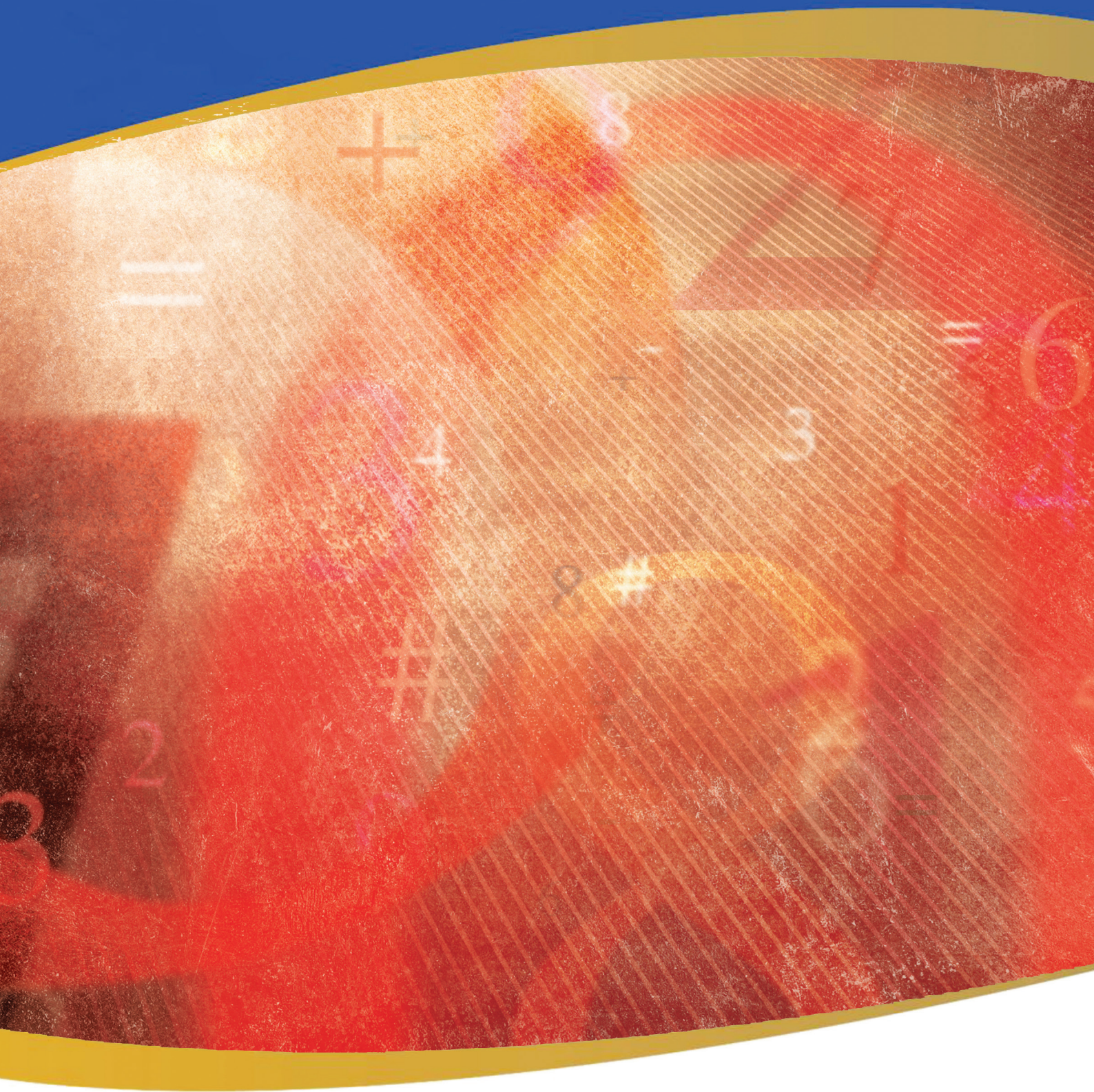


Senior Phase Mathematics

Grade 7

Assessment Participants Manual



GAUTENG PROVINCE
EDUCATION
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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’?

