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 psychosocial 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: Minimum requirements for formal assessment: Senior Phase Mathematics

	Forms of Assessment	Minimum Requirements per term				Number of Tasks per Year	Weighting
		Term 1	Term 2	Term 3	Term 4		
SBA	Test	1	1	1		3	**40%**
	Examination		1			1	
	Assignment	1		1	1	3	
	Investigation		1		1	2	
	Project			1		1	
	Total	**2**	**3**	**3**	**2**	**10***	
End of the year Examination						1	**60%**

*To be completed before the End of the year Examination

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, however, 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.

I**nvestigation** 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**	**Examples**
Knowledge (≈25%)	• Estimation and appropriate rounding of numbers • Straight recall • Identification and direct use of correct formula • Use of mathematical facts • Appropriate use of mathematical vocabulary	1. Estimate the answer and then calculate with a calculator: $\frac{62\,816}{325 + 279}$ **[Grade 7]** 2. Use the formula A = πr^2 to calculate the area of a circle if the diameter is equal to 10 cm. **[Grade 8]** 3. Write down the y-intercept of the function $y = 2x + 1$ **[Grade 9]**
Routine procedures (≈45%)	• 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	1. Determine the mean of 5 Grade 7 learners' marks if they have respectively achieved 25; 40; 21; 85; 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 $SI = \frac{Pnr}{100}$. **[Grade 9]**
Complex procedures (≈20%)	• 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	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]**
Problem solving (≈10%)	• Unseen, non-routine problems (which are not necessarily difficult) • Higher order understanding and processes are often involved • Might require the ability to break the problem down into its constituent parts	1. The sum of three consecutive numbers is 87. Find the numbers. **[Grade 7]** 2. 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]** 3. 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]**

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 unreliable 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.*