CURRICULUM AND ASSESSMENT POLICY STATEMENT

(CAPS)

MATHEMATICAL LITERACY

FINAL

SECTION 4

ASSESSMENT

4.1   INTRODUCTION

Assessment is a continuous planned process of identifying, gathering and interpreting information about 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 (Assessment for Learning) and formal (Assessment of Learning). In both cases regular feedback should be provided to learners to enhance the learning experience.

Assessment of Mathematical Literacy
In accordance with the aims of the subject Mathematical Literacy assessment in Mathematical Literacy must measure the extent to which learners are able to make sense of scenarios based on authentic and realistic, familiar and unfamiliar real-life contexts by drawing on both mathematical and non-mathematical techniques and/or considerations.

As such, assessment tasks should:
- be based on authentic real-life contexts and use real-life data;
- require learners to select and use appropriate mathematical content in order to explore contexts;
- require learners to take into account possible non-mathematical considerations that may have a bearing on the desired outcome to a problem.

Some assessment tasks might more explicitly give learners the opportunity to demonstrate their understanding of specific mathematical content and/or skills (e.g. *the ability to 'solve equations' or 'calculate statistics such as mean, median and mode for different sets of data'*), while other assessment tasks might be less focused on specific mathematical content and rather draw on a range of content and/or skills from a variety of content topics to explore and make sense of an authentic context.

Teachers need to design assessment tasks that provide learners with the opportunity to demonstrate both competence in mathematical content and the ability to use a variety of both mathematical and non-mathematical techniques and/or considerations to make sense of real-life, everyday, meaningful problems.

Areas/topics of focus

Assessment in Mathematical Literacy is specifically focused on the Application Topics of Finance, Measurement, Maps, plans and other representations of the physical world, Data handling and Probability. It is expected that the Basic Skills Topics of Interpreting and communicating answers and calculations, Numbers and calculations with numbers and Patterns, relationships and representations will be integrated throughout all topics.

Although teachers may choose to use assignments, investigations and tests to exclusively test specific concepts and/or skills relating to the Basic Skills Topics, in examinations it is not expected that a whole question will be dedicated to assessing the Basic Skills Topics in isolation from the "Application Topic". Rather, the examinations will focus on assessing the learners' ability to solve problems and explore contexts relating to the topics of Finance, Measurement, Maps, plans and other representations of the physical world, Data handling and Probability, and their ability to use number concepts and equations, tables and graphs in an integrated way in order to make sense of those contexts.

4.2   INFORMAL OR DAILY ASSESSMENT

Assessment for learning has the purpose of continuously collecting information on learners' achievement 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 the learners and to inform planning for teaching, but need not be recorded. It should not be seen as separate from learning activities taking place in the classroom. Learners or teachers can mark these assessment tasks.

Self-assessment and peer assessment actively involves learners in assessment. 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 and certification purposes.

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4.3 FORMAL ASSESSMENT

All assessment tasks that make up a formal programme of assessment for the year are regarded as Formal Assessment. Formal assessment tasks are marked and formally recorded by the teacher for progression and certification purposes. All Formal Assessment tasks are subject to moderation for the purpose of quality assurance and to ensure that appropriate standards are maintained.

Formal assessment provides teachers with a systematic way of evaluating how well learners are progressing in a grade and in a particular subject. Examples of formal assessments include tests, examinations, assignments, investigations, practical tasks, demonstrations, etc. Formal assessment tasks form part of a year-long formal Programme of Assessment in each grade and subject.

Specific details regarding the formal assessment requirements in Mathematical Literacy are given in the section titled **Programme of Assessment** below.

The forms of assessment used should be age and development level appropriate. The design of these tasks should cover the content of the subject and include a variety of tasks designed to achieve the objectives of the subject.
Formal assessments must cater for a range of cognitive levels and abilities of learners. The levels appropriate to Mathematical Literacy are described below.

Mathematical Literacy assessment taxonomy
Assessment can be pitched at different levels of cognitive demand. At one end of the spectrum are tasks that require the simple reproduction of facts, while at the other end of the spectrum tasks require detailed analysis and the use of varied and complex methods and approaches.

Complexity in Mathematical Literacy is structured around the following assessment taxonomy framework:
- Level 1: Knowing
- Level 2: Applying routine procedures in familiar contexts
- Level 3: Applying multi-step procedures in a variety of contexts
- Level 4: Reasoning and reflecting.

The levels of this taxonomy are described in Appendix 1 and are illustrated by means of references to an assessment task (*Responsible use of paracetamol*) provided in Appendix 2.

When designing assignments, investigations, and especially tests and examinations, teachers should use the following guideline for deciding on the number of marks to be allocated to questions at each of the levels of the taxonomy.

Table 1: Distribution of marks according to the levels of the Mathematical Literacy taxonomy in Formal Assessment Tasks

Levels of the Mathematical Literacy assessment taxonomy	Percentage of marks allocated to assignment; control test and examination	Percentage of marks allocated to investigation*
Level 1: Knowing	30% (±5%)	0%
Level 2: Applying routine procedures in familiar contexts	30% (±5%)	25% (±5%)
Level 3: Applying multi-step procedures in a variety of contexts	20% (±5%)	35% (±5%)
Level 4: Reasoning and reflecting	20% (±5%)	40% (±5%)

*The weighting of Investigation is according to P2, as it is expected to afford learners to think at higher order, thus preparing learners for P2.

It is important to point out that in order to promote the vision that Mathematical Literacy involves the use of both mathematical and non-mathematical techniques and considerations in exploring and understanding of authentic real-life scenarios, this taxonomy should not be seen as being associated exclusively with different levels of *mathematical* calculations and/or complexity. In determining the level of complexity and cognitive demand of a task, consideration should also be given to the extent to which the task requires the use of integrated content and skills drawn from different topics, the complexity of the context in which the problem is posed, the influence of non-mathematical considerations on the problem, and the extent to which the learner is required to make sense of the problem without guidance or assistance.

4.4 PROGRAMME OF ASSESSMENT

The Programme of Assessment is designed to spread formal assessment tasks in all subjects in a school throughout a term.

Programme of Assessment for Mathematical Literacy in Grades 10 and 11

The Programme of Assessment for Mathematical Literacy in Grades 10 and 11 consists of *seven tasks* which are internally assessed:

- Six of the seven tasks are completed during the school year and make up 25% of the total mark for Mathematical Literacy.

- The end-of-year examination is the seventh task and makes up the remaining 75%.

Table 2a illustrates one possible Programme of Assessment for Mathematical Literacy for Grades 10 and 11.

Table 2a: Example of a Programme of Assessment for Grades 10 and 11 showing the weighting of assessment tasks

	SCHOOL BASED ASSESSMENT (25%)				EXAMINATION (75%)
	Term 1	**Term 2**	**Term 3**	**Term 4**	
Grade 10	Assignment (10%)	Assignment (10%)	Investigation (10%)	REVISION	Examination
	Test (20%)	Examination (30%)	Test (20%)		
Grade 11	Assignment (10%)	Assignment (10%)	Investigation (10%)		Examination
	Test (20%)	Examination (30%)	Test (20%)		

The suggested Programme of Assessment assumes that:

- all the topics and sections are addressed throughout the year;

- the topics are weighted in accordance with the suggested minimum weightings for each topic outlined in Chapter 2 of this document;

- content and/or skills are integrated across a variety of topics throughout teaching and learning, and in the assessment activities.

- 1-2 weeks may be allocated as duration to complete and submit the Assignment or Investigation.

- The weightings for quarterly reporting will be allocated as 25% assignment or investigation and 75% control test or examination.

Programme of Assessment for Mathematical Literacy in Grade 12

The Programme of Assessment for Mathematical Literacy in Grade 12 consists of *seven tasks*:

- Six tasks are internally assessed and completed during the school year making up 25% of the total mark for Mathematical Literacy;

- The seventh task is an externally assessed end-of-year examination and makes up the remaining 75%.

Table 2b illustrates one possible Programme of Assessment for Mathematical Literacy for Grade 12.

Table 2b: Example of a Programme of Assessment for Grade 12 showing the weighting of assessment tasks

	SCHOOL BASED ASSESSMENT (25%)				EXAMINATION (75%)
	Term 1	**Term 2**	**Term 3**	**Term 4**	
Grade 12	Investigation (10%)	Assignment (10%)	Test (15%)	REVISION	Examination
	Test (15%)	Examination* (25%)	Examination* (25%)		

* In Grade 12, one of the tasks in Term 2 <u>or</u> Term 3 may be an internal examination.

The assessment tasks should be implemented as indicated in Table 2b.

