$

- a) +7                      b) +21  
c) -7                      d) -21                      (2)

1.4 In the pattern, 1 ; 3 ; 5 ; 7 . . . , what would the value of  $n$  be in the equation  $T_n = 3n + 12$ ?

- a) 27                                  b) 5  
c) 3  
d) This variable represents the term position. (2)

1.5 The answer to  $5^3 \times 5$  in exponential form is . . .

- a)  $5^2$   
c)  $5^4$
- b)  $5^3$   
d)  $5^1$  (2)

## Question 2 – Whole Numbers and Integers [29]

2.1 A 500ml bottle of fruit juice concentrate, is sold for R21,99.

2.1.1 Calculate the cost per liter of concentrate. (2)

$$R21,99 \times 2$$

$$= R43,98$$

- 2.1.2 The instructions on the bottle state that it must be mixed in the ratio of one part of concentrate to seven parts of water. How many milliliters of concentrate will be needed to make one liter of fruit juice? (3)

$$C:W=1:7$$

$$1 + 7 = 8$$

$$1 \text{ liter} = 1000 \text{ ml}$$

$$\frac{1}{8} \times 1000 = 125 \text{ml}$$

- 2.1.3 How many liters of fruit juice can be made from one bottle of concentrate? (2)

$$1:7$$

$$500:?$$

$$7 \times 500 = 3500$$

$$\text{Total} = 3500 + 500 = 4000$$

$$\therefore 4l$$

- 2.1.4 Calculate the cost/liter of fruit juice mixture made from one bottle of concentrate. (2)

$$21,99 \div 4$$

$$= 5,4975$$

$$= R5,50$$

2.2 Calculate the following:

2.2.1  $[(3)^2 \times (-2)^3] + \sqrt[3]{-216}$  (3)

$$= [(9) \times (-8)] + (-6)$$

$$= -72 - 6$$

$$= -78$$

2.2.2 The temperature recorded in Oymyakon in Russia on 21 Nov. 2016, was  $-40^{\circ}\text{C}$ . On the same day, the temperature in Buena Vista in Mexico, was  $24^{\circ}\text{C}$ . What is the difference in temperature between these two places? (2)

$$\text{Difference} = \text{Big} - \text{Small}$$

$$= 24 - (-40)$$

$$= 64$$

2.3 Complete the following table by classifying each of the given numbers. (6)

Number	$\mathbb{R}$	Non-real	$\mathbb{Q}$	$\mathbb{Q}'$	$\mathbb{Z}$	$\mathbb{N}_0$	$\mathbb{N}$
$\sqrt{49}$	×		×		×	×	×
1,07	×		×				
$\sqrt{-2}$		×					
4,778...	×			×			
15	×		×		×	×	×
$0,\dot{3}$	×		×				

### Question 3 – Exponents [11]

Simplify the following:

3.1  $\frac{3^4 t^7}{2^4 t^4}$  (2)

$$= \frac{81t^3}{16}$$

---

---

---

---

3.2  $5^0 \times 5^1 \times 5 \times 5 \times 5$  (2)

$$= 5^4$$

$$= 625$$

---

---

---

---

3.3  $(ab)^2 \times (ab)^3$  (2)

$$= (ab)^5$$

$$= a^5 b^5$$

---

---

---

---

$$3.4 \quad \frac{p^3}{(-q)^3} \quad (2)$$

$$= \frac{p^3}{-q^3}$$


---



---



---



---

$$3.5 \quad 19x^0 + 7^1 - (-5x + 3) \quad (3)$$

$$= 19 + 7 + 5x - 3$$

$$= 23 + 5x$$


---



---



---



---

#### Question 4 – Patterns [9]

4.1 The general term of a pattern is given as:

$$T_n = a n + c$$

4.1.1 Use this equation to determine the values of A and B in the following table.  
Calculations must be shown.

Term Number	1	2	3	4	5	6
Term Value	11	18	25	32	A	B

(6)

$$T_n = 7n + 4$$


---

$$A = T_5 = 7(5) + 4 = 39$$


---

$$B = T_6 = 7(6) + 4 = 46$$


---



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---

4.1.2 Use the above information to determine the 25<sup>th</sup> term of this pattern. (3)

$$T_{25} = 7(25) + 4$$

$$= 179$$

**Total 50**

**(School Name)**  
**(District)**

**Task:** Investigation Term 2: Factorising

**Examiner:**

**Grade:** 9

**Moderator:**

**Total:** 50

**Time:** 2 Periods

**Name:** \_\_\_\_\_ **Class:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Instructions and information**

- ✓ This is a fill in question paper. You will need no extra paper for this assignment.
- ✓ This question paper consists of \_\_\_\_\_ pages.
- ✓ Answer ALL the questions.
- ✓ Show ALL of the working you use in order to obtain the correct answers.
- ✓ You are allowed to use a non-programmable scientific calculator where necessary and appropriate, unless the question states otherwise.
- ✓ Answers only will NOT necessarily be awarded full marks.
- ✓ If necessary round off to TWO decimal places.
- ✓ Write neatly and legibly.
- ✓ The use of Tippex or any other correction fluid is NOT allowed.

**Question 1 [30]**

1.1 Multiply the following binomials:

a)  $(a + 2)(a + 10)$  (3)


b)  $(m + 5)(m - 3)$  (3)


c)  $(a - 5)(a + 1)$  (3)


d)  $(m - 7)(4 + m)$  (3)


e)  $(x - 7)(1 + x)$  (3)



Look very carefully at your answers in each of the questions above. What relationship do you see between the coefficients and/or constants in the brackets and the coefficients of the final answer? (2)




1.3 Find the products of the following binomials:

a)  $(p - 1)(p + 1)$  (2)


b)  $(m + n)(m - n)$  (2)


c)  $(x^2 + 2)(x^2 - 2)$   
(2)


d)  $(1 - x^3)(1 + x^3)$  (3)


e)  $(2m + 3n)(2m - 3n)$  (2)



Look very carefully at your answers for the above products. What do you notice about the middle term? Why do you think this happens every time?  
(2)


### Question 2 [20]

Based on what you found in Question 1, factorise the following:  
Match Column A to Column B.

Column A	Column B	Answer
a) $k^2 - 16k + 64$	i) $(2x + 3y)(2x - y)$	a)
b) $m^2 + 7m - 18$	ii) $(2 + 7p)(2 - 7p)$	b)
c) $4x^2 + 4xy - 3y^2$	iii) $(z + x)(x + z)$	c)
d) $2x^2 + 4xy - 6y^2$	iv) $(x + 2y)(x - 2y)$	d)
e) $x^2 + 2xz + z^2$	v) $(1 - x)(1 + x)$	e)
f) $1 - x^2$	vi) $(k - 8)(k - 8)$	f)
g) $4t^2 - 25$	vii) $(3 - x)(3 + x)$	g)
h) $4 - 49p^2$	viii) $(x - y)(2x + 6y)$	h)
i) $9 - x^2$	ix) $(m + 9)(m - 2)$	i)
j) $x^2 - 4y^2$	x) $(2t + 5)(2t - 5)$	j)

**Total [50]**

**(School Name)**  
**(District)**

**Task:** Investigation Term 2: Factorising

**Examiner:**

**Moderator:**

**Grade:** 9

**Total:**

50

**Time:**

2 Periods

**Name:** Memorandum

**Class:** \_\_\_\_\_

**Date:** \_\_\_\_\_

**Instructions and information**

- ✓ This is a fill in question paper. You will need no extra paper for this assignment.
- ✓ This question paper consists of \_\_\_\_\_ pages.
- ✓ Answer ALL the questions.
- ✓ Show ALL of the working you use in order to obtain the correct answers.
- ✓ You are allowed to use a non-programmable scientific calculator where necessary and appropriate, unless the question states otherwise.
- ✓ Answers only will NOT necessarily be awarded full marks.
- ✓ If necessary round off to TWO decimal places.
- ✓ Write neatly and legibly.
- ✓ The use of Tippex or any other correction fluid is NOT allowed.

