

SECTION 4: ASSESSMENT

4.1. Introduction

Assessment is a continuous planned process of identifying, gathering and interpreting information regarding the performance of learners, using various forms of assessment. It involves four steps: generating and collecting evidence of achievement; evaluating this evidence; recording the findings and using this information to understand and thereby assist the learner's development in order to improve the process of learning and teaching. Assessment should be both informal and formal. In both cases regular feedback should be provided to learners to enhance their learning experience. This will assist the learner to achieve the minimum performance level of 40% to 49% required in Mathematics for promotion purposes.

4.2. Types of assessment

The following types of assessment are very useful in mathematics; as a result teachers are encouraged to use them to serve the purpose associated with each.

Baseline assessment: mathematics teachers who might want to establish whether their learners meet the basic skills and knowledge levels required to learn a specific Mathematics topic will use baseline assessment. Knowing learners' level of proficiency in a particular Mathematics topic enables the teacher to plan her/his Mathematics lesson appropriately and to pitch it at the appropriate level. Baseline assessment, as the name suggests, should therefore be administered prior to teaching a particular Mathematics topic. The results of the baseline assessment should not be used for promotion purposes.

Diagnostic assessment: It is not intended for promotion purposes but to inform the teacher about the learner's Mathematics problem areas that have the potential to hinder performance. Two broad areas form the basis of diagnostic assessment: content-related challenges where learners find certain difficulties to comprehend, and psycho-social factors such as negative attitudes, Mathematics anxiety, poor study habits, poor problem-solving behaviour, etc. Appropriate interventions should be implemented to assist learners in overcoming these challenges early in their school careers.

Formative assessment: 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, e.g. short class works during or at the end of each lesson, verbal questioning during the lesson. It is mainly informal and should not be used for promotion purposes. The fundamental distinguishing characteristic of formative assessment is constant feedback to learners, particularly with regard to learners' learning processes. The information provided by formative assessment can also be used by teachers to inform their methods of teaching.

Summative assessment: Contrary to the character of formative assessment, summative assessment is carried out after the completion of a Mathematics topic or a cluster of related topics. It is therefore referred to as assessment **of** learning since it is mainly focusing on the product of learning. The results of summative assessment are recorded and used for promotion purposes. The forms of assessment presented in Table 4.1 are examples of summative assessment.

4.3. Informal or daily assessment

Assessment for learning has the purpose of continuously collecting information on learner performance that can be used to improve their learning.

Informal assessment is a daily monitoring of learners' progress. This is done through observations, discussions, practical demonstrations, learner-teacher conferences, informal classroom interactions, etc. Informal assessment may be as simple as stopping during the lesson to observe learners or to discuss with learners how learning is progressing. Informal assessment should be used to provide feedback to learners and to inform planning for teaching, but need not be recorded. It should not be seen as separate from the learning activities taking place in the classroom.

Self-assessment and peer assessment actively allow learners to assess themselves. This is important as it allows learners to learn from, and reflect on their own performance. The results of the informal daily assessment tasks are not formally recorded unless the teacher wishes to do so. The results of daily assessment tasks are not taken into account for promotion purposes.

4.4. Formal assessment

Formal assessment comprises School-Based Assessment (SBA) and End of the Year Examination. Formal assessment tasks are marked and formally recorded by the teacher for promotion purposes. All Formal Assessment tasks are subject to moderation for the purpose of quality assurance and to ensure that appropriate standards are maintained. The SBA component may take various forms. However, **tests, examinations, projects, assignments** and **investigations** are recommended for Mathematics. The Senior Phase Mathematics minimum formal programme of assessment tasks are outlined in Table 4.1