The suggested Programme of Assessment assumes that:

- all the topics and sections are addressed throughout the year;

- the topics are weighted in accordance with the suggested minimum weightings for each topic outlined in Chapter 2 of this document;

- content and/or skills are integrated across a variety of topics throughout teaching and learning, and in the assessment activities

- 1-2 weeks maybe allocated as a duration to complete and submit the Assignment or Investigation.

- The weightings for quarterly reporting will be allocated as 25% assignment or investigation and 75% control test or examination.

<u>Description of assessment tasks in Mathematical Literacy</u>

The different tasks listed in the Programme of Assessment are described as follows:

Test

Tests assess content under controlled examination or test conditions. tests are essential to prepare learners for examinations and, as such, should resemble the examinations in terms of structure and the conditions under which they are administered. Learners are expected to prepare for these tests and the content that will be tested is explicitly communicated to learners timeously, well before the test.. All information required in the test, including any real-life resources around which questions have been posed, will be provided by the teacher. A test may consist of two or more questions.

> Example: Having studied how taxation is determined using tax bracket tables and tax deduction tables, learners could be set a test on determining taxation for an individual based on the salary information provided. The salary slip and any other information that is required for answering the questions in the test are provided by the teacher.

Assignment

In the context of Mathematical Literacy, an assignment is a well-structured task with clear guidelines and a well-defined outcome. An assignment could provide learners with the opportunity to consolidate a topic or section that has been covered in class, or to apply an approach or method studied in class to a new context, or to revise for tests and/or examinations. Both the content and contexts of the assignment are likely to be familiar to the learner. While the teacher may allocate classroom time to an assignment and supervise the completion, parts of an assignment should also be completed by the learner in his or her own time and/or with the assistance of other learners. An assignment may consist of two or more questions.

> Example: If learners have determined the bank fees for a given bank statement based on the fee structure for a savings bank account for a particular month, an assignment could ask the learners to calculate the bank fees for the same bank statement but based on the fee structure for a different kind of bank account.

Investigation

In the context of Mathematical Literacy, an investigation involves a guided discovery, where learners are led through a process of discovering a particular concept or idea through leading questions. This guided discovery may include the collection of data and/or information to solve a problem. An investigation is suitable for developing high order thinking skills, thus preparing learners for Paper 2.

> Example: Learners are presented with two adverts showing different cell phone contract options. Questions are provided to guide them through various calculations that expose the costs involved in each contract. At the conclusion of the investigation, learners are in a position to be able to make a decision about which cell phone option is the most cost-effective for a given condition.

Summary of the formal assessment tasks listed in the CAPS document

The tables below provide a summary of the various suggested assessment tasks included in this document.

Table 3: Summary of suggested assessments listed in the CAPS document for Grades 10-12

GRADE 10			
Topic	**Section**	**Assessment Type and Title**	**Page Reference**
Numbers and calculations with numbers	Rounding	Assignment: *Exploring the impact of rounding*	25
	Proportion	Investigation: *Comparing direct and indirect proportion*	27
	Rates	Assignment: *Comparing prices*	28
	Percentages	Assignment: *Comparing actual and relative size*	29
Patterns, relationships and representations	Representations of relationships in tables, graphs and equations	Investigation: *Identifying and representing a relationship in daily life*	36
		Assignment: *Representing electricity costs graphically*	36
Finance	Financial documents	Assignment: *Making sense of a household bill*	41
	Income, expenditure, profit/loss, income-and-expenditure statements and budgets	Assignment: *Developing a household budget*	44
Measurement	Measuring length and distance	Assignment: *Measuring accurately*	56
	Perimeter, area and volume	Assignment: *Designing and costing a small vegetable garden*	61
	Time	Assignment: *Baking a cake*	63
Maps, plans and other representations of the physical world	Scale	Investigation: *What happens if you resize a map or plan*?	65
	Maps	Assignment: *Finding your way*	67
	Plans	Assignment: *Writing instructions*	68
		Assignment: *Assembling an object*	68
Data handling	All sections	Assignment: *Electricity usage*	80
Probability	All sections	Assignment: *Unfair play*	86

GRADE 11			
Topic	**Section**	**Assessment Type and Title**	**Page Reference**
Patterns, relationships and representations	Representations of relationships in tables, graphs and equations	Assignment: *Representing cell phone costs graphically*	36
	Working with two or more relationships	Investigation: *Comparing costs on different cell phone systems*	38
Finance	Tariff systems	Investigation: *Which cell phone?*	42
	Break-even analysis	Assignment: *Running a home industry business*	45
	Interest	Investigation: *Comparing simple and compound interest graphically*	46
	Banking, loans and investments	Assignment: *Which bank?*	47
	Inflation	Investigation: *Tracing inflation in the real world*	50
	Taxation	Assignment: *Understanding UIF*	51
Measurement	Measuring mass (weight)	Investigation: *Investigating the (mass) weight status of adults*	57
	Measuring volume	Assignment: *Making and calibrating a rain gauge to monitor rainfall*	58
	Perimeter, area and volume	Assignment: *Household water consumption*	61
	Time	Assignment: *Mini-Olympics*	63
Maps, plans and other representations of the physical world	Plans, conversions, area, finance	Assignment: *Painting a classroom*	70
	Models, surface area, volume	Investigation: *Which box should you use?*	72
Data handling	All sections	Investigation: *Healthy living for adults*	80
Probability	All sections	Investigation: *Tossing coins* Investigation: *Pregnancy tests*	86

GRADE 12			
Topic	**Section**	**Assessment Type and Title**	**Page Reference**
Patterns, relationships and representations	Working with two or more relationships	Investigation: *Comparing costs on different electricity systems*	38
Finance	Financial documents	Assignment: *Understanding the "Tax Pocket Guide"*	41
	Banking, loans and investments	Assignment: *Modelling a loan*	49
	Taxation	Assignment: *Calculating personal income tax*	51
	Exchange rates	Assignment: *Planning a holiday in another country*	52
Measurement	Measuring mass (weight)	Investigation: *Investigating the weight status of children*	58
	Perimeter, area and volume	Investigation: *Tiling a floor* Investigation: *Housing density*	61
	Time, maps, finance	Assignment: *Planning a trip*	63
Maps, plans and other representations of the physical world	Maps, finance, timetables	Assignment: *Planning a trip*	67
	Plans, models, perimeter, area, volume, finance	Assignment: *Building a house*	70
	Models	Assignment: *Building a model of a school hall*	72
Data handling	All sections	Assignment: *Risky behaviour*	80
Probability	All sections	Investigation: *Probability in the world*	86

4.4.2   Examinations for Grades 10, 11 and 12

Overview

- Examination papers for Grades 10 and 11 will be internally set, marked and moderated, unless otherwise instructed by provincial departments of education.

- The Grade 12 final end-of-year examination is nationally set, marked and moderated.

Time and mark allocation

Table 4 shows the number of and stipulated mark and time allocations for examination papers (and tests) for Grades 10 – 12:

Table 4: Number of examination papers and tests with marks and duration for Grades 10–12

	GRADE 10		GRADE 11		GRADE 12	
TERM 1	Test 1 - 2 hours (50 - 100 marks)		Test 1 - 2 hours (50 - 100 marks)		Test 1 - 2 hours (50 - 100 marks)	
TERM 2	Paper 1 1 hour (50 marks)	Paper 2: 1 hour (50 marks)	Paper 1: 1½ hours (75 marks)	Paper 2: 1½ hours (75 marks)	Paper 1: 2 hours (100 marks)	Paper 2: 2 hours (100 marks)
TERM 3	Test 1 - 2 hours (50 - 100 marks)		Test 1 - 2 hours (50 - 100 marks)		Test 1 - 2 hours 50 - 100 marks	Test 1 - 2 hours 50 - 100 marks
					Paper 1: 3 hours (150 marks)	Paper 2: 3 hours (150 marks)
TERM 4	Paper 1 1½ hours (75 marks)	Paper 2 1½ hours (75 marks)	Paper 1: 2 hours (100 marks)	Paper 2: 2 hours (100 marks)	Nationally set examination	
					Paper 1: 3 hours (150 marks)	Paper 2: 3 hours (150 marks)

Additional information regarding examination papers

For each examination in Grades 10, 11 and 12 there are two examination papers. These papers assess the same content but are differentiated according to intention, cognitive demand and the nature of contexts included in the examinations.

Paper 1: A "skills" paper working with familiar contexts
Overview:

This examination paper assesses basic mathematical skills and competency, and primarily contains questions at the *knowing* (Level 1) and *routine procedures* (Level 2) levels. The examination also contains a small number of *multi-step procedures* (Level 3) questions, which will allow for more in-depth analysis of contexts and/or

problems. The contexts included in this paper are limited to those specified in the curriculum outline section of this CAPS document.