**Question 1 [30]**

1.1 Multiply the following binomials:

a)  $(a + 2)(a + 10)$  (3)

b)  $(m + 5)(m - 3)$  (3)

$= a^2 + 10a + 2a + 20$
$= a^2 + 12a + 20$

$= m^2 - 3m + 5m - 15$
$= m^2 + 2m - 15$

c)  $(a - 5)(a + 1)$  (3)

$= a^2 + a - 5a - 5$
$= a^2 - 4a - 5$

d)  $(m - 7)(4 + m)$  (3)

$= 4m + m^2 - 28 - 7m$
$= m^2 - 3m - 28$

e)  $(x - 7)(1 + x)$  (3)

$= x + x^2 - 7 - 7x$
$= x^2 - 6x - 7$


Look very carefully at your answers in each of the questions above. What relationship do you see between the coefficients and/or constants in the brackets and the coefficients of the final answer? (2)

Learner must mention the coefficients and constants are factors of the
coefficient of $x^2$ and the constant in each answer. In addition to that they must
see that the middle term is equal to the sum of the constants in the original
brackets. Each of these will earn 1 Mark.

1.3 Find the products of the following binomials:

a)  $(p - 1)(p + 1)$  (2)

$= p^2 + p - p - 1$
$= p^2 - 1$

b)  $(m + n)(m - n)$  (2)

$= m^2 - mn + mn - n^2$
$= m^2 - n^2$

c)  $(x^2 + 2)(x^2 - 2)$   
(2)

$= x^4 - 2x^2 + 2x^2 - 4$
$= x^4 - 4$

d)  $(1 - x^3)(1 + x^3)$  (3)

$= 1 + x^3 - x^3 - x^6$
$= 1 - x^6$

e)  $(2m + 3n)(2m - 3n)$  (2)

$= 4m^2 - 6mn + 6mn - 9n^2$
$= 4m^2 - 9n^2$


Look very carefully at your answers for the above products. What do you notice about the middle term? Why do you think this happens every time?  
(2)

Learner should mention that the middle term goes away or gets cancelled
every time. The cause should mention the different signs in the sets of
brackets. Each mention can earn only 1 Mark.

### Question 2 [20]

Based on what you found in Question 1, factorise the following:  
Match Column A to Column B.

Column A	Column B	Answer	
a) $k^2 - 16k + 64$	i) $(2x + 3y)(2x - y)$	a)	vi
b) $m^2 + 7m - 18$	ii) $(2 + 7p)(2 - 7p)$	b)	ix
c) $4x^2 + 4xy - 3y^2$	iii) $(z + x)(x + z)$	c)	i
d) $2x^2 + 4xy - 6y^2$	iv) $(x + 2y)(x - 2y)$	d)	viii
e) $x^2 + 2xz + z^2$	v) $(1 - x)(1 + x)$	e)	iii
f) $1 - x^2$	vi) $(k - 8)(k - 8)$	f)	v
g) $4t^2 - 25$	vii) $(3 - x)(3 + x)$	g)	x
h) $4 - 49p^2$	viii) $(x - y)(2x + 6y)$	h)	ii
i) $9 - x^2$	ix) $(m + 9)(m - 2)$	i)	vii
j) $x^2 - 4y^2$	x) $(2t + 5)(2t - 5)$	j)	iv

Total [50]

(School Name)  
(District)

**MATHEMATICS**

**GRADE 9 CONTROL TEST**

**TERM 2**

**(Date)**

**MARKS: 75**

**TIME : 1 HOUR 30 MIN**

**LEARNER NAME:** \_\_\_\_\_

**LEARNER CLASS:** \_\_\_\_\_

**EXAMINER:** \_\_\_\_\_

**MODERATOR:** \_\_\_\_\_

**INSTRUCTIONS**

1. Show ALL calculations clearly.
2. Round off ALL the final answers to TWO decimal places, unless stated otherwise.
3. The use of Tippex or any other correction fluid is NOT allowed.
4. Write neatly and legibly.
5. This paper consists of 7 pages and is a fill-in paper. No extra pages will be necessary.
6. This paper consists of 5 questions. All must be answered.
7. You are allowed to use a scientific, non-programmable calculator unless stated otherwise.

## Question 1 – Multiple Choice [10]

For each of the following questions, choose the correct answer. Circle or highlight the answer you chose.

1.1 Identify the prime number from the following:

- |       |       |     |
|-------|-------|-----|
| a) 26 | b) 39 |     |
| c) 41 | d) 52 | (2) |

1.2 Which of the following is a real number?

- |               |                      |     |
|---------------|----------------------|-----|
| a) 4          | b) 4,3               |     |
| c) $\sqrt{2}$ | d) All of the above. | (2) |

1.3 To make  $3^3$  equivalent to  $2^3$ , we need to change the ...

- |          |             |     |
|----------|-------------|-----|
| a) base  | b) exponent |     |
| c) power | d) index    | (2) |

1.4 Complete the next term of the following pattern:

$$\frac{1}{4} ; \frac{2}{11} ; \frac{3}{18} ; \frac{4}{25} ; \dots$$

- |                    |                    |     |
|--------------------|--------------------|-----|
| a) $\frac{5}{31}$  | b) $\frac{5}{32}$  |     |
| c) $\frac{11}{32}$ | d) $\frac{12}{31}$ | (2) |

1.5 How many terms are there in the following expression?

$$5 - (6x + 3) + \frac{2y-8}{3}$$

- |      |      |     |
|------|------|-----|
| a) 3 | b) 4 |     |
| c) 5 | d) 6 | (2) |

## Question 2 – [20]

Calculate the following:

2.1  $\sqrt{49} + \sqrt[3]{-125} + (-8)(-3)$ . (3)

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$$2.2 \quad (a^3 \div a^2) - (a^3 \times a^2) + (a^2)^3 \quad (3)$$

---



---



---



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$$2.3 \quad \sqrt{300t^2 - 44t^2} \quad (3)$$

---



---



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$$2.4 \quad \sqrt[3]{119x^3y^3 + 6x^3y^3} \quad (3)$$

---



---



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---

$$2.5 \quad x \div \frac{x}{117} \quad (2)$$

---



---



---



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Calculate the value of the following expressions if  $x = -2$  and  $y = 3$

2.6.1  $\frac{(5x)^3y \times (2xy^2)^2}{15x^5y^2}$  (3)

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2.6.2  $\frac{2x+4y}{x+2y}$  (3)

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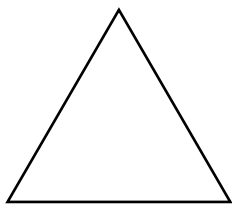
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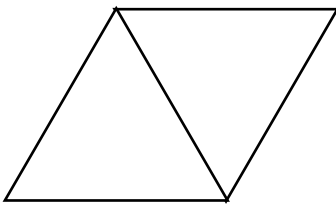
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**Question 3 – [6]**

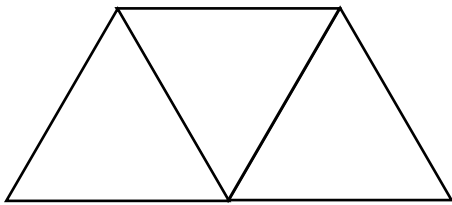
3.1 Consider the following geometric pattern:



Pattern 1



Pattern 2



Pattern 3

3.1.1 Complete the following table: (2)

Pattern	1	2	3	4	5	6
Number of sticks	3	5	7	9		

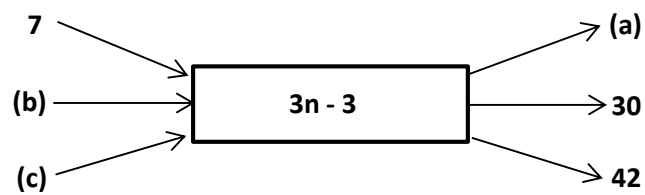
3.1.2 Write down the rule of the given pattern in the form  $T_n = \dots$  (2)

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- 3.2 Refer to the flow diagram below and determine the values of (a), (b) and (c). (2)



#### Question 4 – [11]

Simplify the following:

4.1 
$$\frac{3x^2 - x^3 + x^4 - 2x^5}{-x}$$
 (3)

4.2  $(7x + 2)(2x - 4)$  (3)

Factorise the following fully:

4.3  $5x^2 + 5x - 30$  (3)

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4.4  $64a^9 - 1$  (2)