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
Baseline Assessment	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.
Diagnostic Assessment	To identify misconceptions or misinterpretations in a learner's understanding of a topic or mathematical method used.	At any time during a lesson or set of lessons.
Formative Assessment	To aid the teaching process. Used to determine to extent to which a learner has mastered the concepts being taught. Often referred to as Assessment for Learning .	Usually at the end of a lesson or set of lessons focusing on a particular topic of concept.
Summative Assessment	Used for promotion purposes. Formal Assessment with recorded results and is often referred to as the Assessment of Learning .	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
Test	Individualised assessments designed to demonstrate a learner's 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

Form of Assessment	Requirements of the assessment	When it is used
Examination/School-Based Test	Individualised assessment designed to demonstrate a learner's 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
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:

Check-list:

Rubric:

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?

Informal assessment forms the base for educators to collect information about the learner's 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 Grade 7? What do they already know? What do they need to learn?

Below is a table showing what is taught in Grade 6 (Intermediate Phase) and what is to be taught in Grade 7 (Senior Phase) on the topic of fractions. When setting a baseline assessment educators need to cover what was previously learned and what is still to be taught.

GRADE 6	GRADE 7
Describe and ordering fractions <ul style="list-style-type: none"> Compare and order common fractions, including tenths and hundredths 	Ordering, comparing and simplifying fractions <ul style="list-style-type: none"> Revise what was done in Grade 6 Extend to thousandths
Calculations with fractions <ul style="list-style-type: none"> Addition and subtraction of common fractions in which one denominator is a multiple of another Addition and subtraction of mixed numbers Fractions of whole numbers 	Calculations with fractions <ul style="list-style-type: none"> Revise what was done in Grade 6 Extend additions and subtractions of fractions where one denominator is not a multiple of the other Multiplication of common fractions, including mixed numbers, not limited to fractions where one denominator is a multiple of another
	Calculation techniques <ul style="list-style-type: none"> Convert mixed numbers to common fractions in order to perform calculations with them Use knowledge of multiples and factors to write fractions in the simplest form before or after calculations Use knowledge of equivalent fractions to add and subtract common fractions
Solving problems <ul style="list-style-type: none"> Solve problems in context involving common fractions, including grouping and sharing 	Solving problems <ul style="list-style-type: none"> Solve problems in contexts involving common fractions and mixed numbers, including grouping, sharing and finding fractions of whole numbers

Sample of a Grade 7 baseline assessment

Question One: Creating equivalent fractions

- 1.1 Complete the fractions to make them equal. (6)
- a. $\frac{2}{6} = \frac{\square}{6}$ b. $\frac{3}{5} = \frac{\square}{10}$
- c. $\frac{5}{6} = \frac{\square}{18}$ d. $\frac{6}{7} = \frac{\square}{21}$
- e. $\frac{6}{22} = \frac{\square}{11}$ f. $\frac{20}{25} = \frac{80}{\square}$
- 1.2 Extend the pattern by writing down the next three equivalent fractions (6)
- a. $\frac{1}{3} = \frac{2}{6} = \frac{4}{12} = \frac{8}{24} = \frac{\square}{\square} = \frac{\square}{\square} = \frac{\square}{\square}$
- b. $\frac{1}{5} = \frac{3}{15} = \frac{9}{45} = \frac{27}{135} = \frac{\square}{\square} = \frac{\square}{\square} = \frac{\square}{\square}$
- 1.3 Explain in your own words what happens to the denominator and numerator. (2)