Intention:

The intention of this paper is to assess understanding of the core content and/or skills outlined in the CAPS document in the context of authentic real-life problems. Although questions will be contextualised, the focus is primarily on assessing proficiency in a range of content topics, techniques and/or skills.

Structure and scope of content:

A Mathematical Literacy Paper 1 examination will typically consist of five questions:

- Each question will be contextualised and may focus on more than one context.

- Each question will contain sub-questions.

- The first question will integrate concepts and/or skills from across all the topics in the curriculum and will consists only consists of Cognitive Level 1 questions of 20% ± 5%.

- The remaining 40% ± 5% of Cognitive Level 1 questions will be intergrated in the remaining questions.

- The second to the fifth question will be focused on each of the topics:
    - Finance
    - Measurement
    - Maps, plans and other representations of the physical world
    - Data handling

with the content and/or skills outlined in the following topics integrated throughout each question:
    - Interpreting and communicating answers and calculations
    - Numbers and operations with numbers
    - Patterns, relationships and representations.

- The topic of Probability will be assessed in the context of one or more of these questions rather than as a question on its own.

Scope of contexts:

Contexts used in the Paper 1 examination will be limited to those specified in the Curriculum Outline section of the CAPS document thus the contexts used in this examination will be familiar to the learners.

Distribution of marks according to the taxonomy levels:

A Paper 1 examination should include questions at the different levels of the taxonomy according to the following mark distribution:

- 60% (±5%) of the marks at Level 1 (*knowing*);35% (±5%) of the marks at Level 2 (*applying routine procedures in familiar contexts*);5% (minimum) of the marks at Level 3 (*applying multi-step procedures in a variety of contexts*).

Comments on mark allocation:

There should be no 1 mark question in the examination and all SBA tasks. Even in situations where all that is required is for information to be read straight from a table, the information in the table has to be interpreted and the appropriate information located and identified. This process involves two steps and should be awarded two marks. It is also envisioned that a mark will be allocated for each step of working required in a calculation.

Paper 2: An "applications" paper, using both familiar and unfamiliar contexts

This examination paper is an "applications" paper and primarily contains *multi-step procedures* (Level 3) and *reasoning and reflecting* (Level 4) questions, and a small number of *routine procedures* (Level 2) questions. The purpose of the Level 2 questions in this paper is to provide learners with greater access to the contexts in which problems are situated.

Intention:

The intention of this examination paper is to assess the ability to identify and use a variety of mathematical and non-mathematical techniques and/or considerations to understand and explore both familiar and unfamiliar authentic contexts.

Structure and scope of content:

A Mathematical Literacy Paper 2 examination will typically consist of four or five questions:

- Each question will contain sub-questions.
- Each question will explore one or more contexts, drawing on content and/skills from two or more of the following topics:
  - Finance
  - Measurement
  - Maps, plans and other representations of the physical world
  - Data handling

  with the content and/or skills outlined in the following topics integrated throughout each question:
  - Interpreting and communicating answers and calculations
  - Numbers and operations with numbers
  - Patterns, relationships and representations.
- The topic of Probability will be assessed in the context of one or more of these questions and not as a question on its own.
- Each question will include sub-questions consisting of a small number of questions at the *routine procedures* (Level 2) levels, and a greater number at the *multi-step procedures* (Level 3) and *reasoning and reflecting* (Level 4) levels.

- The focus of each question will be on assessing the ability to explore and understand a context(s) rather than on mathematical proficiency.

Scope of contexts:
Contexts used in a Paper 2 examination will include both familiar and unfamiliar (applicable to grade 12 only) contexts and are not limited to those specified in the Curriculum Outline section of the CAPS document.

Distribution of marks according to the taxonomy levels:
A Paper 2 examination should include questions at the different levels of the taxonomy according to the following mark distribution:
- 25% of the marks at Level 2 (*applying routine procedures in familiar contexts*);
- 35% of the marks at Level 3 (*applying multi-step procedures in a variety of contexts*);
- 40% of the marks at Level 4 (*reasoning and reflecting*).

Paper 1 and Paper 2 compared
Table 5 shows a summary of the differences between Paper 1 and Paper 2 examinations.

Table 5: Summary of the differences between Paper 1 and Paper 2

	Paper 1	Paper 2
Intention	"Basic skills" paper → assesses proficiency of content and/or skills	"Applications" paper → assesses ability to use both mathematical and non-mathematical techniques/considerations to explore familiar and unfamiliar (applicable to grade 12 only) contexts.
Structure and scope of content and/or skills	5 questions. The first question integrates context from across all topics. The second to the fifth question will focus on each of the following topics: • Finance • Measurement • Maps, plans and other representations of the physical world • Data handling Probability will be examined in the context or one or more of the other questions. The "Basic Skills" topics *Numbers and operations with numbers* and *Patterns, relationships and representations* will be integrated throughout all other questions. Each question can contain more than one context.	4 or 5 questions. Each question deals with contexts drawing integrated content from across all of these topics: • Finance • Measurement • Maps, plans and other representations of the physical world • Data handling Probability will be examined in the context of one or more of the other questions. The "Basic Skills" topics *Numbers and operations with numbers* and *Patterns, relationships and representations* will be integrated throughout all other questions. Each question can contain more than one context.

Taxon-omy levels	**Level 1**	60% (±5%)	---
	Level 2	35% (±5%)	25% (±5%)
	Level 3	5% (minimum)	35% (±5%)
	Level 4	---	40% (±5%)
Contexts		"Familiar", that is, limited to the contexts listed in the CAPS document.	Both "familiar" and "unfamiliar" (applicable to Grade 12 only), that is, not limited to the contexts listed in the CAPS document.

In order to achieve the aim of Mathematical Literacy to help learners develop the ability to use a variety of mathematical and non-mathematical techniques and/or considerations to explore and understand both familiar and unfamiliar real-life contexts, it is essential that assessment items and examinations draw on <u>realistic and authentic contexts</u>. Learners should be asked to interpret newspaper articles, real bank statements, real plans and other authentic resources, rather than contrived problems containing only a semblance of reality.

<u>Weightings of topics</u>

The following weightings are stipulated for each topic in examinations:

Table 6: Weighting per topic

	Topic	Weighting (%)
Basic Skills Topics	Interpreting and communicating answers and calculations	No weighting is provided for these topics. Rather, they will be assessed in an integrated way in the Application Topics.
	Numbers and calculations with numbers	
	Patterns, relationships and representations	
Application Topics	Finance	35% (±5%)
	Measurement	20% (±5%)
	Maps, plans and other representations of the physical world	15% (±5%)
	Data handling	25% (±5%)
	Probability	5% - 10%

<u>Distribution of marks according to the taxonomy levels</u>

Table 7 illustrates the percentage of marks to be allocated to the different taxonomy levels for Grades 10, 11 and 12.

Table 7: Percentage of marks to be allocated to the different assessment taxonomy levels in examinations in Grades 10, 11 and 12

The four levels of the Mathematical Literacy assessment taxonomy	Grades 10, 11 and 12		
	Paper 1	Paper 2	Overall allocation
Level 1: Knowing	60% ± 5%		30% ± 5%
Level 2: Applying routine procedures in familiar contexts	35% ± 5%	25% ± 5%	30% ± 5%
Level 3: Applying multi-step procedures in a variety of contexts	5% (minimum)	35% ± 5%	20% ± 5%
Level 4: Reasoning and reflecting		40% ± 5%	20% ± 5%

4.4.3   Additional information on the mid-year examinations

Much of the information relating to the structure of the examinations provided above relies on the whole curriculum having been covered and so relates primarily to examinations that take place at the end of the year. Clearly this will not be the case for the mid-year examinations, which will focus on assessing content covered in Terms 1 and 2.

It is not the intention of this document to prescribe the contents and the weighting of the various topics covered in these mid-year examinations. However, the following guidelines are suggested:

- Two examinations papers: Paper 1 (Basic Skills Paper) and Paper 2 (Applications Paper).
- The structure of the questions in these papers should follow the structure suggested above for Paper 1 and Paper 2 examinations (see Table 5 on page 99 above).
- The examinations should include questions on all of the topics covered in Terms 1 and 2:
    - This means that in Grade 10 teachers can choose to include questions that assess the content, skills and contexts covered in the Basic Skills topics of Numbers and calculations with numbers and Patterns, relationships and representations (both of which designated to be taught in Term 1 in the work schedule provided at the beginning of this document).
    - In Grade 11 teachers can choose to include questions that assess the content, skills and contexts covered in the Basic Skills topic of Patterns, relationships and representations (which is designated to be taught in Term 1 according to the work schedule provided at the beginning of this document).
- Teachers can decide on an appropriate weighting of the topics assessed in the examination, possibly as determined by the amount of content included in a topic or section and the amount of time taken to teach the topic or section. The table below shows an example of a possible weighting of topics for a Grade 10 mid-year examination (across both Paper 1 and Paper 2).