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### Question 5 – [21]

In each of the following cases, solve for the variable:

5.1  $t^0 + t^1 + t = 19$  (2)

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5.2  $\frac{x}{2} - \frac{3-x}{7} = 29$  (4)

---

---

---

---

5.3  $6 + 3^x = 87$  (4)

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5.4  $\frac{2^x}{4} = 8$  (3)

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5.5  $5x^2 - 30x = 0$  (4)

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5.6  $a^2 - 21 = -4a$  (4)

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**Total 75**

(School Name)  
(District)

**MATHEMATICS**

**GRADE 9 CONTROL TEST**

**TERM 2**

**(Date)**

**MARKS: 75**

**TIME : 1 HOUR 30 MIN**

**LEARNER NAME:** \_\_\_\_\_

**LEARNER CLASS:** \_\_\_\_\_

**EXAMINER:** \_\_\_\_\_

**MODERATOR:** \_\_\_\_\_

**INSTRUCTIONS**

1. Show ALL calculations clearly.
2. Round off ALL the final answers to TWO decimal places, unless stated otherwise.
3. The use of Tippex or any other correction fluid is NOT allowed.
4. Write neatly and legibly.
5. This paper consists of 7 pages and is a fill-in paper. No extra pages will be necessary.
6. This paper consists of 5 questions. All must be answered.
7. You are allowed to use a scientific, non-programmable calculator unless stated otherwise.

### Question 1 – Multiple Choice [10]

For each of the following questions, choose the correct answer. Circle or highlight the answer you chose.

1.1 Identify the prime number from the following:

- a) 26                      b) 39  
c) 41                      d) 52
- (2)

1.2 Which of the following is a real number?

- a) 4  
b) 4,3  
c)  $\sqrt{2}$   
d) All of the above. (2)

1.3 To make  $3^3$  equivalent to  $2^3$ , we need to change the ...

- a) base                      b) exponent  
c) power                  d) index                    (2)

1.4 Complete the next term of the following pattern:

$$\frac{1}{4}, \frac{2}{11}, \frac{3}{18}, \frac{4}{25}, \dots$$

- a)  $\frac{5}{31}$       b)  $\frac{5}{32}$   
c)  $\frac{11}{32}$       d)  $\frac{12}{31}$       (2)

1.5 How many terms are there in the following expression?

$$5 - (6x + 3) + \frac{2y - 8}{3}$$

- a) 3                      b) 4  
c) 5                      d) 6
- (2)

### Question 2 – [20]

Calculate the following:

$$2.1 \quad \sqrt{49} + \sqrt[3]{-125} + (-8)(-3). \quad (3)$$

$$= 9 - 5 + 24$$

$= 28$

$$2.2 \quad (a^3 \div a^2) - (a^3 \times a^2) + (a^2)^3 \quad (3)$$

$$= a - a^5 + a^6$$


---



---



---



---

$$2.3 \quad \sqrt{300t^2 - 44t^2} \quad (3)$$

$$= \sqrt{256t^2}$$


---

$$= 16t$$


---



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---

$$2.4 \quad \sqrt[3]{119x^3y^3 + 6x^3y^3} \quad (3)$$

$$= \sqrt[3]{125x^3y^3}$$


---

$$= 5xy$$


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---



---

$$2.5 \quad x \div \frac{x}{117} \quad (2)$$

$$= x \times \frac{117}{x}$$


---

$$= 117$$


---



---



---



Calculate the value of the following expressions if  $x = -2$  and  $y = 3$

2.6.1  $\frac{(5x)^3y \times (2xy^2)^2}{15x^5y^2}$  (4)

$= \frac{125x^3y \times 4x^2y^2}{15x^5y^2}$

$= \frac{100y}{3}$

$= \frac{100(3)}{3}$

$= 100$

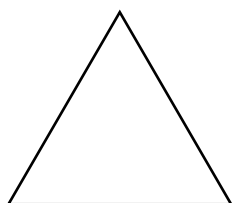
2.6.2  $\frac{2x+4y}{x+2y}$  (3)

$= \frac{2(-2)+4(3)}{(-2)+2(3)}$

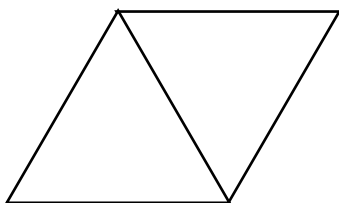
$= 2$

Question 3 – [10]

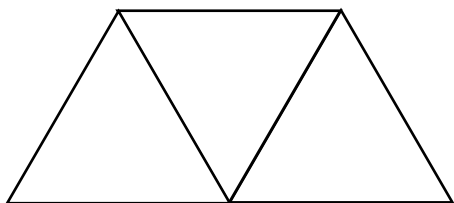
3.1 Consider the following geometric pattern:



Pattern 1



Pattern 2



Pattern 3

3.1.1 Complete the following table: (2)

Pattern	1	2	3	4	5	6
Number of sticks	3	5	7	9	11	13

3.1.2 Write down the rule of the given pattern in the form  $T_n = \dots$  (2)

$$= T_n = 2n + 1$$


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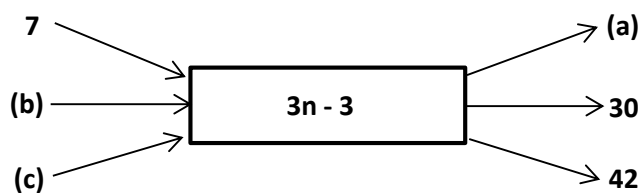


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3.2 Refer to the flow diagram below and determine the values of (a), (b) and (c). (2)



$$a = 3(7) - 3$$

$$30 = 3b - 3$$

$$42 = 3c - 3$$

$$= 18$$

$$33 = 3b$$

$$45 = 3c$$

$$11 = b$$

$$15 = c$$


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## Question 4 – [11]

Simplify the following:

4.1  $\frac{3x^2 - x^3 + x^4 - 2x^5}{-x}$  (3)

$$= \frac{x(3x - x^2 + x^3 - 2x^4)}{-x}$$

$$= -(3x - x^2 + x^3 - 2x^4)$$

$$= -3x + x^2 - x^3 + 2x^4$$


---



---



---

4.2  $(7x + 2)(2x - 4)$  (3)

$$= 14x^2 - 28x + 4x - 8$$


---



---



---

$$= 14x^2 - 24x - 8$$


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---

Factorise the following fully:

$$4.3 \quad 5x^2 + 5x - 30 \quad (3)$$

$$= 5(x^2 + x - 6)$$


---

$$= 5(x + 3)(x - 2)$$


---



---



---

$$4.4 \quad 64a^6 - 1 \quad (2)$$

$$= (8a^3 - 1)(8a^3 + 1)$$


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---



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### Question 5 – [21]

In each of the following cases, solve for the variable:

$$5.1 \quad t^0 + t^1 + t = 19 \quad (2)$$

$$1 + 2t = 19$$


---

$$2t = 18$$


---

$$t = 9$$


---



---

$$5.2 \quad \frac{x}{2} - \frac{4-x}{7} = 29 \quad (4)$$

$$7x - 2(4 - x) = 406$$


---

$$7x - 8 + 2x = 406$$

---

$$9x = 414$$

---

$$x = 46$$

---

$$5.3 \quad 6 + 3^x = 87 \quad (4)$$

$$3^x = 81$$

---

$$3^x = 3^4$$

---

$$x = 4$$

---

$$5.4 \quad \frac{2^x}{4} = 8 \quad (3)$$

$$2^x = 32$$

---

$$2^x = 2^5$$

---

$$x = 5$$

---

$$5.5 \quad 5x^2 - 30x = 0 \quad (4)$$

$$5x(x - 6) = 0$$

---

$$x = 0 \text{ or } x = 6$$

---

$$5.6 \quad a^2 - 21 = -4a \quad (4)$$

$$a^2 + 4a - 21 = 0$$

---

$$(a + 7)(a - 3) = 0$$

---

$$a = -7 \text{ or } a = 3$$

---

Total 75

**(School Name)**  
**(District)**

**MATHEMATICS**

**GRADE 9 GEOMETRY PROJECT**

**TERM 3**

**(Date)**

**MARKS: 50**

**TIME: 2 Periods**

**LEARNER NAME:** \_\_\_\_\_

**LEARNER CLASS:** \_\_\_\_\_

**EXAMINER:** \_\_\_\_\_

**MODERATOR:** \_\_\_\_\_

**INSTRUCTIONS**

Your task is to design a map that includes several different kinds of lines, angles and polygons. Your map can be of a town, your neighbourhood or a made up place.