Table 4.1: Requirements for Formal Assessment: Senior Phase Mathematics

	TERM 1		TERM 2		TERM 3	TERM 4	
Form of assessment	Assignment	Test	Investigation	Examination	Project	Test	Examination
Marking guideline	Memo	Memo	Memorandum and/ Rubric	Memo	Rubric	Memo	Memo
Number of papers	1	1	1	2	1		2
Minimum marks: Gr 7	50	40	40	Paper 1: 50 Paper 2: 50	50	40	Paper 1: 50 Paper 2: 50
Gr 8	50	50	40	Paper 1: 60 Paper 2: 60	50	50	Paper 1: 60 Paper 2: 60
Gr 9	50	50	50	Paper 1: 75 Paper 2: 75	50	50	Paper 1: 75 Paper 2: 75
Time allocation		1 hour		1 ½ hours /paper		1 hour	1 ½ hours /paper
SBA Weighting (40%)	10%	5%	5%		15%	5%	
End of year exam (60%)				30%			30%
Term weight (for reporting purpose)	100%		100%		100%		
Content areas covered				Paper 1: CA 1,2 Paper 2: CA 3,4,			Paper 1: CA 1, 2 Paper 2: CA 3,4,5
Content /concepts coverage	Gr 7: CAPS, p. 38 Gr 8: CAPS, p. 74 Gr 9: CAPS p. 118						
Skills and knowledge	Gr 7: CAPS, p. 39 – 48 Gr 8: CAPS, p. 75 – 91 Gr 9: CAPS, p. 119 – 133		Gr 7 CAPS: p.49–57 Gr 8 CAPS: p.92–99 Gr 9 CAPS: p.134-140	Gr 7 CAPS: p.39–57 Gr 8 CAPS: p.75–99 Gr 9 CAPS: p.119-140	Gr 7 CAPS: p.39–66 Gr 8 CAPS: p.75 –112 Gr 9 CAPS: p.119-146	Gr 7 CAPS: p. 58–74 Gr 7 CAPS: p.113–118 Gr 7 CAPS: p.147-153	

- There is reduction of assessment tasks from eleven to seven.
- Calculation of **Term weight** for reporting of 100% - Add marks of two tasks and calculate the percentage.
- June and November exam weight add up to 60% and the Assignment, Investigation, Project and two tests weight add up to 40% SBA
- Two 2 papers are prescribed in the June and November examinations to ensure concepts and skills are adequately assessed
- The weight of tests are 5% as this form of assessment are done under controlled conditions

Tests and **examinations** are individualised assessment tasks and should be carefully designed to ensure that learners demonstrate their full potential in Mathematics content. The questions should be carefully spread to cater for different cognitive levels of learners. Tests and examinations are predominantly assessed using a memorandum.

The assignment, as is the case with tests and examinations, is mainly an individualised task. It can be a collection of past questions, but should focus on 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.

Projects are used to assess a range of skills and competencies. Through projects, learners are able to demonstrate their understanding of different Mathematics concepts and apply them in real-life situations. Caution should, how-

ever, be exercised not to give projects that are above learners' cognitive levels. 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, followed by deductions that can be substantiated.

Investigation promotes critical and creative thinking. It can be used to discover rules or concepts and may involve inductive reasoning, identifying or testing patterns or relationships, drawing conclusions, and establishing general trends. To avoid having to assess work which is copied without understanding, it is recommended that whilst initial investigation could be done at home, the final write-up should be done in class, under supervision, without access to any notes. Investigations are assessed with rubrics, which can be specific to the task, or generic, listing the number of marks awarded for each skill. These skills include:

- organizing and recording ideas and discoveries using, for example, diagrams and tables.
- communicating ideas with appropriate explanations
- calculations showing clear understanding of mathematical concepts and procedures.
- generalizing and drawing conclusions,

The forms of assessment used should be appropriate to the age and cognitive level of learners. The design of these tasks should cover the content of the subject and designed to achieve the broad aims of the subject. Appropriate instruments, such as rubrics and memoranda, should be used for marking. Formal assessments should cater for a range of cognitive levels and abilities of learners as shown in Table 4.2:

Table 4.2: Cognitive levels

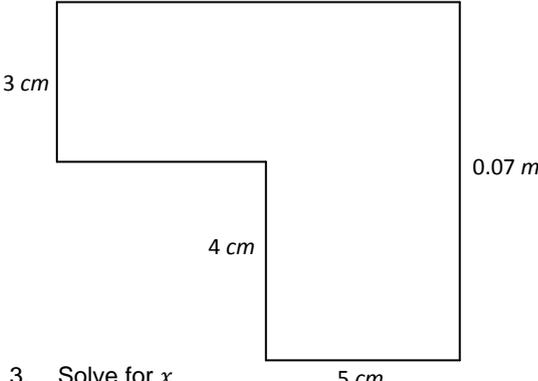
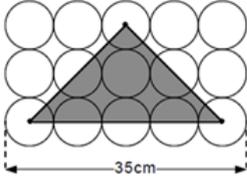
Description and Examples of Cognitive levels		
Cognitive levels	Description of skills to be demonstrated	Example
Knowledge (~25%)	<ul style="list-style-type: none"> Estimation and appropriate rounding of numbers Straight recall Identification and direct use of correct formula Use of mathematical facts Appropriate use of mathematical vocabulary 	<ol style="list-style-type: none"> Estimate the answer and then calculate with a calculator: $\frac{62\ 816}{325 + 279}$ [Grade 7] Use the formula $A = \pi r^2$ to calculate the area of a circle if the diameter is equal to 10 cm. [Grade 8] 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"> Determine the mean of 5 Grade 7 learners' marks if they have respectively achieved 25; 40; 21; 85; 14 out of 50. [Grade 7] Solve x in $x - 6 = 9$ [Grade 8] R600 invested at $r\%$ per annum for a period of 3 years yields R150 interest. Calculate the value of r if $SI = \frac{P.n.r}{100}$ [Grade 9]
Complex procedures (~20%)	<ul style="list-style-type: none"> Problems involving complex calculations and/or higher order reasoning Investigate elementary axioms to generalize 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"> 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] Study the figure below and answer the following questions: Calculate perimeter and area [Grade 8]  <ol style="list-style-type: none"> Solve for x $\frac{(4x^2-1)}{(2x+1)} = -\frac{1}{2}$ [Grade 9]
Problem solving (~10%)	<ul style="list-style-type: none"> Unseen, non-routine problems Higher order understanding and processes are often involved Might require the ability to break the problem down into its constituent parts Problems based on real world contexts 	<ol style="list-style-type: none"> The sum of three consecutive numbers is 87. Find the numbers. [Grade 7] Mary travels a distance of 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 diagram shows 15 identical circles arranged as a rectangle, and a shaded triangle. The vertices of the triangle are at the centre of the circles  <p>Calculate the area of the shaded triangle. [Grade 9]</p>

Table 4.3. Examination Guidelines

The content of the Exam papers is as indicated in the tables below

EXAMINATION GUIDELINES JUNE: GRADE 7

TOPICS	PAPER 1					Marks
	CONCEPTS					
Whole numbers	Properties of whole numbers and Calculations using whole numbers [4]		Multiples and factors [4]		Solving problems in context of ratio and rate and finance[9]	17 ± 2
Exponents	Calculations using numbers in exponential form	Solve problems in contexts involving numbers in exponential form. [Comparing and representing numbers in exponential form	10 ± 2
Common fractions	Percentages	Equivalent forms	Ordering and comparing common fractions	Solving problems	Calculations with common fractions	10 ± 2
Decimal fractions	Equivalent forms	Ordering and comparing decimal fractions	Solving problems	Calculations with decimal fractions		8 ± 2
Functions and relationships	Input and output values					5 ± 2
TOTAL						50

TOPICS	PAPER 2			Marks
	CONCEPTS			
Geometry of straight line	Definitions			5 ± 2
Geometry of 2 D	Classifying 2D shapes	Similar and congruent 2D shapes	Solving problems	18 ± 2
Area and perimeter of 2D shapes	Area and perimeter of regular and irregular polygons	Calculations and solving problems		12 ± 2
Surface area and volume of 3D objects	Surface area and volume	Calculations and solving problems		15 + 2
TOTAL				50