Table 8: Example of weightings per topic in the mid-year examinations

Term	Topic / Section	Weeks allocated in suggested work schedule (on page 14 above)	Weighting (% of combined Paper 1 & Paper 2)
1	Numbers and calculations with numbers	5	10%
	Patterns relationships and representations	3	10%
	Contexts focussing on Measurement (Conversions and Time)	1	10%
2	Contexts focussing on Measurement (Measuring length/distance, mass, volume and temperature)	2	15%
	Contexts focussing on Finance (Financial documents and Tariff systems)	2	20%
	Contexts focussing on Maps, plans and other representations of the physical world (Scale and Maps)	2	20%
	Contexts focussing on Probability	2	15%

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 learner progress towards the achievement of the knowledge as prescribed in the *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 progress or 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. Learner performance can be reported in a number of ways which include report cards, parents' meetings, school visitation days, parent-teacher conferences, phone calls, letters, class or school newsletters, etc. Teachers in all grades report in percentages against the subject. Seven levels of competence have been described for each subject listed for Grades R - 12. The various achievement levels and their corresponding percentage bands are as shown in the Table below.

CODES AND PERCENTAGES FOR RECORDING AND REPORTING

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%

Note: The seven point scale should have clear descriptors that give detailed information for each level.

Teachers will record actual marks against the task by using a record sheet; and report percentages against the subject on the learners' report cards.

4.6 MODERATION OF ASSESSMENT

Moderation refers to the process which ensures that the assessment tasks are fair, valid and reliable. Moderation should be implemented at school, district, provincial and national levels. Comprehensive and appropriate moderation practices must be in place for the quality assurance of all subject assessments.

In Mathematical Literacy:

- School Based Assessment tasks for Grade 10, 11 and 12 must be moderated at school level prior moderation at other levels.
- Grade 10, 11 and 12 tasks are moderated at school, district and provincial level. This process will be managed by the provincial education department.

4. 7   APPENDICES

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APPENDIX 1

DESCRIPTION OF THE LEVELS IN THE MATHEMATICAL LITERACY ASSESSMENT TAXONOMY

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Complexity in Mathematical Literacy is structured around the following assessment taxonomy framework:

- Level 1: Knowing
- Level 2: Applying routine procedures in familiar contexts
- Level 3: Applying multi-step procedures in a variety of contexts
- Level 4: Reasoning and reflecting.

It is important to recognise that this taxonomy should not be seen as associated exclusively with different levels of *mathematical* calculations and/or complexity. In determining the level of complexity and cognitive demand of a task, consideration should also be given to the extent to which the task requires the use of integrated content and skills drawn from different topics, the complexity of the context in which the problem is posed, the influence of non-mathematical considerations on the problem, and the extent to which the learner is required to understand the problem without guidance or assistance.

Level 1: Knowing

Level 1: Knowing questions serve two functions:

- To familiarise learners with the context in which problems are posed by asking them questions about the context;
- To test ability to interpret contextualised information, to use familiar techniques to perform basic calculations and to explain common terms.

Examples of the types of tasks at the *knowing* level of the Mathematical Literacy taxonomy include:

- reading information directly from a table (e.g. *the date on a bank statement; the time that a bus leaves the bus terminal*);
- performing basic operations on numbers (e.g. *subtracting income and expenditure values to determine the profit/loss for a business; adding values to show how the "Amount due" value on an electricity bill has been determined*);
- measuring accurately (e.g. *measuring the dimensions of a room on a given plan accurately using a ruler*).
- rounding answers appropriately as per a given instruction (e.g. *rounding off an answer to one decimal place when instructed to do so*);
- identifying the appropriate formula to be used in a given calculation (e.g. *identifying the formula for the area of a circle as area = π × radius2 from a given list of area formulae*);

- recognising and explaining vocabulary appropriate to a particular scenario (e.g. *"discrete" and "continuous" in the context of data; "event" and "outcome" in the context of Probability; "dependent" and "independent" variables; "debit" and "credit" in the context of finance*);

- reading values directly from the values provided on a graph or table (e.g. *reading off the cost of talking for 60 minutes on a cell phone contract from a graph showing the cost of calls over time*);

- performing conversions within the metric system (e.g. *from mm to cm to m to km; from ml to ℓ; from g to kg; from seconds to minutes to hours*).

Example:

In the **Responsible use of paracetamol** task in **Appendix 2** below, *Questions 1.1, 2.1.1, 3.1.1, 1.2 and 1.3* are at the *knowing* level of the taxonomy.

- Questions 1.1, 2.1.1 and 3.1.1 require the learner to interpret the given information and read information directly from the tables in the text. None of these questions require a calculation. The intention of these questions is to force learners to read the information provided in the tables and, hopefully, to help them to become more familiar and comfortable with the context.

- Questions 1.2 and 1.3 both require a basic calculation.
  - Question 1.2 requires the learner to determine the relationship between body weight and dosage of paracetamol from the information given at the start of the task and to use this relationship to determine the dosage for children of a given weight . The task requires the use of a basic operation (multiplication) and all the information is given.
  - Question 1.3 requires the learner to use the same information and operation as in Question 2 to complete a table of values.

Level 2: Applying routine procedures in familiar contexts

Tasks at the *applying routine procedures in familiar contexts* level of the Mathematical Literacy taxonomy require learners to perform well-known procedures and complete common tasks in familiar contexts. Learners know which procedure/task is required from the way the problem is posed and all the necessary information to solve the problem is immediately available to the learner. Routine procedures questions commonly involve single-step calculations, repeating the same calculation several times, or the completion of a task with which learners are familiar (e.g. *constructing an income-and-expenditure statement to reflect an individual's finances*).

Examples of *routine procedures* tasks include:

- substituting values into given equations (e.g. *determining the bank charge for depositing money into an account using a given formula*);

- solving equations by means of trial and improvement or algebraic processes;

- drawing graphs from given tables of values (e.g. *drawing a graph to show the cost of a call on a cell phone contract over time from a given table of time and cost values*);

- constructing a budget for a small household project;
- using tax deduction tables to determine the amount of tax to be deducted from an employee's salary;
- measuring the dimensions of the floor of a room and using the dimensions to determine how many running metres of carpeting to buy to cover the floor of the room;
- calculating the mean, median and/or modal averages of a set of data;
- increasing or decreasing an amount by a percentage (e.g. *determining how much a person will pay for a television set if a 5% discount is given);*
- estimating values from the values provided on a graph or in a table (e.g. *on a graph showing population statistics in millions for the different provinces in South Africa, estimate the population of KwaZulu-Natal*);
- converting units of measurement between different systems of measurement using given conversion tables and/or factors (e.g. *using a baking conversion table to convert from g to ml when baking a cake*);
- using a given scale to determine actual length or distance (e.g. *using a scale of 1:100 on a plan to determine the actual length and width of the walls of a room*).

In the **Responsible use of paracetamol** task in **Appendix 2** below, *Questions 1.4* and *1.5* are at the *applying routine procedures in familiar contexts* level of the taxonomy.

- Question 1.4 requires the learner to describe the relationship between input and output values in a table of data by means of an equation. Since the relationship is linear and learners from Grade 9 upwards should be familiar with this relationship, the task is one that requires the application of routine procedures.
- Question 1.5 requires the learner to draw a graph of a linear function based on a table of values and/or an equation. The knowledge and skills required to draw this graph have been developed in Grades 8 and 9 and nurtured from Grade 10 upwards in Mathematical Literacy, and hence is considered to be the application of a routine procedure.
- Since it is expected that learners will deal with a large number of contexts in which the relationship between the variables is linear, it is reasonable to suggest that the nature of the context is familiar, even if the learner has not expressly dealt with medicine as a context before.
- Notice that in Questions 1.4 and 1.5, the number of steps in every calculation is limited to one or two, or a repetition of the same calculation several times. Also notice that it is obvious from the way in which the questions are posed precisely what is required in order to complete the question.