Question Two: Addition and Subtraction of Fractions

- 2.1 Complete the following addition of fractions: (2)
- a. $\frac{1}{2} + \frac{1}{4} = \frac{2}{4} + \frac{1}{4} = \frac{\square}{4}$ b. $\frac{2}{6} + \frac{1}{2} = \frac{\square}{12} + \frac{6}{12}$
- 2.2 Complete the following: (4)
- a. $\frac{1}{2} = \frac{1}{8} + \frac{\square}{\square} = \frac{\square}{\square}$ b. $\frac{1}{2} = \frac{1}{14} + \frac{\square}{\square} = \frac{\square}{\square}$
- 2.3 Complete the following subtractions of fractions: (10)
- a. $5\frac{2}{4} - 2\frac{1}{4}$ b. $7\frac{1}{8} - 3$

c. $4\frac{3}{8} - 3\frac{4}{6}$

d. $5\frac{1}{3} - 1\frac{2}{4}$

Question Three

Complete the table below. (5)

Number	Add 0,1	Subtract 0,01	Add 0,001
0,657	0,757		
23,245			

DISCUSSION: Which questions or parts of questions are on a Grade 6 level? How could the results of the test above assist the educator?

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 learner's 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.

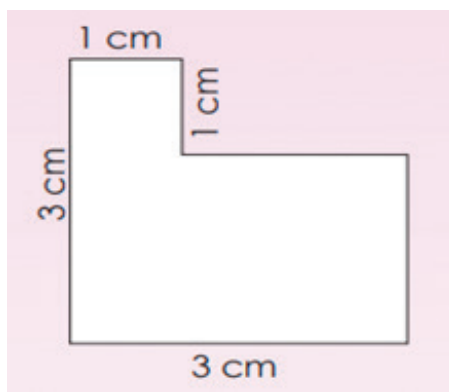
Using the information from above look at a possible multiple-choice question that could assist us in identifying the misconception the learner has:

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.

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

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.

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?

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
Knowledge (25%)	<ul style="list-style-type: none"> • Estimation and appropriate rounding of numbers • Straight recall • Identification and direct use of correct formula • Use of mathematical facts • Appropriate use of mathematical vocabulary 	<ol style="list-style-type: none"> 1. Estimate the answer and then calculate with a calculator: $\frac{62\,816}{325 + 279} \cdot [\text{Grade 7}]$ 2. Use the formula $A = \pi r^2$ to calculate the area of a circle, if the diameter is 10 cm. [Grade 8] 3. Write down the y-intercept of the function $y = 2x + 1$. [Grade 9]
Routine procedures (45%)	<ul style="list-style-type: none"> • Perform well-known procedures • Simple applications and calculations which might involve many steps • Derivation from given information may be involved • Identification and use (after changing the subject) of correct formula • Generally similar to those encountered in class 	<ol style="list-style-type: none"> 1. 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] 2. Solve x in $x - 6 = 9$. [Grade 8] 3. R600 invested at $r\%$ per annum for a period of 3 years yields R150 interest. Calculate the value of r, if $SI = \frac{Prt}{100}$. [Grade 9]
Complex procedures (20%)	<ul style="list-style-type: none"> • Problems involving complex calculations and/or higher order reasoning • Investigate elementary axioms to generalise them into proofs for straight line geometry, congruence and similarity • No obvious route to the solution • Problems not necessarily based on real world contexts • Making significant connections between different representations • Require conceptual understanding 	<ol style="list-style-type: none"> 1. 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] 2. 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] 3. Use investigation skills to prove that the angles on a straight line are supplementary. [Grade 9]

Description and examples of cognitive levels		
Cognitive levels	Description of skills to be demonstrated	Examples
Problem solving (10%)	<ul style="list-style-type: none"> Unseen, non-routine problems (which are not necessarily difficult) Higher order understanding and processes are often involved Might require the ability to break the problem down into its constituents parts 	<ol style="list-style-type: none"> The sum of three consecutive numbers is 87. Find the numbers. [Grade 7] 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] 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? [Grade 9]

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

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 effected 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 7 formal summative assessment tasks in Grade 7 per year in alignment to the Recovery ATPs (2021 – 2023).

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

4.2: Tests and Examinations / School Based Controlled Tests (SBT)

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?

Exemplars of the 5 Forms of Summative Assessment, in Mathematics Grade 7, according to Senior Phase CAPS

Example of Grade 7 – Term 1 Test

Assessment Criteria

Instructions:

1. Complete all the questions.
2. All drawings and diagrams to be completed in pencil.
3. Write neatly and legibly.
4. Show all calculations.