Your map must be neat and legible. Colouring is optional. Lines must be straight – drawn with a ruler. Streets and buildings labelled in order to receive full marks.

You may add other buildings, trees, cars and attractions if you so choose, but this will not be given extra credit. You do have to have the items given in the list on the next page.

Remember to keep your buildings proportional. For example, the ice cream shop should not be larger than the hospital.

Use the attached sheet provided for your project. Do not exceed the space provided.

## Map Checklist:

Your map must include the following:

- a) Two sets of streets that are parallel to each other. (4)
  - b) Two sets of streets that are perpendicular to each other. (4)
  - c) One street that intersects another street to form an obtuse angle. (2)
  - d) One street that intersects another to form an acute angle. (2)
  - e) One street that is a line segment. (2)
  - f) One street that is a line. (2)
  - g) One ice cream shop in the shape of an equilateral triangle. (2)
  - h) A pool that is in the shape of an obtuse angled isosceles triangle. (2)
  - i) A post office in the shape of a trapezoid on a set of parallel streets. (4)
  - j) A library in the shape of a square at a perpendicular intersection. (4)
  - k) A park in the shape of an octagon. (2)
  - l) A police station in the shape of a hexagon. (2)
  - m) A fire station in the shape of a kite. (2)
  - n) Municipal buildings in the shape of a parallelogram. (2)
  - o) Mall in the shape of a pentagon. (2)
  - p) Restaurant in the shape of a trapezoid. (2)
  - q) Grocery store in the shape of a pentagon. (2)
  - r) Hospital in the shape of a right angled isosceles triangle. (2)
  - s) Gym in the shape of a rhombus. (2)
  - t) School in the shape of a hexagon. (2)
- Remember to use appropriate scaling. (2)

You can use more than the required amount of each of the above. You **cannot** use less than the required amount.

(School Name)  
(District)

**MATHEMATICS**

**GRADE 9 GEOMETRY PROJECT**

**TERM 3**

**(Date)**

**MARKS: 50**

**TIME: 2 Periods**

**LEARNER NAME: Marking guidelines**

**LEARNER CLASS: \_\_\_\_\_**

**EXAMINER: \_\_\_\_\_**

**MODERATOR: \_\_\_\_\_**

**INSTRUCTIONS**

Your task is to design a map that includes several different kinds of lines, angles and polygons. Your map can be of a town, your neighbourhood or a made up place.

Your map must be neat and legible. Colouring is optional. Lines must be straight – drawn with a ruler. Streets and buildings labelled in order to receive full marks.

You may add other buildings, trees, cars and attractions if you so choose, but this will not be given extra credit. You do have to have the items given in the list on the next page.

Remember to keep your buildings proportional. For example, the ice cream shop should not be larger than the hospital.

Use the attached sheet provided for your project. Do not exceed the space provided.

## Map Checklist:

Your map must include the following:

- a) Two sets of streets that are parallel to each other. (4)  
2 Marks for each set of parallel lines
- b) Two sets of streets that are perpendicular to each other. (4)  
2 Marks for each set of perpendicular lines
- c) One street that intersects another street to form an obtuse angle. (2)  
2 Marks for correct angle
- d) One street that intersects another to form an acute angle. (2)  
2 Marks for correct angle
- e) One street that is a line segment. (2)  
Line segment does not continue in both directions, so learners must draw a street with a dead end or a street that ends in a turn or indicate this in some way.
- f) One street that is a line. (2)  
Line does continue in both directions, so learners must draw a T-junction of some kind or indicate this somehow.
- g) One ice cream shop in the shape of an equilateral triangle. (2)  
Measure the sides to make sure they are approximately equal. Remember constructions isn't part of the syllabus, so we are just checking to see if they know the sides must be equal.
- h) A pool that is in the shape of an obtuse angled isosceles triangle. (2)  
Check for angle to look obtuse and for 2 sides to be equal. Again, we are just testing if they know the definitions of obtuse and isosceles.
- i) A post office in the shape of a trapezoid on a set of parallel streets. (4)  
It's important that the parallel sides of the trapezoid must be the streets between which it lies. 2 marks for trapezoid, 2 marks for between parallel streets.
- j) A library in the shape of a square at a perpendicular intersection. (4)  
Learners must have 4 equal sides. 2 marks for square and two marks for positioning next to the perpendicular intersection.
- k) A park in the shape of an octagon. (2)  
2 marks for a shape with 8 sides. Side length does not matter. Can be a regular or irregular shape.
- l) A police station in the shape of a hexagon. (2)  
2 marks for a shape with 6 sides. Side length does not matter. Can be a regular or irregular shape.
- m) A fire station in the shape of a kite. (2)  
2 Marks for shape resembling a kite. Do not deduct marks if the appropriate corresponding sides are not equal.
- n) Municipal buildings in the shape of a parallelogram. (2)  
2 Marks for any kind of parallelogram. Remember that a parallelogram can be a square, rectangle or a rhombus too.
- o) Mall in the shape of a pentagon. (2)  
2 marks for a shape with 5 sides. Side length does not matter. Can be a regular or irregular shape.
- p) Restaurant in the shape of a trapezoid. (2)  
2 Marks for trapezoid figure.



q) Grocery store in the shape of a pentagon. (2)

2 marks for a shape with 5 sides. Side length does not matter. Can be a regular or irregular shape.

r) Hospital in the shape of a right angled isosceles triangle. (2)

2 Marks for correct shape. Deduct 1 mark if no right angle is present.

s) Gym in the shape of a rhombus. (2)

2 Marks for correct shape. Remember a square is also a rhombus.

t) School in the shape of a hexagon. (2)

2 marks for a shape with 6 sides. Side length does not matter. Can be a regular or irregular shape.

Remember to use appropriate scaling. (2)

Please check that the sizes of the shapes resemble the scale of the sizes of the buildings they represent. The library cannot be smaller than the police station, for example. Be lenient, but not too lenient.

You can use more than the required amount of each of the above. You **cannot** use less than the required amount.

**TOTAL 50**

(School Name)  
(District)

**MATHEMATICS**

**GRADE 9 CONTROL TEST**

**TERM 3**

**(Date)**

**MARKS: 50**

**TIME : 1 HOUR**

**LEARNER NAME:** \_\_\_\_\_

**LEARNER CLASS:** \_\_\_\_\_

**EXAMINER:** \_\_\_\_\_

**MODERATOR:** \_\_\_\_\_

**INSTRUCTIONS**

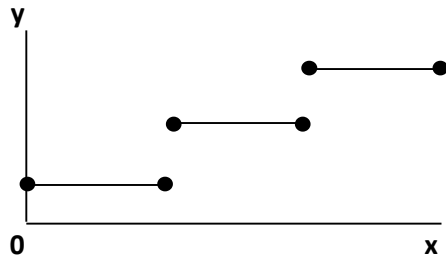
1. Show ALL calculations clearly.
2. Round off ALL the final answers to TWO decimal places, unless stated otherwise.
3. Units of measurement MUST be indicated, where applicable.
4. Write neatly and legibly.
5. This paper consists of 7 pages and is a fill-in paper. No extra pages will be necessary.
6. This paper consists of 4 questions. All must be answered.
7. You are allowed to use a scientific, non-programmable calculator unless stated otherwise.
8. Diagrams are NOT necessarily drawn to scale, unless stated otherwise.

## QUESTION 1

1.1 Factorize  $3a + 18b$

- |                |                 |     |
|----------------|-----------------|-----|
| a) $3(a + 6b)$ | b) $3(3 + 6b)$  | (1) |
| c) $6(a + 3b)$ | d) $3a(a + 6b)$ |     |

1.2 What do we call the following graph type?



- |               |             |     |
|---------------|-------------|-----|
| a) Continuous | b) Constant | (1) |
| c) Discrete   | d) Linear   |     |

1.3 The gradient of a line is represented in the given formula  $y = mx + c$ . Which of the variables refer to the gradient?