Level 3: Applying multi-step procedures in a variety of contexts

Tasks at the a*pplying multi-step procedures in a variety of contexts* level of the Mathematical Literacy taxonomy require learners to solve problems or complete tasks using well-known procedures and methods, but where the procedure or method is not immediately obvious from the way the problem is posed. As such, learners may have to decide on the most appropriate procedure or method to find the solution to the question or to complete a task, and they may have to perform one or more preliminary calculations or complete one or more preliminary tasks before determining a solution.

Situations in which a variety of mathematical and non-mathematical content, skills and/or considerations should be utilised from different topics in the curriculum in order to make sense of a problem, are also at the *multi-step procedures* level of the taxonomy.

Tasks at the *multi-step procedures* level contain far less direction or guidance than tasks at the *routine procedures level* and require that learners make decisions regarding the appropriate content, methods and non-mathematical considerations needed to solve problems and complete tasks.

Examples of *multi-step procedures* tasks include:

- deciding on the most appropriate graph and an appropriate means of constructing that graph to represent a particular scenario (e.g. *constructing a table of values to represent a tariff structure for a particular electricity system and then using the table of values to draw a graph to represent that tariff structure*);
- determining the most appropriate scale in which to draw a plan, determining dimensions according to that scale, and then drawing the plan according to those scaled dimensions;
- determining the quantity of paint needed to paint the walls of a building by determining the surface area of the walls of a building, using a conversion ratio to convert the surface area value from m^2 to litres, rounding the litres value up to the nearest whole litre and then making a decision about the most appropriate quantity of paint to be bought based on available tin sizes;
- using maps, a distance chart, weather report information and other travel resources to plan a trip, giving consideration to where to stop for petrol, estimated travelling distance and time, and estimated travel costs;
- researching the costs involved in a fund-raising activity and preparing a budget for the activity;
- using given inflation rates to investigate the estimated value of an item over a multiple time period. (E.g. *if a car is currently worth R90 000, what would the car be worth in two years' time if the value of the car depreciated by approximately 15% in the first year and 10% in the second year?)*

In the **Responsible use of paracetamol** task in **Appendix 2** below, *Questions 2.1.2* and *3.2* are at the *applying multi-step procedures in a variety of contexts* level of the taxonomy.

- Question 2.1.2 requires the learner to first determine how many mg of paracetamol is safe for a particular child and then the number of measures of the medicine to be given to this child. This is a multi-step procedure and, though not complex, the procedure is not obvious from the way the question is posed.
- Question 3.2 requires learners firstly to choose between two graphs — one for boys and one for girls — and secondly to select the appropriate line on each graph to answer the question. In this sense, the procedure is multi-step in nature. While the learner may not have seen this exact graph before, it is expected that a learner in Grade 12 will be sufficiently competent and experienced with graphs to understand the information presented in this one.
- Notice that in both Questions 2.1.2 and 3.2 it is not immediately obvious from the way the questions are posed what calculations are required to answer the questions. Also notice that multiple steps are required in these questions.

Level 4: Reasoning and reflecting

Tasks at the *reasoning and reflecting* level of the Mathematical Literacy taxonomy can be divided into two groups of questions:

- Questions that require a decision, opinion or prediction about a particular scenario based on calculations in a previous question or on given information (e.g. *analysing calculations performed in a previous question on two different electricity costing options and making a decision about the most suitable option for a person with particular needs; or critiquing a statement regarding crime statistics reported in a newspaper article; or making a prediction about the projected income for a business based on current financial data*).

Examples of these types of *reasoning and reflecting* questions include:

- comparing provided data on the performance of two groups of learners in an examination and explaining which group performed better based on the available data;
- providing an opinion on how a particular government minister might react to a particular set of statistics;
- analysing a completed income-and-expenditure statement for a household and making suggestions on how the members of the household could change their expenditure to improve their financial position.

- Questions that require learners to pose and answer questions about which mathematics they require to solve a problem, select and use that mathematical content, recognise the limitations of using mathematics to solve the problem, and consider other non-mathematical techniques and factors that may define or determine a solution to the problem. (E.g. *when presented with adverts for two different cell phone contracts, learners have to decide which method will be the most appropriate to compare the costs involved in the contracts*. They may decide to construct tables of values, or draw graphs, or use equations. Having chosen a suitable method, they will need to perform the necessary calculations and then make sense of their calculations in order to make a decision regarding the most affordable contract for an individual with particular needs. They will also need to recognise that irrespective of the mathematical solution to the problem, the individual may choose a cell phone based on personal preference, e.g. *colour or cell phone model*).

Examples of these types of *reasoning and reflection* questions include:

- using calculations to compare income and expenditure values for a business in order to determine whether the business is in a healthy financial position;
- comparing bank charges on two different types of accounts for various transactions and making a decision about the most suitable account for an individual with particular needs;
- constructing a table to model a loan scenario, taking into account the interest calculated on the loan, the monthly repayment and the closing balance on the loan every month;
- using the model of the loan scenario to investigate the effect of changes in the interest rate on the loan and the impact of increasing the monthly repayment on the real cost of the loan;

- designing two different types of boxes for packaging an item, comparing the boxes in terms of wasted space (volume) and materials (surface area), and making a decision about the most cost-effective box for packaging the item.

In the **Responsible use of paracetamol** task in **Appendix 2** below, *Questions 3.1.2* and *3.3* are at the *reasoning and reflection* level of the taxonomy.

- Question 3.1.2 requires the learner to make inferences. Learners are expected to draw on what they have learnt about the safe use of paracetamol in the questions so far to make deductions or inferences. The answer that the learner provides will be within a range of possible values and the quality of the answer will be based on the reasoning that is evident in determining the answer.
- In Question 3.3 the learner is expected to evaluate the dosage recommended by the manufacturer. Firstly, the learner should make inferences about why the manufacturer made these recommendations. Secondly, the learner should critique the decision. In critiquing the dosage recommended by the manufacturer, the learner has to draw not only on mathematical content, but also on his or her own experiences of the world. Therefore, this question is at the highest level of the Mathematical Literacy taxonomy.

ASSESSMENT TASK EXAMPLE: Responsible use of paracetamol

INFORMATION:

Paracetamol is a drug with analgesic (painkilling) properties.
Paracetamol is the active ingredient in the well-known medicine Panado that can be bought over the counter in supermarkets and pharmacies.

Paracetamol is, however, involved in many incidents of accidental poisoning through overdose.

Paracetamol dosage is based on body weight. A healthy single dose of paracetamol for children is considered to be 10 mg per kilogram of body weight, with up to four doses per day.

Question 1
1.1.
    1.1.1.   According to the information given above, what is considered to be a healthy dose of
        paracetamol for children?   (2)
    1.1.2.   How many doses of paracetamol can be administered per day?   (2)
        [4]

1.2.   Calculate how many mg of paracetamol each of the following children can safely take per dose.
    1.2.1.   Gabriella, weight 12 kg   (2)
    1.2.2.   Ricardo, weight 20½ kg   (2)
        [4]

1.3.   Copy and complete the table below:

Weight of patient	6 kg	7 kg	8 kg	9 kg	15 kg	25 kg	35 kg
Safe dose of paracetamol in mg							

        [7]

1.4.   Write an equation that can be used to determine how many mg of paracetamol is a safe dose for
    a child of a given weight.   [2]

1.5.   Based on your answers to 1.2 and/or 1.3, draw a graph that can be used to determine how many
    mg of paracetamol is a safe dose for a child of a given weight.   [3]

Question 2

FURTHER INFORMATION:

Paracetamol is sold in supermarkets and pharmacies in the following concentrations:
- Infant drops: 60 mg per drop (0,6 ml)
- Syrup: 120 mg per medicine measure (medicine spoon) (5 ml)
- Tablets: 120 mg per tablet

2.1.

    2.1.1.   What concentration of paracetamol is found in syrup?   [2]

    2.1.2.   Determine the following:
        a.   The number of infant drops in a safe dose for a child who weighs 7 kg.   (2)
        b.   The number of medicine measures in a safe dose of syrup for a child who weighs
            9½ kg.   (2)
        c.   The number of tablets in a safe dose for a child who weighs 12,25 kg.   (2)

            [6]

Question 3

FURTHER INFORMATION:

The directions for use on the paracetamol syrup (120 mg/5 ml) packaging state:
- 3–12 months old: 2,5 to 5 ml per dose
- 1–5 years old: 5 to 10 ml per dose
- 6–12 years old: 10 to 20 ml per dose
- A maximum of 4 doses per day

3.1.