QUESTION 1: Place value

- 1.1 Identify the value of the underlined digits. (6)

- a) 957 482: _____ b) 623 831: _____
c) 6 893 260: _____ d) 10 592 427: _____
e) 463,95: _____ f) 14,391: _____

- 1.2 Arrange the following numbers in ascending order. (4)

- a) 465; 65,4; 456; 5,46; 6,54; 54,6

- b) 879 425; 987 425; 425 978; 25 897; 8 974 205; 798 542

- 1.3 Complete the table by rounding off the numbers as indicated.

NUMBER	Nearest Tenth	Nearest Unit	Nearest Ten
187,24	187,2	a)	b)
649,89	c)	d)	e)
45,23	f)	g)	h)

QUESTION 2: Multiples and factors

- 2.1 Write down the multiples of 6 between 40 and 60. (1)

- 2.2 List all the multiples of 125. (1)

- 2.3 Which number multiplied by itself three times will give the product of 64? (1)

2.4 Find the Lowest Common Multiple of 12 and 36. (1)

2.5 Find the Highest Common Factor of 18 and 42. (1)

QUESTION 3:

Solve the following problems based on the information provided.

The school recently had a fun day to raise funds. Tickets were sold for R2 per ticket. Below shows the ticket price and number of people who participated in various activities:

Activity	Ticket Cost	Number of people
Fun Slide	4 tickets	154
Tombola	1 ticket	457
Fish Tank	2 tickets	315
Pie Toss	3 tickets	201

3.1 Which activity had the largest number of people participating? (1)

3.2 How much money was raised at the fish tank? (2)

3.3 How many tickets were collected at the Fun Slide? (2)

3.4 What was the total number of tickets sold? (4)

3.5 How much money was raised in total? (2)

QUESTION 4:

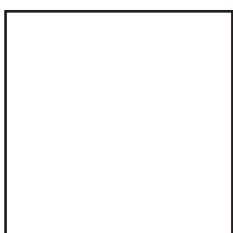
Expand and solve the following: (4)

4.1 $4^3 + 6^2 =$ _____

4.2 $8^2 - 2^3 + 5^2 =$ _____

QUESTION 5:

List the properties of a square (4)



MEMORANDUM

QUESTION	EXPECTED ANSWER	EXPLANATION
1.1 a)	Hundreds	One mark
b)	Hundred Thousandths	One mark
c)	Ten Thousandths	One mark
d)	Thousandths	One mark
e)	Hundredths	One mark
f)	Tens	One mark
1.2 a)	5,46; 6,54; 54,6; 65,4; 456; 465	Full marks if all correct, one mark if 1 or 2 are incorrect
b)	25 897; 425 978; 798 542; 879 425; 987 425; 8 974 205	Full marks if all correct, one mark if 1 or 2 are incorrect
1.3	NUMBER	Nearest Tenth
	187,24	187,2
	649,89	c) 649,9
	45,23	f) 45,2
		Nearest Unit
		Nearest Ten
		a) 187
		b) 190
		d) 650
		e) 650
		g) 45
		h) 50
2.1	42; 48; 54; 60	One mark if all are correct
2.2	1; 5; 25; 125	One mark if all are correct
2.3	4	One mark
2.4	36	One mark
2.5	6	One mark
3.1	Tombola	One mark
3.2	1 260	<ul style="list-style-type: none"> One mark for 315×2 Full marks for correct answer
3.3	616	Full marks for correct answer
3.4	11 270	<ul style="list-style-type: none"> Full marks for correct answer One mark for adding all the people One mark for adding all the tickets One mark for multiplying correctly
3.5	R22 540	<ul style="list-style-type: none"> One mark for correct number One mark for remembering the Rands
4.1	$4 \times 4 \times 4 + 6 \times 6 = 100$	<ul style="list-style-type: none"> One mark for expanding One mark for answer
4.2	$8 \times 8 - 2 \times 2 \times 2 - 5 \times 5 = 81$	<ul style="list-style-type: none"> One mark for expanding One mark for answer

QUESTION	EXPECTED ANSWER	EXPLANATION
5	Four sides equal All angles equal (90°) Opposite sides parallel	One mark for each

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
Terminology	No terms correctly defined	1 or 2 terms correctly defined	2 terms correctly defined	4 terms correctly defined	All terms correctly defined
Drawing shapes	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?