- |        |        |     |
|--------|--------|-----|
| a) $c$ | b) $m$ | (1) |
| c) $x$ | d) $y$ |     |

1.4 What would be the correct answer when factorizing the expression:  
 $a^2 - 49$

- |                     |                     |     |
|---------------------|---------------------|-----|
| a) $(a - 7)(a - 7)$ | b) $a(a - 7)$       | (1) |
| c) $(a + 7)(a + 7)$ | d) $(a + 7)(a - 7)$ |     |

1.5 Determine the solution to the equation  $\frac{7a}{2} = 35$

- |             |             |     |
|-------------|-------------|-----|
| a) $a = 5$  | b) $a = 28$ | (1) |
| c) $a = 35$ | d) $a = 10$ |     |

**TOTAL QUESTION 1: [5]**

## QUESTION 2

2.1 Sketch the following line by finding the two intercepts. Show all workings.

$$3x + 2y = 6$$

(4)

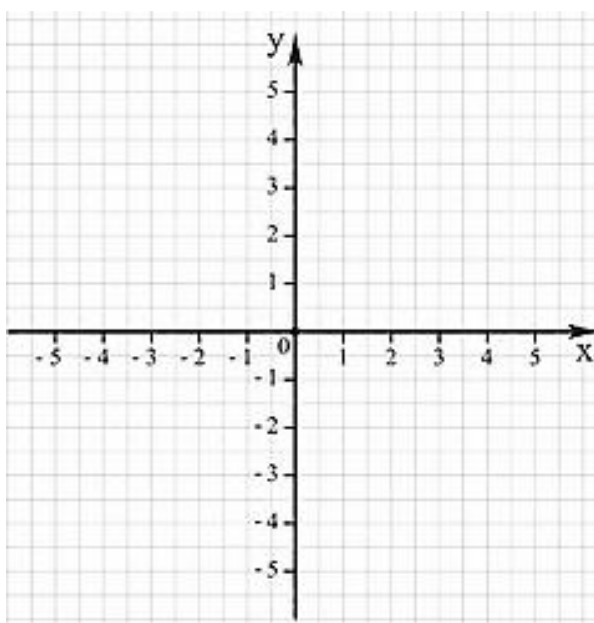
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2.2 Write  $5y - 25x = -10$  in standard form and write down the gradient and the y-intercept. (3)

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2.3.1 Give an alternative name for “ordered pairs”. (1)

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2.3.2 Complete the table below for the equation: (5)

$$y = -3x^2 + 5$$

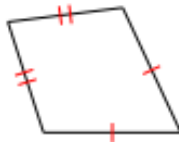
$x$	-3	-2	-1	0	1
$y$					

**TOTAL QUESTION 2: [13]**

### QUESTION 3

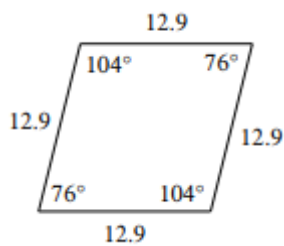
3.1 State the most specific name for each figure. Give a reason for your answer.

3.1.1



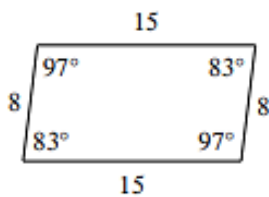
(2)

3.1.2



(2)

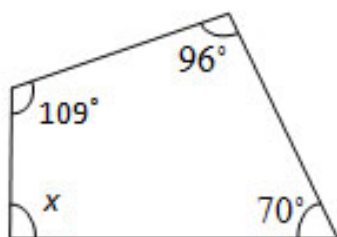
3.1.3



(2)

3.2 Solve the unknown angles in the following quadrilaterals. Give reasons and show all workings.

3.2.1



(3)

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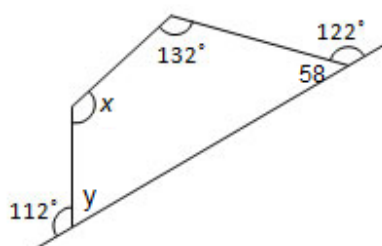
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3.2.2



(4)

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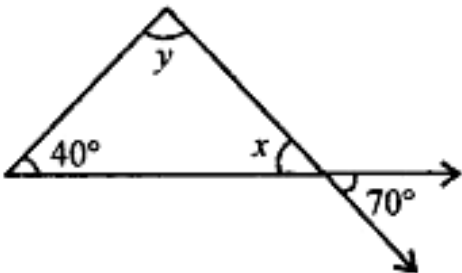
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**TOTAL QUESTION 3: [13]**

# QUESTION 4

4.1 Solve the unknown angles for the following sketches. Provide reasons.

4.1.1



(4)

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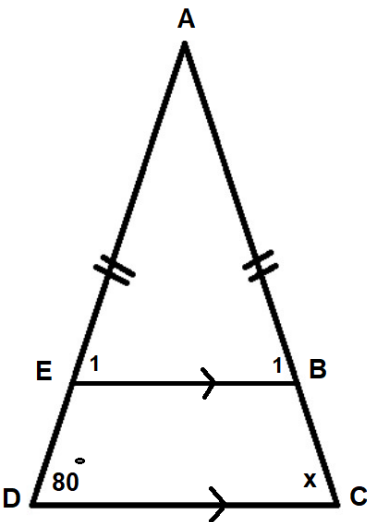
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4.1.2



(5)

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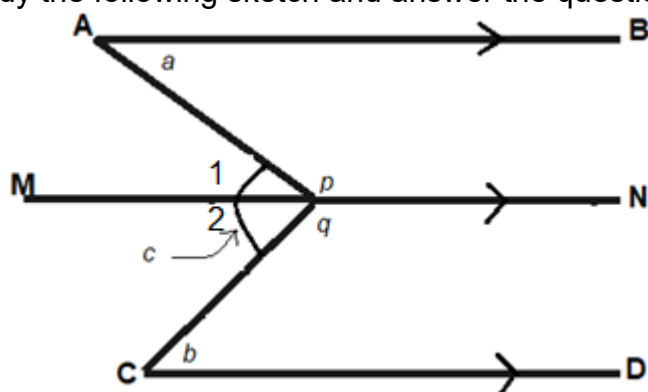
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4.2 Study the following sketch and answer the questions that follow:



4.2.1 If  $p = 150^\circ$ , find  $a$  (with reasons) (3)

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4.2.2 If  $a = 35^\circ$  and  $b = 25^\circ$ , find  $c$ . (4)

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4.2.3 If  $c = 50^\circ$  and  $p = 145^\circ$ , find  $q$ . (3)

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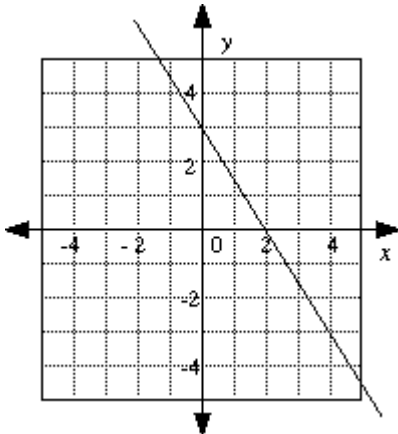


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**TOTAL QUESTION 4: [19]  
Total 50**



**MATHEMATICS**  
**GRADE 9**  
**TERM 3**  
**TEST**  
**MARKING GUIDELINES**

Q1																
1.1	A ✓															
1.2	C ✓															
1.3	B ✓															
1.4	D ✓															
1.5	D ✓		=5													
		TOTAL		[5]												
Q2																
2.1	y-intercept is 3 ✓ x-intercept is 2 ✓ 	Intercepts  Graph	=2  =2	(4)												
2.2	$5y = 25x - 10$ $y = 5x - 2$ ✓ gradient = 5 ✓ c = -2 ✓	Answer	=3	(3)												
2.3.1	Coordinates ✓	Answer	=1	(1)												
2.3.2	<table border="1"><tr><td>x</td><td>-3</td><td>-2</td><td>-1</td><td>0</td><td>1</td></tr><tr><td>y</td><td>-22 ✓</td><td>-7 ✓</td><td>2 ✓</td><td>5 ✓</td><td>2 ✓</td></tr></table>	x	-3	-2	-1	0	1	y	-22 ✓	-7 ✓	2 ✓	5 ✓	2 ✓	Answers	=1x5	(5)
x	-3	-2	-1	0	1											
y	-22 ✓	-7 ✓	2 ✓	5 ✓	2 ✓											
		Total		[13]												
Q3																
3.1.1	Kite ✓ Adjacent sides are = ✓	Answer Reason	=1 =1	(2)												
3.1.2	Rhombus ✓ Opp ∠s are = and all sides are = ✓	Answer Reason	=1 =1	(2)												
3.1.3	Parallelogram ✓ Opp ∠s are = and opp sides are = ✓	Answer Reason	=1 =1	(2)												