    3.1.1.   What is the maximum dosage of paracetamol that should be given to a 7-year-old child?   (2)
    3.1.2.   According to these directions, what does the manufacturer consider the weight of a child
            who is 6–12 years old to be?   (4)

            [6]

3.2.   Refer to the CDC weight-for-age percentile charts on the next page to answer the following
    questions:
    3.2.1.   According to the chart, how heavy is a 6 year-old girl whose weight is at the 25th
            percentile?   (2)
    3.2.2.   According to the chart, how heavy is a 12 year-old girl whose weight is at the 75th
            percentile?   (2)
    3.2.3.   According to the chart, how heavy is a 6 year-old boy whose weight is at the 75th
            percentile?   (2)
    3.2.4   According to the chart, how heavy is a 12 year-old boy whose weight is at the 25th
            percentile?   (2)

            [8]

3.3.   Based on the information provided in this question (including the weight-for-age charts) discuss the following,
    giving reasons:
    3.3.1.   How the recommended dosage for paracetamol syrup has been determined   (4)
    3.3.2.   Whether or not you think this is the most appropriate dosage to recommend   (4)

            [8]

            50

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Boys: weight-for-age percentiles
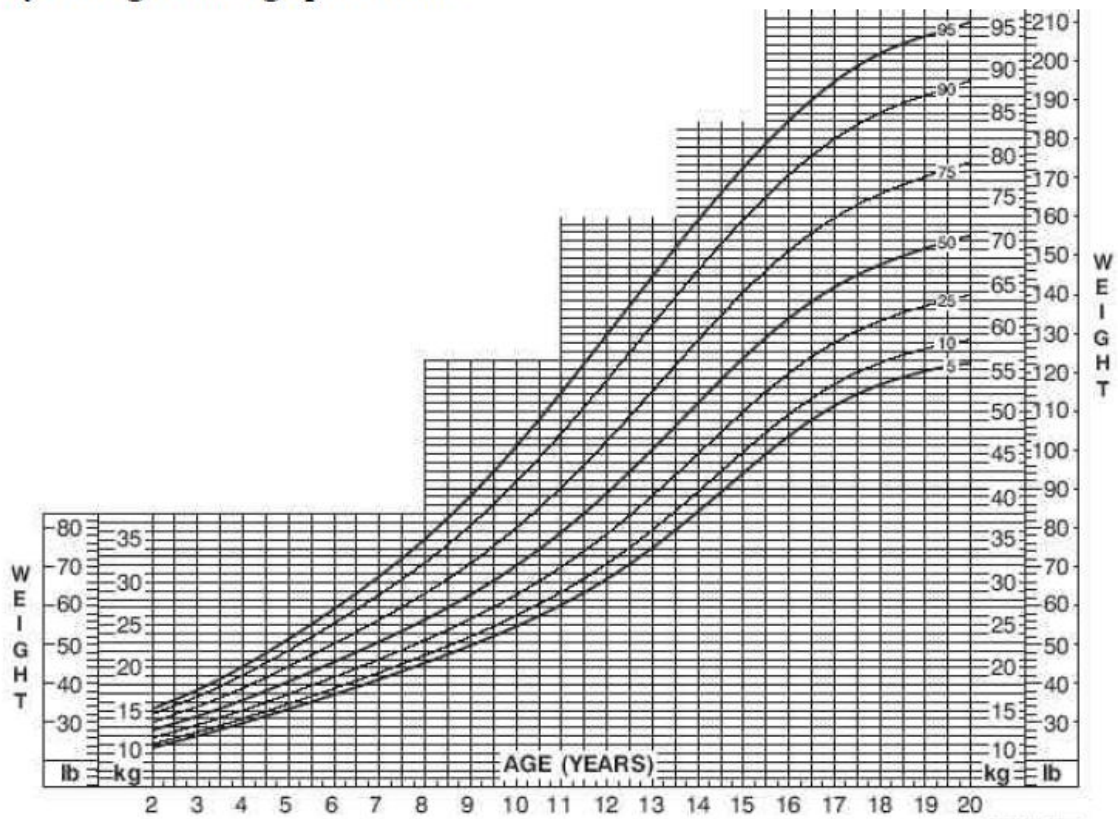
Girls: weight-for-age percentiles
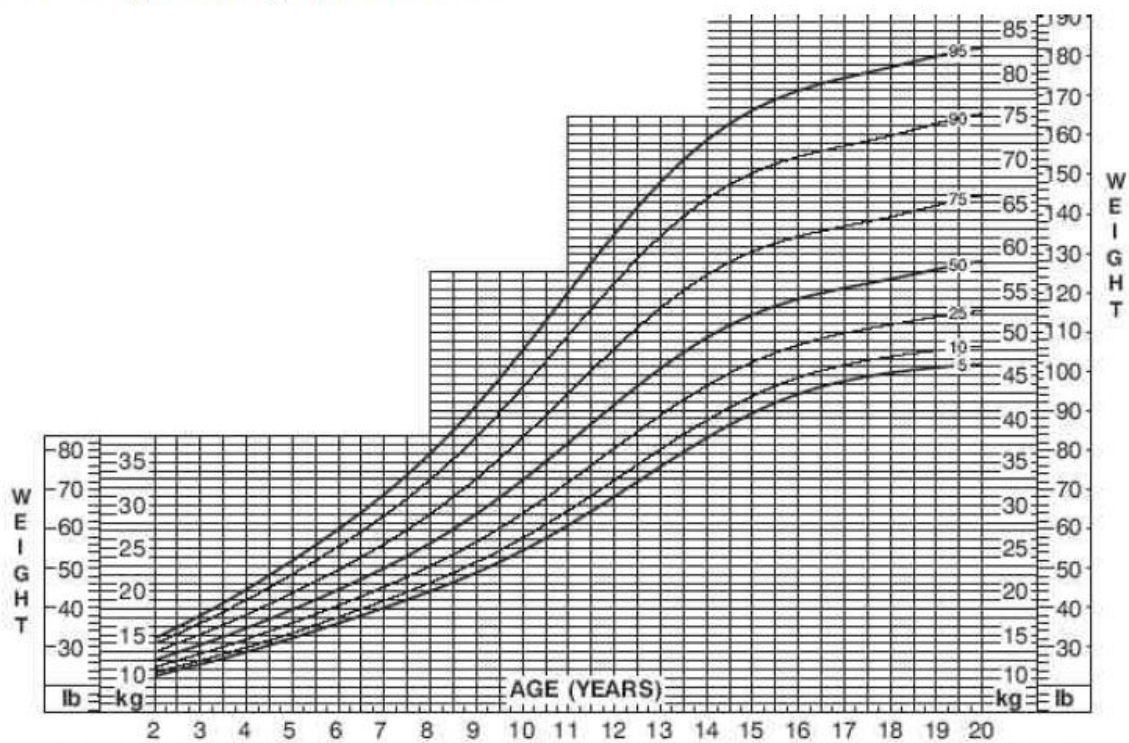
Published May 30, 2000 (modified 11/21/00).
SOURCE: Developed by the National Center for Health Statistics in collaboration with
the National Center for Chronic Disease Prevention and Health Promotion (2000).
http://www.cdc.gov/growthcharts

APPENDIX 3

FURTHER INTERPRETATION OF THE DIFFERENT TAXONOMY LEVELS ACCORDING TO TOPICS

The intention of this section is to provide greater clarity about the types of questions, calculations, applications and/or contexts that fall into the different levels of the Mathematical Literacy taxonomy. **It is essential to emphasise that the tables below do not provide a comprehensive or definitive list of all possible questions, calculations and/or tasks associated with the four levels of the taxonomy. They contain examples of a small selection of questions, calculations and/or tasks from the different topics in the curriculum that can be associated with the different levels.** These examples are meant to illustrate more clearly the difference between the demands of a question at the different levels of the taxonomy.

TOPIC: FINANCE				
Section	**Level 1: Knowing**	**Level 2: Applying routine procedures in familiar contexts**	**Level 3: Applying multi-step procedures in a variety of contexts**	**Level 4: Reasoning and reflecting**
Financial documents and Tariff systems	• Read information directly from an electricity bill (e.g. *date; name of account holder; electricity consumption for the month; etc.* • Show how the "Total Due" on the electricity bill has been calculated by adding together all items listed on the bill. • Show how the VAT value listed on the electricity bill has been calculated when told that VAT is 14% of the value excluding VAT (that is, calculating a percentage of an amount.	• Use a given formula to show how the amount charged for electricity consumption shown on the bill has been determined. • Complete a table of values to show the cost of various quantities of electricity consumption. • Use the table of values to construct a graph to represent the cost of electricity consumption.	• Replicate the calculations/values shown on the bill for a different electricity consumption value. • Without any scaffolded or guiding questions, draw a graph to represent the cost of electricity on a particular electricity system.	• Choose an appropriate strategy (e.g. *tables of values, graphs, interpreting points of intersection, etc*) to compare the electricity costs for two different electricity systems and make a decision about which system is the most cost effective for a user with particular needs. • Analyse a newspaper article describing proposed increases in electricity tariffs and make deductions about the implications of these increases for consumers.