According to 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 criterion. If your rubric is not clearly defined it could result in learners achieving 100% for the project.

Example of Grade 7 – Term 3 Project

3-D Object

Project Assessment Criteria

In this project you will be required to

- Identify and sort 3-D objects
- Draw 2-D nets for 3-D objects

The project will be assessed using a rubric for the nets and a memo for the questions. Use the information in the rubric to assist you with what is expected

Follow the steps below to complete your project.

- You will need three A4 quad pages in which to draw your nets
- Each page will be used to draw a separate net according to the instructions provided
- Put the name of the 3D model at the top centre of each page
- Diagrams are to be done in pencil. Use a broken line (----) to indicate the fold lines.
- Answer the questions for each net at the top left-hand corner of the page
- Number the questions correctly
- Use a ruler to ensure your lines are straight and correctly measured

NET ONE: Cube

- How many faces does a cube have?
- How many edges does a cube have?
- How many vertices does a cube have?
- Draw a net for a cube with edges of 7 cm

NET TWO: Square Based Pyramid

- How many faces does a square based pyramid have?
- How many edges does a square based pyramid have?
- How many vertices does a square based pyramid have?
- Draw a net for a square based pyramid with a square base of 10 cm

NET THREE: Triangular Prism

- How many faces does a triangular prism have?
- How many edges does a triangular prism have?
- How many vertices does a triangular prism have?
- Draw a net for a triangular prism with a length of 12 cm and equilateral triangles with 5 cm sides

NETS	1 mark	2 marks	3 marks	4 marks	5 marks
Cube	Net was attempted but not accurate or useable	Net drawn but measurements are incorrect	Nets drawn. Measurements are mostly correct	Nets drawn correctly and accurately, but fold lines not indicated	Nets drawn correctly and accurate with fold lines indicated correctly
Square-based pyramid	Net was attempted but not accurate or useable	Net drawn but measurements are incorrect	Nets drawn. Measurements are mostly correct	Nets drawn correctly and accurately, but fold lines not indicated	Nets drawn correctly and accurate with fold lines indicated correctly
Triangular prism	Net was attempted but not accurate or useable	Net drawn but measurements are incorrect	Nets drawn. Measurements are mostly correct	Nets drawn correctly and accurately, but fold lines not indicated	Nets drawn correctly and accurate with fold lines indicated correctly
Following of instructions	Work set out incorrectly	Work set out mostly as instructed	All instructions followed and work set out as requested	n/a	n/a

MEMORANDUM

Cube	Square-based Pyramid	Triangular Prism	Marks
1. 6	1. 5	1. 5	One each
2. 12	2. 8	2. 9	One each
3. 8	3. 5	3. 6	One each
4. Net drawn	4. Net drawn	4. Net drawn	One each

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.

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.

Example of Grade 7 – Term 1 Assignment
Assignment Assessment Criteria

Assignment instructions:

1. Complete all the questions
2. All drawings and diagrams to be completed in pencil
3. Write neatly and legibly
4. You may use the textbook, posters, dictionaries and DBE Workbooks to assist you in required
5. Show all calculations where necessary

QUESTION 1: Whole Numbers

- 1.1 Use the properties of numbers to complete the statements. (4)

- a) $2(4 + 9) = (\text{_____}) + (\text{_____})$
- b) $4 + (6 + 9) = (\text{_____} + \text{_____}) + 9$
- c) $156 \times 24 = (\text{_____} \times \text{_____}) + (\text{_____} \times \text{_____}) + (\text{_____} \times \text{_____})$
- d) $65 + 15 + 87 + 123 = 123 + \text{_____} + 15 + \text{_____}$