3.2.1	$x + 109 + 96 + 70 = 360$ ✓ $x = 85$ ✓	Int $\angle$ of quad ✓			(3)
3.2.2	$\angle y = 180 - 112$ ✓ $y = 68$ ✓ $x + 68 + 132 + 58 = 360$ $x = 102$ ✓	Angles on straight line ✓  Int $\angle$ of quad			(4)
				<b>TOTAL</b>	<b>[13]</b>
<b>Q4</b>					
4.1.1	$\angle x = 70$ ✓ $\angle y = 180 - 40 - 70$ ✓ $y = 70$	Vertically opp angles ✓  Int angles of $\Delta$ ✓			(4)
4.1.2	$\angle E_1 = 80$ ✓ $B_1 = E_1$ $B_1 = 80$ ✓  $x = B_1$ $x = 80$ ✓	Corresponding angles ✓ ( $BE \parallel CD$ ) Angles opp equal sides ✓  Corresponding angles ( $BE \parallel CD$ )			(5)
4.2.1	$a + 150 = 180$ ✓ $a = 30$ ✓	Co-interior angles ✓ ( $AB \parallel MN$ )			(3)
4.2.2	$\hat{C}_1 = a$ ✓ $\therefore \hat{C}_1 = 35^\circ$  $\hat{C}_2 = b = 25^\circ$ ✓ $\hat{C} = 25^\circ + 35^\circ$ ✓ $\hat{C} = 60^\circ$ ✓	Alternating angles ( $AB \parallel MN$ ) ✓  Alternating angles ( $CD \parallel MN$ )			(4)
4.2.3	$c + p + q = 360^\circ$ ✓ $q = 360^\circ - 50^\circ - 145^\circ$ $q = 165^\circ$ ✓	Angles around a point ✓ (Revolution)			(3)
				<b>TOTAL</b>	<b>[19]</b>

#### Taxonomy level summary

Question	Thinking Levels			
	Knowledge	Routine Procedure	Complex Procedure	Problem Solving
1.1		1		
1.2	1			
1.3	1			
1.4		1		
1.5		1		
2.1			4	
2.2			3	
2.3.1	1			
2.3.2		5		
3.1.1		1	1	
3.1.2		1	1	
3.1.3		1	1	
3.2.1		3		
3.2.2		2	2	
4.1.1	2	2		
4.1.2	2	3		
4.2.1	1	2		
4.2.2				4
4.2.3		3		
Total	8	26	12	4
%	16	52	24	8

**(School Name)**  
**(District)**

**MATHEMATICS**

**GRADE 9 CONTROL TEST**

**TERM 4**

**(Date)**

**MARKS: 75**

**TIME : 1,5 HOUR**

**LEARNER NAME:** \_\_\_\_\_

**LEARNER CLASS:** \_\_\_\_\_

**EXAMINER:** \_\_\_\_\_

**MODERATOR:** \_\_\_\_\_

**INSTRUCTIONS**

1. Show ALL calculations clearly.
2. Round off ALL the final answers to TWO decimal places, unless stated otherwise.
3. Units of measurement MUST be indicated, where applicable.
4. Write neatly and legibly.
5. This paper consists of 8 pages and is a fill-in paper. No extra pages will be necessary.
6. This paper consists of 5 questions. All must be answered.
7. You are allowed to use a scientific, non-programmable calculator unless stated otherwise.
8. Diagrams are NOT necessarily drawn to scale, unless stated otherwise.

## QUESTION 1

State whether each of the following are True or False. Explain the reason for your choice.

1.1  $7x^2 + \frac{x}{y} + y^3$  is a polynomial. (2)

---

1.2  $3p^2 + p + q^{-1} + 4$  is a polynomial. (2)

---

1.3  $\frac{(4x^2+x)}{4} + 23 - 3x^3$  is a trinomial. (2)

---

1.4  $7t^3v^2 + 3t^2v$  is a polynomial of the third degree. (2)

---

1.5  $7t^3v^2 + 3t^2v$  is a third degree polynomial in  $t$  and a second degree polynomial in  $v$ . (2)

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**TOTAL QUESTION 1: [10]**

## QUESTION 2

Solve the following equations:

2.1  $17 + 12x = 53$  (3)

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2.2  $6 + 3^x = 87$  (4)

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2.3  $5x^2 - 30x = 0$  (4)

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2.4  $3x^2 + 27x + 42 = 0$  (4)

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**TOTAL QUESTION 2: [15]**

### **QUESTION 3**

3.1 Factorise each of the following:

3.1.1  $x^2 + x - 20$  (3)

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$$3.1.2 \quad x(a + 5) + y(a + 5) \quad (2)$$

---

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$$3.1.3 \quad \frac{1}{9}x^2 - \frac{16}{36}y^2 \quad (3)$$

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3.2 Simplify each of the following expressions:

$$3.2.1 \quad -3a^2b(ab - b + a) \quad (3)$$

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$$3.2.2 \quad \frac{(18a^3 + 27a^4)}{9a^2} \quad (2)$$

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3.2.3  $\sqrt{121x^2} - \sqrt[3]{8y^3z^6}$  (2)

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**TOTAL QUESTION 3: [15]**

**QUESTION 4**

4.1 Name a property which is common to all quadrilaterals. (1)

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4.2 State True or False to each of the following. In each case, provide a reason for your answer.

4.2.1 In a rhombus, all sides are equal and all angles are equal to each other. (2)

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4.2.2 In a trapezium, only one pair of opposite sides are parallel. (2)

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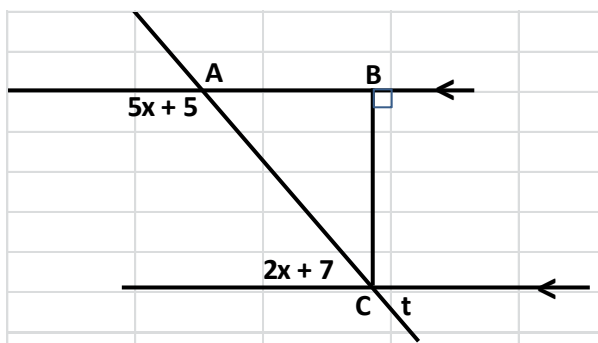
4.2.3 In a rectangle, the diagonals are equal, but do not bisect each other. (2)

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4.3 Given the figure below, determine:



4.3.1 The value of  $x$ . (5)

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4.3.2 The value of  $t$ . (3)

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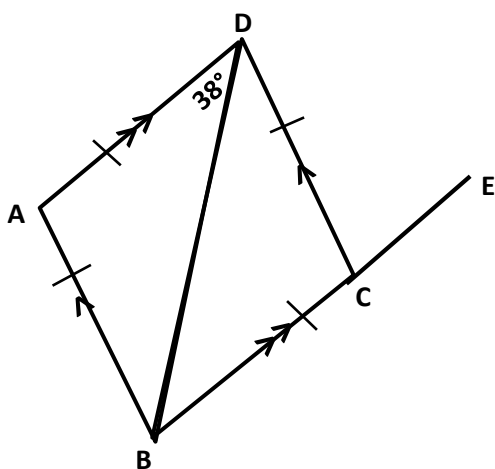


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4.4 The following figure is given:



4.4.1 Name the figure ABCD shown above. (1)

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4.4.2 Calculate the size of:

a)  $\angle DCE$  (6)

---

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---

b)  $\angle BAD$  (3)