EXAMINATION GUIDELINES NOVEMBER: GRADE 7

TOPICS	PAPER 1				Marks
	CONCEPTS				
Numeric and geometric patterns	Investigate and extend patterns				10 ± 2
Functions and relationships	Input and output values	Equivalent forms			7 ± 2
Algebraic expressions	Algebraic language				7 ± 2
Algebraic equations	Number sentences				8 ± 2
Graphs	Interpreting graphs		Drawing graphs		7 ± 2
Integers	Counting, ordering and comparing integers	Calculations with integers	Properties of integers	Solving problems	11 ± 2
TOTAL					50

TOPICS	PAPER 2					Marks
	CONCEPTS					
Information geometry	Informations		Arguments and reductions			18 ± 2
Geometry of 3D objects	Classifying 3D objects					30 ± 2
Data Handling	Organize and summarize data	Present data	Interpret data	Analyse data	Report data	10 ± 2
Probability	Probability					20 ± 2
TOTAL						50

EXAMINATION GUIDELINES JUNE: GRADE 8

TOPICS	PAPER 1				Marks
	CONCEPTS				
Whole numbers	Properties of whole numbers	Calculations using whole numbers	Multiples and factors	Solving problems in context of ratio and rate and finance	8 ± 2
Exponents	Comparing and representing numbers in exponential form	Calculations using numbers in exponential form	Solve problems in contexts involving numbers in exponential form.		13 ± 2
Numeric and geometric patterns	Investigate and extend patterns				7 ± 2
Integers	Counting, ordering and comparing integers	Calculations with integers	Properties of integers	Solving problems	13 ± 2
Functions and relationships	Input and output values				6 ± 2
Algebraic expressions	Algebraic language		Expand and simplify algebraic expression		7 ± 2
Algebraic equations	Solve equations				6 ± 2
TOTAL					60

EXAMINATION GUIDELINES JUNE: GRADE 8

TOPICS	PAPER 2			Marks
	CONCEPTS			
Geometry of straight line	Angle relationships		Solving problems	28 ± 2
Geometry of 2 D	Classifying 2D shapes	Similar and congruent 2D shapes	Solving problems	32 ± 2
TOTAL				60

EXAMINATION GUIDELINES NOVEMBER: GRADE 8

TOPICS	PAPER 1				Marks
	CONCEPTS				
Common Fractions	Percentages	Equivalent forms	Solving problems		13 ± 2
Decimal Fractions	Equivalent forms	Ordering and comparing decimal fractions	Solving problems	Calculations with decimal fractions	12 ± 2
Functions and relationships	Input and output values		Equivalent forms		12 ± 2
Algebraic equations	Solve equations				6 ± 2
Graphs	Interpreting graphs		Drawing graphs		17 ± 2
TOTAL					60

EXAMINATION GUIDELINES NOVEMBER: GRADE 8

TOPICS	PAPER 2					Marks
	CONCEPTS					
Information Geometry	Transformations		Enlargements and reductions			10 ± 2
Geometry of 3D objects	Classifying 3D objects					10 ± 2
Theorem of Pythagoras	Use the Theorem of Pythagoras					9 ± 2
Data Handling	Organize and summarize data	Present data	Interpret data	Analyse data	Report data	15 ± 2
Probability	Probability					8 ± 2
Area and perimeter	Area and perimeter of regular and irregular polygons		Calculations and solving problems			9 ± 2
Surface area and volume of 3D objects	Surface area and volume					9 ± 2
TOTAL						60

EXAMINATION GUIDELINES JUNE: GRADE 9

TOPICS	PAPER 1			Marks	
	CONCEPTS				
Whole numbers	Properties of whole numbers	Calculations using whole numbers	Multiples and factors	Solving problems in context of ratio rate and proportions and finance	10 ± 2
Exponents	Calculations using numbers in exponential form	Solve problems in contexts involving numbers in exponential form.	Comparing and representing numbers in exponential form		10 ± 2
Common fractions	Equivalent forms		Solving problems		8 ± 2
Integers	Properties of integers	Calculations with integers	Solving problems		8 ± 2
Decimal fractions	Equivalent forms	Calculations with decimal fractions	Solving problems		8 ± 2
Functions and relationships	Input and output values				5 ± 2
Numeric and geometric patterns	Investigate and extend patterns				8 ± 2
Algebraic expressions	Algebraic language		Expand and simplify algebraic expression		10 ± 2
Algebraic equations	Solve equations				8 ± 2
TOTAL					75