- 1.2 Use the set of numbers below to answer the following questions

122	29	15	100	49	3	11
2,5	51	19	64	27	5,42	

- a) Identify all the even numbers: _____ (1)
 - b) Identify all the prime numbers: _____ (2)
 - c) Identify three square numbers: _____ (1)
 - d) Identify two cubed numbers: _____ (1)
 - e) Identify two equivalent numbers: _____ (1)
- 1.3 Explain in your own words what the order of operations means: (2)
- _____
- _____
- _____
- 1.4 Calculate the missing numbers in the problems below. (5)
- a) $26 - 5 = \text{_____} - 26$
 - b) $23 + 27 = 100 - \text{_____}$
 - c) $3 \times 12 = \text{_____}^2$
 - d) $\text{_____}^2 = \text{_____}^3$

QUESTION 2: Multiples and Factors

2.1 Complete the table of multiples.

(10)

Number	$\times 3$	$\times 6$	$\times 7$	$\times 10$	$\times 12$
25	75	150	a)	b)	c)
37	d)	e)	259	F	444
111	g)	h)	i)	1 110	j)

2.2 Find the factors for the following numbers.

(3)

a) 39: _____

b) 42: _____

MEMORANDUM

QUESTION	EXPECTED ANSWER	EXPLANATION
1.1 a)	$(2 \times 4) + (2 \times 9)$	One mark
b)	$(4+6) + 9$	One mark
c)	$(100 \times 24) + (50 \times 24) + (6 \times 24)$	One mark
d)	$123 + 87 + 15 + 65$	One mark
1.2 a)	122; 100; 64	One mark
b)	29; 3; 11; 19	<ul style="list-style-type: none"> One mark for identifying 3 Two marks for identifying all
c)	100; 49; 64	One mark
d)	27; 64	One mark
e)	$2,5 = 2$	One mark
1.3	The order in which to complete an operation BODMAS	<ul style="list-style-type: none"> One mark One mark
1.4 a)	31	One mark
b)	50	One mark
c)	6	One mark
d)	$8^2 = 4^3$	One mark
2.1 a)	175	One mark
b)	250	One mark
c)	300	One mark
d)	111	One mark
e)	370	One mark
f)	222	One mark
g)	333	One mark

QUESTION	EXPECTED ANSWER	EXPLANATION
h)	666	One mark
i)	777	One mark
j)	1 332	One mark
2.2 a)	1; 3; 13; 39	One mark
b)	1; 2; 3; 6; 7; 14; 21; 42	<ul style="list-style-type: none"> • One mark for 5 or more • Two marks for all

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?

Example of Grade 7 – Term 2 Investigation

Number sentences

Assignment Assessment Criteria

Assignment instructions:

1. Complete all the questions
2. Write neatly and legibly
3. You may make use of a non-scientific calculator
4. You may use the textbook, posters, dictionaries and DBE Workbooks to assist you in required
5. Show all calculations where necessary

QUESTION 1

- 1.1 Use your calculator to solve the following. Work from left to right: (5)
- a) $6 \times 8 + 2 \times 13 =$ _____
- b) $5 + 27 \times 11 - 9 =$ _____
- c) $150 - 45 \div 9 + 8 - 3 =$ _____
- d) $690 \div 3 + 5 \times 46 =$ _____
- e) $1 + 2 \times 4 =$ _____

QUESTION 2

- 2.1 a) In Mathematics we must follow the Order of Operations. What does this mean? (2)
- _____
- b) BODMAS is an acronym used in Mathematics to help remember the order of operations. What does each letter represent? (6)
- B: _____
- O: _____
- D: _____
- M: _____
- A: _____
- S: _____

QUESTION 3:

- 3.1 Do the calculations from 1.1 again using the correct order of operations. (6)
- a) $6 \times 8 + 2 \times 13 =$ _____
- b) $5 + 27 \times 11 - 9 =$ _____
- c) $150 - 45 \div 9 + 8 - 3 =$ _____
- d) $690 \div 3 + 5 \times 46 =$ _____

e) $1 + 2 \times 4 =$ _____

f) What do you notice about your answers?