---

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**TOTAL QUESTION 4: [25]**

### **QUESTION 5**

The straight line with equation  $y = 4x + 4$  is given:

5.1 What is the  $x$ -value at  $y = 4$ ? (2)

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5.2 Is this graph increasing or decreasing? (1)

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5.3 Give the gradient of the graph. (1)

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5.4 Find the  $x$ -intercept and the  $y$ -intercept of the graph. (3)

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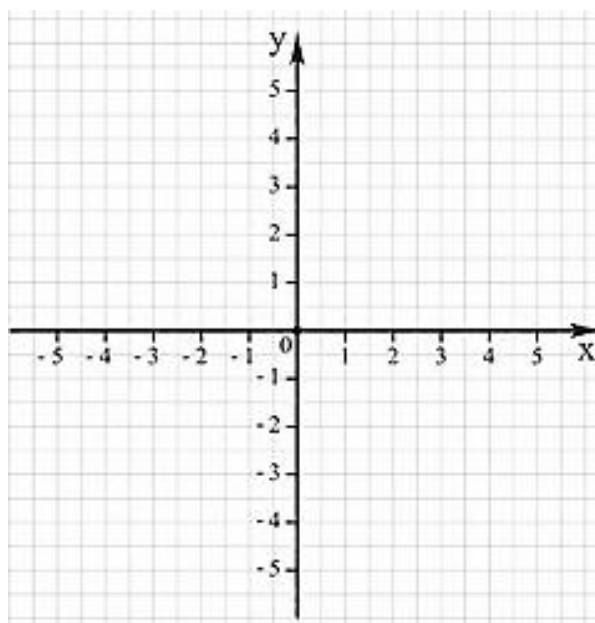
5.5 Sketch the graph of  $y = -2x + 4$  showing all calculations you used. (3)

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**TOTAL QUESTION 5: [10]**  
**Total 75**

**MATHEMATICS**  
**GRADE 9**  
**TERM 4**  
**TEST**  
**MARKING GUIDELINES**

**Taxonomy level summary**

Question	Thinking Levels			
	Knowledge	Routine Procedure	Complex Procedure	Problem Solving
1.1	2			
1.2	2			
1.3	2			
1.4	2			
1.5	2			
2.1	3			
2.2			4	
2.3			4	
2.4			4	
3.1.1		3		
3.1.2		2		
3.1.3			3	
3.2.1	3			
3.2.2	2			
3.2.3		2		
4.1		1		
4.2.1		2		
4.2.2		2		
4.2.3		2		
4.3.1				5
4.3.2			3	
4.4.1	1			
4.4.2			(b) 3	(a) 6
5.1		2		
5.2	1			
5.3		1		
5.4		3		
5.5			3	
<b>TOTAL</b>	<b>20</b>	<b>20</b>	<b>24</b>	<b>11</b>
<b>%</b>	<b>27</b>	<b>27</b>	<b>32</b>	<b>14</b>

<b>Q1</b>				
1.1	False: ✓ Has a variable as a denominator ✓	Answer Explanation	= 1 = 1	(2)
1.2	False: ✓ Has a negative exponent ✓	Answer Explanation	= 1 = 1	(2)
1.3	True: ✓ Has three terms ✓	Answer Explanation	= 1 = 1	(2)
1.4	False: ✓ The sum of the exponents of $t$ is 5 ✓	Answer Explanation	= 1 = 1	(2)
1.5	True: ✓ $t^3$ and $v^2$ are the highest exponents for each of these variables ✓	Answer Explanation	= 1 = 1	(2)
		<b>TOTAL</b>		<b>[10]</b>
<b>Q2</b>				
2.1	$17 + 12x = 53$ $\therefore 12x = 53 - 17$ ✓ $\therefore 12x = 36$ ✓ $\therefore x = 3$ ✓	Method Method Answer	= 1 = 1 = 1	(3)
2.2	$6 + 3^x = 87$ $\therefore 3^x = 87 - 6$ ✓ $\therefore 3^x = 81$ ✓ $\therefore 3^x = 3^4$ ✓ $\therefore x = 4$ ✓	Method  Method Method Answer	= 1  = 1 = 1 = 1	(4)
2.3	$5x^2 - 30x = 0$ $5x(x - 6) = 0$ ✓ $\therefore 5x = 0$ ✓ <u>OR</u> $\therefore x - 6 = 0$ ✓ $\therefore x = 0$ ✓ $\therefore x = 6$ ✓	Factorise Factors = 0 Answers one mark each	= 1 = 1 = 2	(4)
2.4	$3x^2 + 27x + 42 = 0$ $3(x^2 + 9x + 14) = 0$ ✓ $\therefore 3(x + 7)(x + 2) = 0$ ✓ $\therefore x + 7 = 0$ <u>OR</u> $\therefore x + 2 = 0$ $\therefore x = -7$ ✓ $\therefore x = -2$ ✓	Factorise Answers one mark each	= 2 = 2	(4)
		<b>Total</b>		<b>[15]</b>
<b>Q3</b>				
3.1.1	$x^2 + x - 20$ $= (x + 5)(x - 4)$	One mark each: 4, 5 and signs	= 3	(3)
3.1.2	$x(a + 5) + y(a + 5)$ $= (x + y)(a + 5)$ ✓	Take out $(x + y)$ $(a + 5)$	= 1 = 1	(2)
3.1.3	$\frac{1}{9}x^2 - \frac{16}{36}y^2$	Correct square roots (each)	= 2	(3)

	$= (\frac{1}{3}x - \frac{4}{6}y)(\frac{1}{3}x + \frac{4}{6}y) \checkmark \checkmark$	One plus one minus	= 1	
3.2.1	$-3a^2b(ab - b + a)$ $= -3a^3b^2 \checkmark + 3a^2b^2 \checkmark - 3a^3b \checkmark$	One mark per term	= 3	(3)
3.2.2	$\frac{(18a^3 + 27a^4)}{9a^2}$ $= 2a \checkmark + 3a^2 \checkmark$	One mark per term	= 2	(2)
3.2.3	$\sqrt{121x^2} - \sqrt[3]{8y^3z^6}$ $= 11x \checkmark - 2yz^2 \checkmark$	One mark per term	= 2	(2)
		<b>TOTAL</b>		<b>[15]</b>
<b>Q4</b>				
4.1	The sum of their interior angles all = $360^\circ \checkmark$ They have four sides	Either reason	= 1	(1)
4.2.1	False $\checkmark$ In a rhombus, four sides are equal but only opposite angles are equal. $\checkmark$	False Reason	= 1 = 1	(2)
4.2.2	True $\checkmark$ A trapezium only has one pair of sides parallel $\checkmark$	True Reason	= 1 = 1	(2)
4.2.3	False $\checkmark$ In a rectangle, the diagonals are equal and they bisect each other. $\checkmark$	False Reason	= 1 = 1	(2)
4.3.1	$5x + 5 + 2x + 7 = 180^\circ \checkmark$ (co-int $\angle$ 's) $\checkmark$ $\therefore 7x = 180 - 5 - 7 \checkmark$ $= 168$ $\therefore x = \frac{168}{7} \checkmark$ $= 24^\circ \checkmark$	Method and reason  Method Answer	= 2  = 2 = 1	(5)
4.3.2	$t = (2x + 7)$ (vert. opp. $\angle$ 's) $\checkmark$ $= 2 \times 24 + 7$ $= 55^\circ \checkmark$	Method and reason Answer	= 2 = 1	(3)
4.4.1	Rhombus	Answer	= 1	(1)
4.4.2a	$D\hat{B}C = 38^\circ \checkmark$ (Alt $\angle$ 's; $AD \parallel BC$ ) $\checkmark$ $\therefore B\hat{D}C = 38^\circ \checkmark$ ( $\angle$ 's opp. = sides) $\checkmark$ $\therefore D\hat{C}E = 38^\circ + 38^\circ$ (exterior $\angle$ = sum Int. opp. $\angle$ 's) $\checkmark$ $= 76^\circ \checkmark$ Learner can also use sum of angles in triangle and then angles on a straight line.	Method Method Answer Answer	= 2 = 2 = 1 = 1	(6)
4.4.2b	$D\hat{B}A = 38^\circ$ ( $\angle$ 's opp. = sides) $\checkmark$ $B\hat{A}D = 180 - 38 - 38$ (sum of $\angle$ 's in $\triangle ABD$ ) $\checkmark$ $= 104^\circ \checkmark$ Award full marks if learner uses the property of rhombus that says opposite angles are equal	Method Answer	= 2 = 1	(3)
		<b>TOTAL</b>		<b>[25]</b>
<b>Q5</b>				
5.1	$4 = 4x + 4$ $4 - 4 = 4x$	Substitution	= 1	(2)



## 5. ICT Integration

With the Fourth industrial revolution, online learning and technological advancements it is becoming more and more important to make use of ICT in our teaching and assessing of learners. Platforms such as Google Classroom, Socrative and the GDE Content Platform are fast becoming part of our and learners everyday lives.