		TOPIC: FINANCE		
Section	**Level 1: Knowing**	**Level 2: Applying routine procedures in familiar contexts**	**Level 3: Applying multi-step procedures in a variety of contexts**	**Level 4: Reasoning and reflecting**
Income, expenditure, profit/loss, income-expenditure statements and budgets	• Classify items on an income and expenditure statement as fixed, variable and occasional income and expenditure. • Show how total Income, expenditure and profit/loss values on an income and expenditure statement or budget have been determined.	• Construct an income and expenditure statement for an individual or a household. • Construct a budget for a small household project.	• Construct an income and expenditure statement for a business that includes a comparison of income and expenditure values over a two year period. • Construct a budget for a large fundraising event.	• Analyse a budget for a household or business and make recommendation as to how the expenditure should be changed to improve the finances of the household/business. • Compare income and expenditure values for a business or organisation over a two-year period and describe differences and/or trends. • Analyse projected versus actual budget values and explain differences.
Cost price and selling price	• Determine the cost price of an item by adding together given cost values for the component parts of the item. • Determine the income generated from the sale of an item based on a given sales price and given sales volumes.	• Compare the difference between the cost and selling price of an item by calculating the percentage mark-up in price of the selling price from the cost price. • Construct a table of values to show how the cost price of an item changes depending on the number of items made.	• Draw graphs, without scaffolded or guiding questions, to show the costs involved in producing an item and money generated from the sale of the item. • Investigate, through research, the various costs involved in manufacturing an item, and decide on an appropriate selling price for the item.	• Conduct market research on a group of people and use the results of the research to defend a particular selling price for a product. • Interpret graphs showing the cost of production and income generated from the production and sale of an item, and use the graphs to make decisions about the business (e.g. *how many items must be manufactured and sold to cover all production costs).*
Break-even analysis	• Explain the meaning of the word "break-even" in the context in which a problem is posed (e.g. *in the context of a business, "break-even" refers to the income that must be generated to cover all expenses*).	• Determine the break-even point of a business from a given table of income and expenditure values. • When given two graphs that intersect, read off the value of the independent and dependent variables at the break-even point (point of intersection) of the graphs.	• Draw two or more graphs and identify the point of intersection of those two graphs in order to compare different options (e.g. *income vs. expenditure; cell phone contract options; electricity tariff systems; etc).*	• Explain the relevance of the break-even point of two graphs in relation to the problem or context for which the graphs have been drawn. • Explain the meaning of different regions on a graph (that is, between different points of intersection) in relation to the problem or context for which graphs have been drawn.

	TOPIC: FINANCE			
Section	**Level 1: Knowing**	**Level 2: Applying routine procedures in familiar contexts**	**Level 3: Applying multi-step procedures in a variety of contexts**	**Level 4: Reasoning and reflecting**
Interest	• Explain the meaning and difference between "interest" and the "interest rate". • Identify interest rate values quoted on bank statements.	• Perform simple interest calculations manually (that is, without the use of a calculator) over multiple time periods. • Read values off graphs showing simple and compound investment scenarios.	• Perform compound interest calculations manually (that is, without the use of a formula) over multiple time periods. • Complete a table that models a loan scenario and include consideration of a monthly interest calculation, monthly repayment, and monthly amount outstanding on the loan. • Draw graphs from given tables of values to represent loan scenarios.	• Construct a model of a loan or investment scenario without scaffolded or guiding questions. • Investigate and describe the impact of increasing the monthly repayments on the total cost of the loan/investment. • Investigate and describe the impact of making a lump sum payment into a loan/investment during the first half of the loan/investment period on the total cost of the loan/investment.
Inflation	• Explain what the term "inflation" means.	• Show by calculation how the price of an item might change if affected by inflation (that is, increasing a value by a percentage).	• Show by calculation how the price of an item might change if affected by inflation over multiple time periods (that is, compound calculation).	• Describe the effect of inflation on the buying power of money. • Use knowledge of inflation rates to argue and justify a particular salary increase.
Taxation	• Identify the name of the employee listed on a pay slip and the month for which the pay slip has been issued. • Identify the employee's monthly salary. • Explain how the employees "taxable income" has been determined by referring to the salary and deduction values shown on the payslip. • Explain the meaning of the terms "gross pay", "net pay", "deductions", and "taxable income" shown on a payslip.	• Read appropriate tax values from given income tax deduction tables. • Identify the income tax bracket into which an individual falls based on a given monthly and/or annual income.	• Use formulae provided on income tax bracket tables to calculate an individual's annual and monthly income tax. • Investigate through calculation how the tax rebate value is determined.	• Compare income tax tables over different financial periods and explain how an individual's tax may have changed from one period to another. • Investigate the effect that an increase in salary has on increased tax payments. • Analyse graphs showing changes in income tax over different time periods and explain differences.

TOPIC: FINANCE			
Section	**Level 1: Knowing**	**Level 2: Applying routine procedures in familiar contexts**	**Level 3: Applying multi-step procedures in a variety of contexts**	**Level 4: Reasoning and reflecting**
Exchange rates	• Identify the exchange rate between two currencies from a given table or rate board.	• Use a given exchange rate to determine the value of one currency for a specific quantity of another currency.	• Perform currency conversion calculations, taking into account currency exchange fees charged by banks and other financial institutions.	• Explain how the "Big Mac Index" provides a tool for determining the worth of one currency in relation to another currency; • Explain why it is not necessarily accurate when a South African tourist in America exclaims that a can of cool dink that costs \$2,00 (R14,00) is much cheaper in South Africa.

TOPIC: MEASUREMENT			
Section	**Level 1: Knowing**	**Level 2: Applying routine procedures in familiar contexts**	**Level 3: Applying multi-step procedures in a variety of contexts**	**Level 4: Reasoning and reflecting**
Conversions	• Convert between mm, cm, m and km. • Convert between g and kg. • Convert between ml and litres.	• Convert from °C to °F using given formulae. • Convert between different systems using given conversion factors (e.g. *convert from m^3 to litres using the fact that 1 m^3 = 1 litre*).	• Convert between different systems using given conversion tables, where it is necessary to first identify and then use an appropriate conversion factor from the table.	• Compare solutions to a problem expressed in different units and make a decision about what unit is the most appropriate or useful for the particular context in which the problem is posed.
Measure length, weight, volume and temperature	• Measure accurately using appropriate measuring instruments (e.g. *ruler; tape measure; kitchen scale; jugs; etc*).	• Perform calculations involving measured values (e.g. *working out how much longer one piece of wood is than another piece*).	• Use measured values in conjunction with other content or skills to complete a larger project (e.g. *measure the dimensions of a bedroom to determine the running metres of carpet needed for the floor*).	• Make decisions about the need for accuracy when performing a measurement in a particular context. • Interpret a measured value and make a decision based on the value (e.g. *measure the temperature of a child and decide if the child should be taken to hospital*).
Perimeter, area and volume	• Explain the meaning of terms (e.g. *"area", "perimeter", "volume", "radius", etc*). • Identify from a list of given formulae which formulae relate to perimeter calculations, which relate to area calculations, etc. • Determine the radius of a circle from a given diameter.	• Calculate perimeter, area and volume by substituting given values into given formulae.	• Perform preliminary calculations to determine dimensions required in perimeter/area/volume calculations and then calculate perimeter/area/volume (e.g. *when asked to determine the volume of concrete needed for the foundations of a house, interpret top view plans of the foundation trench of*	• Use perimeter, area and/or volume calculations to complete a project, where it is not stated specifically what type of calculation is required (e.g. *when asked to determine the amount of paint needed to paint a building, first interpret plans to determine dimensions of the walls, then calculate the surface area of the*

		TOPIC: MEASUREMENT		
Section	**Level 1: Knowing**	**Level 2: Applying routine procedures in familiar contexts**	**Level 3: Applying multi-step procedures in a variety of contexts**	**Level 4: Reasoning and reflecting**
	• Know that area is expressed in units^2 (e.g. cm^2) and volume in units^3 (e.g. cm^3).		*a house, use the plans to determine the dimensions of the trench, and then calculate the volume of the trench).*	*walls, then use the paint conversion ratio on the back of the paint tin to determine the required number of litres of paint required).*
Time	• Read time values on a clock or watch.	• Record time values at a school sports event and perform calculations with time in order to determine winning teams.	• Interpret time values on a bus timetable to determine departure, arrival and travelling times.	• Perform time calculations in conjunction with maps and other travel resources in order to plan a trip (e.g. *determine approximate travelling times, appropriate stopping points for refuelling, the best time to start a journey in order to arrive at a destination at a particular time, etc*).