EXAMINATION GUIDELINES JUNE: GRADE 9

TOPICS	PAPER 2			Marks	
	CONCEPTS				
Geometry of straight line	Angle relationships	Solving problems		24 ± 2	
Geometry of 2 D	Classifying 2D shapes	Similar and congruent 2D shapes	Solving problems		24 ± 2
Area and perimeter of 2D shapes	Area and perimeter of regular and irregular polygons	Calculations and solving problems		13 ± 2	
Theorem of Pythagoras	Solve problems using the Theorem of Pythagoras			14 ± 2	
TOTAL					75

EXAMINATION GUIDELINES NOVEMBER: GRADE 9

TOPICS	PAPER 1		Marks
	CONCEPTS		
Functions and relationships	Input and output values	Equivalent forms	10 ± 2
Algebraic expressions	Expand and simplify algebraic expression	Factorise algebraic expressions	20 ± 2
Algebraic equations	Solve equations		20 ± 2
Graphs	Interpreting graphs	Drawing graphs	25 ± 2
TOTAL			75

EXAMINATION GUIDELINES NOVEMBER: GRADE 9

TOPICS	PAPER 2					Marks
	CONCEPTS					
Information geometry	Informations	Arguments and reductions				17 ± 2
Geometry of 3D objects	Classifying 3D objects					15 ± 2
Data Handling	Organize and summarize data	Present data	Interpret data	Analyse data	Report data	21 ± 2
Probability	Probability					9 + 2
Surface Area and Volume of 3D objects	Surface area and volume		Calculations and solving problems			13 + 2
TOTAL						75

4.5. Recording and Reporting

Recording is a process in which the teacher documents the level of a learner's performance in a specific assessment task. It indicates the learner's progress towards the achievement of the knowledge as prescribed in the National Curriculum and Assessment Policy Statements. Records of learner performance should provide evidence of the learner's conceptual progression within a grade and her/his readiness to be promoted to the next grade. Records of learner performance should also be used to verify the progress made by teachers and learners in the teaching and learning process.

Reporting is a process of communicating learner performance to learners, parents, schools, and other stakeholders. Primary schooling is a critical period for the acquisition of foundational Mathematics skills and conceptual knowledge. Reporting of learner performance is therefore essential and should not be limited to the quarterly report card. Other methods of reporting should be explored, e.g. parents' meetings, school visitation days, parent-teacher conferences, phone calls, letters. These extreme, but worthwhile modalities will ensure that any underperformance is communicated promptly and appropriate measures of intervention are implemented collaboratively by teachers and parents. Formal reporting is done on a 7-point rating scale (see Table 4.3)

Table 4.3: scale of achievement for the national Curriculum statement Grades 7 - 9

Rating Code	Description of Competence	Percentage
7	Outstanding achievement	80 - 100
6	Meritorious achievement	70 - 79
5	Substantial achievement	60 - 69
4	Adequate achievement	50 - 59
3	Moderate achievement	40 - 49
2	Elementary achievement	30 - 39
1	Not achieved	0 - 29

4.6. Moderation of Assessment

Moderation refers to the process that ensures that the assessment tasks are fair, valid and reliable. Moderation should be carried out internally at school and/or externally at district, provincial and national levels. Given that the promotion of learners in the Senior Phase is largely dependent upon the SBA (which contributes 40%); the moderation process should be intensified to ensure that:

- learners are not disadvantaged by the invalid and reliable assessment tasks
- quality assessment is given and high but achievable standards are maintained

4.7. General

This document should be read in conjunction with:

- 4.7.1. *National policy pertaining to the programme and promotion requirements of the National Curriculum Statement Grades R-12; and*
- 4.7.2. *National Protocol for Assessment Grades R-12.*