QUESTION 4:

4.1 Write a suitable number sentence for the following problems and then solve them.

a) The product of six and twelve is subtracted from the product of ten to the power of 2. (3)

b) Angie works a five-day week. She works 7 hours per day and gets paid R980 per week. What does she earn per hour? (4)

MEMORANDUM

QUESTION	EXPECTED ANSWER	EXPLANATION
1.1 a)	650	One mark
b)	343	One mark
c)	16,666	One mark
d)	10 810	One mark
e)	12	One mark
2.1 a)	The order in which to solve a problem BODMAS	<ul style="list-style-type: none"> One mark for explanation One mark for BODMAS
b)	B – brackets O – of (fractions) D – divide M – multiply A – add S – subtract	One mark each
3.1 a)	74	One mark
b)	293	One mark
c)	140	One mark
d)	460	One mark
e)	9	One mark
f)	They are not the same as before.	One mark

QUESTION	EXPECTED ANSWER	EXPLANATION
4 a)	$10^2 - (6 \times 12)$ $100 - 72$ 28	<ul style="list-style-type: none"> • One mark for number sentence • One mark for calculation • One mark for correct answer
b)	$980 \div (5 \times 7)$ $980 \div 35$ R28/h	<ul style="list-style-type: none"> • One mark for number sentence • One mark for calculation • One mark for correct answer • One mark for writing it as a ratio

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.

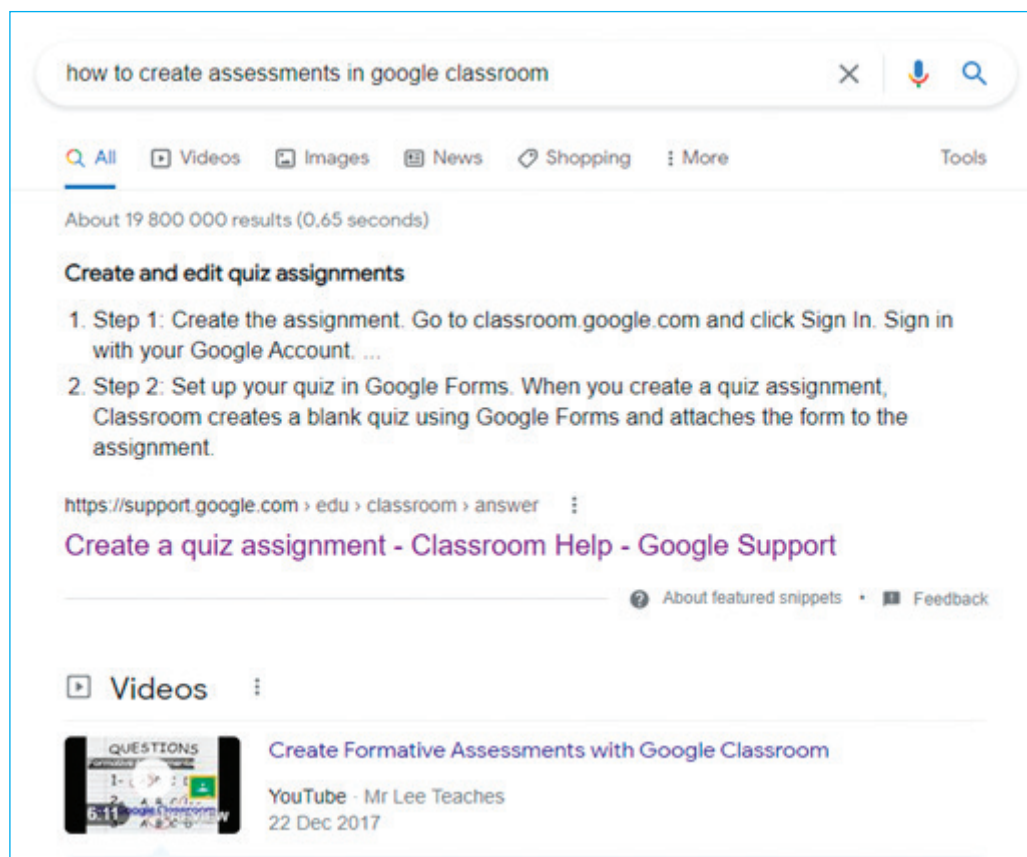
Electronic platforms are useful for educators to store information which is interactive and easy for learners to access. Baseline assessments, formative assessments and diagnostic assessments can all be conducted online.