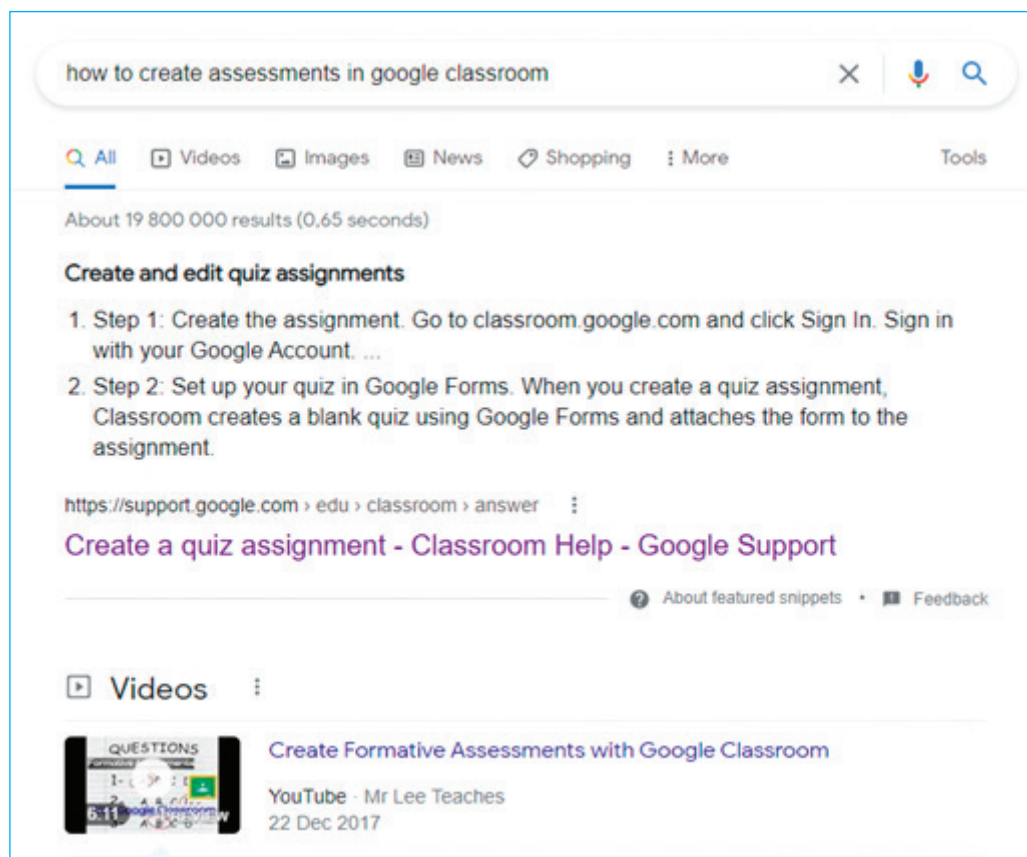
Electronic platforms are useful for educators to store information which is interactive and easy for learners to access. Baseline assessments, formative assessments and diagnostic assessments can all be conducted online.

Google is especially useful when setting short diagnostic assessments as it can evaluate learner performance and itemise responses for easy diagnosis by the educator. This gives the educator a clear picture of how learners performed, where the mistakes and misconceptions are as well as which learners need support.

When conducting projects, investigations or assignments the information required or resources to be used can be set up by the educator in advance and this will allow learners to access the information when required. However, at this stage, the actual writing of the summative assessment must still be done under the supervision of the educator and is to be done at school.

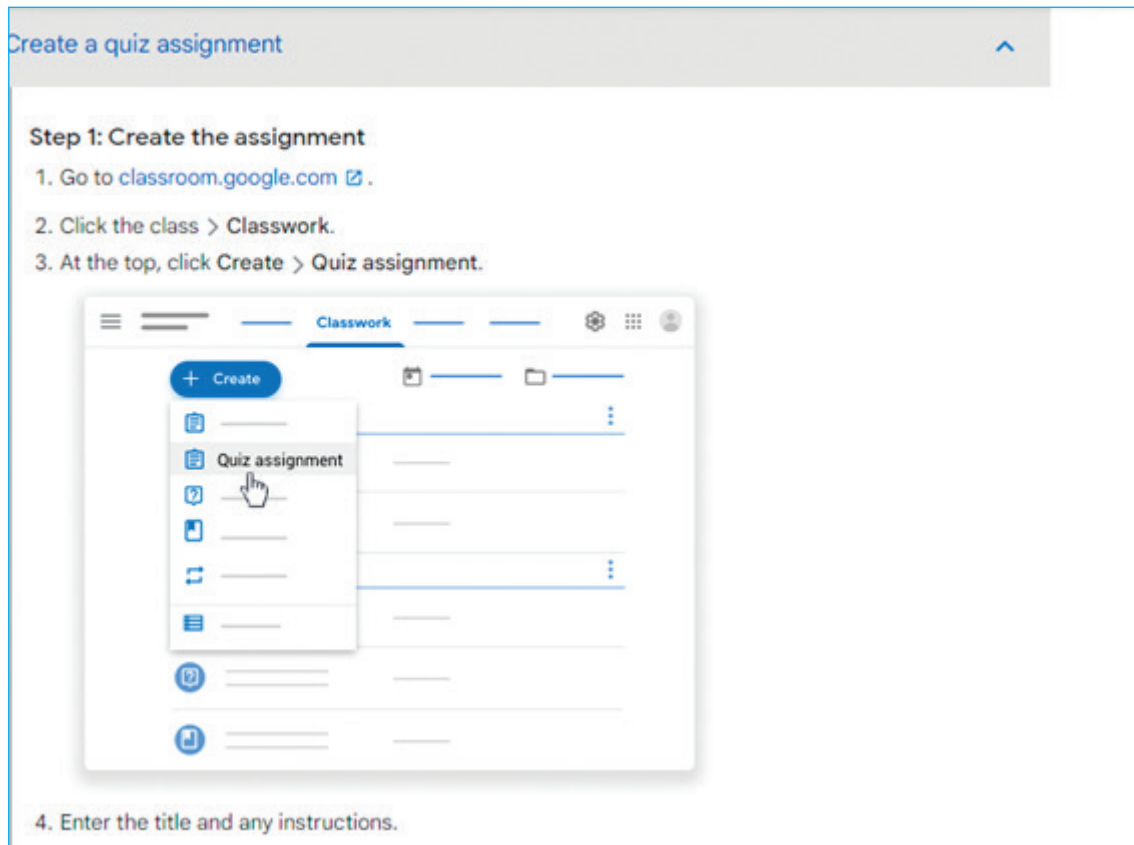
Setting of ICT Assessments takes time when you first begin. However, instructions on how to create them are easily available.

You can type the following search on your internet search engine:





Click on Create a quiz assignment



Follow the prompts.

## 6. Conclusion

The success of any teaching-learning experience can only be measured through the assessment of the outcomes. As discussed, there are many different aspects to consider when assessing and a sound understanding of assessment is essential for all educators.

Assessment should not be seen as a necessary evil or a task to be completed in order for compliance. Assessment should rather be viewed as a means to an end. The end goal being a successful and beneficial teaching-learning experience.

Although the assessments at school level are always completed by learners, they offer invaluable insight for the educators regarding the methods used, the style of teaching as well as how to improve what and how you teach. Assessment should always be viewed as tool for improvement and never as an indicator of failure.