TOPIC: MAPS, PLANS AND OTHER REPRESENTATIONS OF THE PHYSICAL WORLD				
Section	**Level 1: Knowing**	**Level 2: Applying routine procedures in familiar contexts**	**Level 3: Applying multi-step procedures in a variety of contexts**	**Level 4: Reasoning and reflecting**
Scale	• Explain the meaning of a given scale (e.g. *explain what the scale 1 : 100 means in terms of the measurements on a plan and actual dimensions*).	• Use a given scale to determine actual measurements when given measured values, or measured values from given actual values.	• Use a given scale in conjunction with measurement on a plan/map to determine length/dimensions. • Determine the scale of a map or plan. • Use a given scale in conjunction with other content or skills to complete a project (e.g. *use a given scale to determine the dimensions in which to draw a 2-dimensional plan of an object, and then draw the plan*).	• Critique the scale in which an object has been drawn and offer an opinion as to a more appropriate scale. • Decide on an appropriate scale in which to draw a picture or build a model, and then complete the project.
Maps	• Identify the labels/names of national roads (e.g. *N3*) that must be travelled on to travel between two locations. • Identify the names of the towns on the route between two locations. • Identify the scale of a map.	• Identify the position of two locations on a map and use given distance values on the map to determine the travelling distance between the two locations. • Interpret a given set of directions and describe what location the directions lead to. • Provide a set of directions to travel between two locations in a town using street names.	• Use a map in conjunction with a distance chart to determine the shortest route to travel between two locations. • Identify a possible route between two locations on a map, measure the distance between the locations, and use a given scale to estimate the distance between the two locations. • Estimate travelling times between two or more locations based on estimated travelling speed and known or calculated distances.	• Critique a proposed travel route in relation to distance, estimated travelling times, etc, and suggest and justify possible alternative routes. • Use maps in conjunction with other travel resources (e.g. *exchange rate information; distance chart; bus timetable; etc*) and financial information (e.g. *fare tables; petrol price; etc*) to plan and cost a trip). • Make decisions regarding appropriate stopping points during a journey based on considerations of fatigue, petrol consumption, travelling time, etc.
Plans	• Identify the scale of a plan. • Explain the meaning of terms (e.g. *floor plan; elevation plan; layout plan; etc*). • Read off the value(s) of given dimensions on the plan (e.g. *the length of the wall is 4 m*).	• Use a given key to identify the number of windows/doors/rooms shown on a plan for a building. • Identify on which plan a particular structure is shown (e.g. *the door is shown on the North elevation plan*).	• Measure dimensions on a plan and use a given scale to determine actual dimensions. • Use plans in conjunction with other content, skills or applications to complete a project (e.g. *interpret plans to determine the dimensions of a room in order to establish the amount of carpet needed for the floor of the room*).	• Describe an item represented in a plan. • Critique the design of a structure shown on a plan. • Decide on an appropriate scale in which to draw a plan and then draw the plan. • Make connections between plans showing different views of the same structure (e.g. *explain which wall shown on a floor plan is represented on a particular side view plan*).

TOPIC: MAPS, PLANS AND OTHER REPRESENTATIONS OF THE PHYSICAL WORLD			
Section	Level 1: Knowing	Level 2: Applying routine procedures in familiar contexts	Level 3: Applying multi-step procedures in a variety of contexts	Level 4: Reasoning and reflecting
Models	• Measure the dimensions of a structure for which a model or 2D drawing will be constructed.	• Build a model using a given table of dimensions or a given net/cut-out.	• Use a given scale to determine the dimensions in which to build a model or make a 2D drawing, and complete the project. • Build a model and use the model in conjunction with other content, skills or applications to solve a problem (e.g. *build a model of a container and use the model to investigate different types of packaging arrangements; or build a model of a container and determine the surface area and volume of the model to investigate the amount of storage space available in the container*).	• Decide on an appropriate scale in which to build a model or make a 2D drawing, use the scale to determine dimensions, and complete the project. • Construct and compare two models in terms of storage space and materials used and make a decision about which model will the better choice for packaging an item. • Analyse a model and critique the layout of the structure shown in the model.

TOPIC: DATA HANDLING				
Section	**Level 1: Knowing**	**Level 2: Applying routine procedures in familiar contexts**	**Level 3: Applying multi-step procedures in a variety of contexts**	**Level 4: Reasoning and reflecting**
Developing questions and collecting data	• Read information directly from a given questionnaire/survey (e.g. *the name of the organisation for which the questionnaire is being conducted*). • Complete a given questionnaire.	• Conduct a given questionnaire/survey with a group of people.	• Decide on appropriate questions to include on a questionnaire/survey, construct and then conduct the questionnaire/survey.	• Critique the questions/layout of a questionnaire/survey. • Make a deduction about whether collected information is biased or valid based on the structure of instrument used to collect the data and the way in which the data was collected.
Classifying and organising data	• Sort data from smallest to biggest. • Count the number of values in a data set. • Explain the difference between categorical data and numerical data; discrete and continuous data.	• Sort data according to two categories (e.g. *sort a set of data separately for females and males).* • Complete a given frequency table. • Calculate percentage values to represent the relative size of different categories of data.	• When given a raw set of data, sort the data, decide on appropriate intervals (if necessary), and construct a frequency table to organise the data. If necessary, use the frequency table to draw an appropriate graph to represent the data.	• Explain with justification whether data is discrete or continuous. • Analyse data organised in tables and make deductions about trends in the data.
Measuring data	• Identify the maximum and minimum values in a set of data.	• Calculate mean, median, mode and range for sorted data and for data sets containing an even and an odd number of data values.	• Calculate the mean, median and modal average for a set of data and decide with reasons which average provides the most accurate representation of the data. • Use data presented on a graph to determine the mean, median, mode and range of a data set.	• Analyse measures of central tendency and spread and make deductions about trends in the data. • Interpret tables and charts showing percentile/quartile values and explain what those values represent in relation to the scenario represented in the table/chart. • Compare measures of central tendency/spread calculated for two sets of data and use these measures to explain differences between the data sets.
Representing data	• Read values directly from the values provided on graphs.	• Draw a specified graph from a given table of data. • Estimate values from given graphs.	• Organise data using an appropriate table, decide on the most appropriate format for representing the data (that is, actual values or percentages), and decide on the most appropriate graph needed to represent the data.	• Analyse graphs and make deductions about trends in the data and predictions for the future.

TOPIC: PROBABILITY				
Section	Level 1: Knowing	Level 2: Applying routine procedures in familiar contexts	Level 3: Applying multi-step procedures in a variety of contexts	Level 4: Reasoning and reflecting
Expressions of probability Prediction Evaluate expressions of probability	• Identify the percentage chance of rain for a particular town from a weather report in a newspaper. • Explain the meaning of terms associated with probability (e.g. *event; outcome*).	• Express the probability of an event using fraction, percentage and decimal notation. • Identify all of the possible outcomes of a particular event (e.g. *rolling a dice; gambling game).* • Explain whether or not a particular rainfall prediction indicates that it is more or less likely to rain.	• Conduct an experiment to compare the experimental probability of an event to its theoretical probability. • Identify appropriate values from a given table of data values (e.g. *on motor vehicle fatalities in South Africa*) and express the probability of certain events shown on the table. • Develop a game involving probability and play the game with another learner in the class.	• Analyse a table of rainfall data for a town and make predictions about the chance of rain in that town during a particular month during the year. • Explain whether the statement "if I take the same Lottery numbers every week then my chances of winning increase" makes sense. • Critique the use of references to probability values in newspaper articles. • Analyse a table showing risk assessment profiles for people from different age groups and explain why particular age groups are classified as higher risks than others. • Analyse a game involving probability and make a deduction about the fairness of the game.

4.8   GENERAL

This document should be read in conjunction with:

4.8.1   [National Protocol of Assessment] *An addendum to the policy document, the National Senior Certificate: A qualification at Level 4 on the National Qualifications Framework (NQF), regarding the National Protocol for Assessment (Grades R – 12).*

4.8.2   Progression and Promotion Requirements Grades 1 - 12 .

4.8.3   Subject specific exam guidelines as contained in the draft policy document:
National policy pertaining to the programme and promotion requirements of the National Curriculum Statement, Grades R - 12