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.

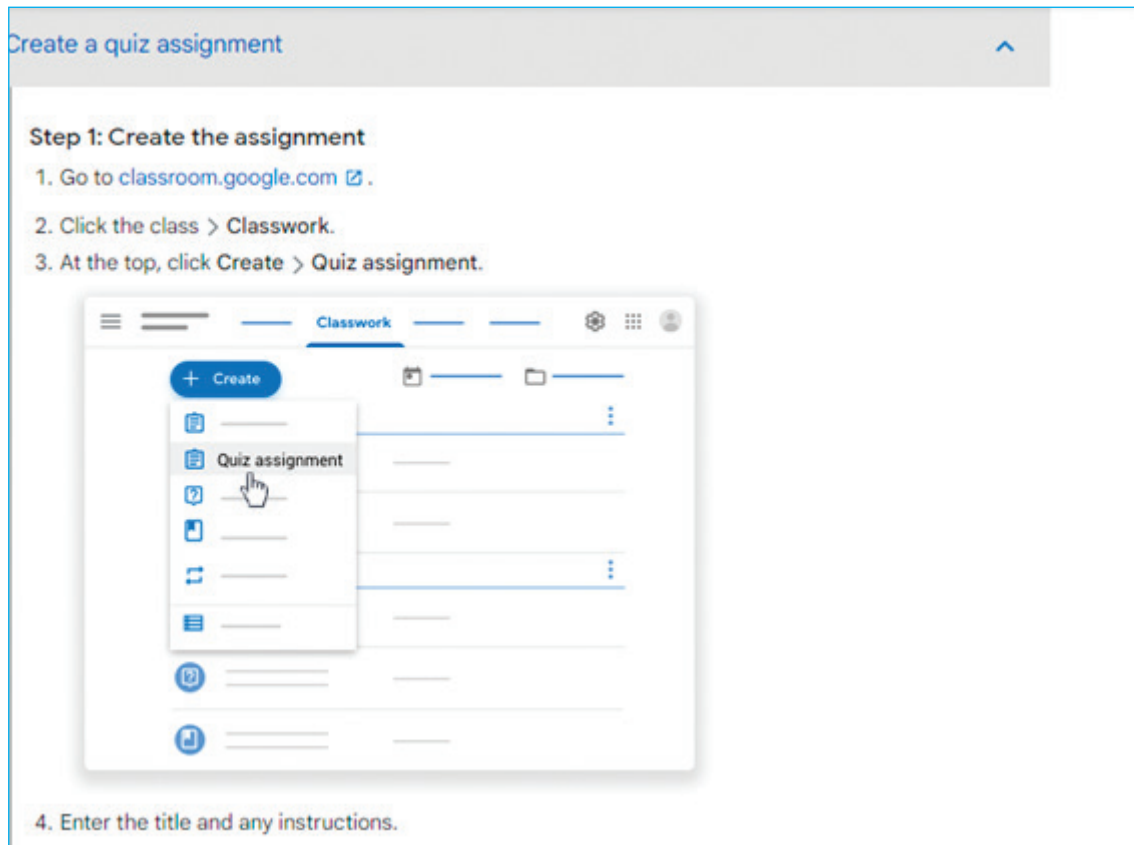
When conducting projects, investigations or assignments the information required or resources to be used can be set up by the educator in advance and this will allow learners to access the information when required. However, at this stage, the actual writing of the summative assessment must still be 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.

