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NATIONAL CURRICULUM STATEMENT GRADES 10-12 (GENERAL)

LEARNING PROGRAMME GUIDELINES

MATHEMATICAL LITERACY

JANUARY 2008

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SECTION 1

INTRODUCTION

1.1 INTRODUCING THE NATIONAL CURRICULUM STATEMENT

1.1.1 BACKGROUND

In 1995 the South African government began the process of developing a new curriculum for the school system. There were two imperatives for this. First, the scale of change in the world, the growth and development of knowledge and technology and the demands of the 21st Century required learners to be exposed to different and higher level skills and knowledge than those required by the existing South African curricula. Second, South Africa had changed. The curricula for schools therefore required revision to reflect new values and principles, especially those of the Constitution of South Africa.

The first version of the new curriculum for the General Education Band, known as Curriculum 2005, was introduced into the Foundation Phase in 1997. While there was much to commend the curriculum, the concerns of teachers led to a review of the Curriculum in 1999. The review of Curriculum 2005 provides the basis for the development of the National Curriculum Statement for General Education and Training (Grades R-9) and the National Curriculum Statement for Grades 10-12.

1.1.2 THE NATIONAL CURRICULUM STATEMENT

The National Curriculum Statement consists of 29 subjects. Subject specialists developed the Subject Statements which make up the National Curriculum Statement. The draft versions of the Subject Statements were published for comment in 2001 and then re-worked to take account of the comments received. In 2002 twenty-four subject statements and an overview document were declared policy through Government Gazette. In 2004 five subjects were added to the National Curriculum Statement. The National Curriculum Statement now consists of the Subject Statements for the following subjects:

- Languages – 11 official languages (each counted as three subjects to cater for the three levels Home Language, First Additional Language and Second Additional Language); 13 non-official languages
- Mathematics; Mathematical Literacy; Physical Sciences; Life Sciences; Computer Applications Technology; Information Technology
- Accounting; Business Studies; Economics
- Geography; History; Life Orientation; Religion Studies
- Consumer Studies; Hospitality Studies; Tourism
- Dramatic Arts; Dance Studies; Design; Music; Visual Arts
- Agricultural Sciences, Agricultural Management Practices, Agricultural Technology

- Civil Technology; Mechanical Technology; Electrical Technology; Engineering Graphics and Design

1.1.3 NATIONAL SENIOR CERTIFICATE

The *National Senior Certificate: A Qualification on Level 4 of the National Qualifications Framework (NQF)* provides the requirements for promotion at the end of Grades 10 and 11 and the awarding of the National Senior Certificate at the end of Grade 12. This document replaces two of the original National Curriculum Statement documents: the *Overview* and the *Qualifications and Assessment Policy Framework.*

1.1.4 SUBJECT ASSESSMENT GUIDELINES

The Subject Assessment Guidelines set out the internal or school-based assessment requirements for each subject and the external assessment requirements. In addition, the *National Protocol for Recording and Reporting (Grades R-12)* (an addendum to the policy, *The National Senior Certificate*) has been developed to standardise the recording and reporting procedures for Grades R to 12. This protocol came into effect on 1 January 2007.

1.2 INTRODUCING THE LEARNING PROGRAMME GUIDELINES

1.2.1 PURPOSE AND CONTENT OF THE LEARNING PROGRAMME GUIDELINES

The Learning Programme Guidelines aim to assist teachers and schools in their planning for the introduction of the National Curriculum Statement. The Learning Programme Guidelines should be read in conjunction with the National Senior Certificate policy and the National Curriculum Statement Subject Statements.

Section 2 of the Learning Programme Guidelines suggests how teaching the particular subject may be informed by the principles which underpin the National Curriculum Statement.

Section 3 suggests how schools and teachers might plan for the introduction of the National Curriculum Statement. The Department of Education encourages careful planning to ensure that the high skills, high knowledge goals of the National Curriculum Statement are attained.

The Learning Programme Guidelines do not include sections on assessment. The assessment requirements for each subject are provided in the Subject Assessment Guidelines which come into effect on 1 January 2008.

1.2.2 WHAT IS A LEARNING PROGRAMME

INTRODUCTION

A Learning Programme assists teachers to plan for sequenced learning, teaching and assessment in Grades 10 to 12 so that all Learning Outcomes in a subject are achieved in a progressive manner. The following three phases of planning are recommended:

- Phase 1 – develop a *Subject Framework* for grades 10 to 12

- Phase 2 – develop a *Work Schedule* for each grade

- Phase 3 – develop *Lesson Plans*

It is recommended that the teachers of a subject at a school or cluster of schools first put together a broad subject outline (Subject Framework) for the three grades to arrive at an understanding of the content of the subject and the progression which needs to take place across the grades (see Section 3.3.1). This will assist with the demarcation of content for each grade. Thereafter, teachers of the subject teaching the same grade need to work together to develop a year long Work Schedule. The Work Schedule should indicate the sequence in which the content and context will be presented for the subject in that particular grade (see Section 3.3.2). Finally, individual teachers should design Lesson Plans using the grade-specific Work Schedule as the starting point. The Lesson Plans should include learning, teaching and assessment activities that reflect the Learning Outcomes and Assessment Standards set out in the Subject Statements (see Section 3.3.3). Learning Programmes should accommodate diversity in schools and classrooms but reflect the core content of the national curriculum.

An outline of the process involved in the design of a Learning Programme is provided on page 6.

DESIGNING A LEARNING PROGRAMME

A detailed description of the process involved in the design of a Learning Programme is provided in Sections 3.3.1 – 3.3.3 of the Learning Programme Guidelines. The first stage, the development of a Subject Framework does not require a written document but teachers are strongly advised to spend time with subject experts in developing a deep understanding of the skills, knowledge and values set out in the Subject Statements. The quality and rigour of this engagement will determine the quality of teaching and learning in the classroom.

Once the Subject Framework has been completed, teachers should develop Work Schedules and Lesson Plans. Examples of Work Schedules and Lesson Plans are provided in the Learning Programme Guidelines. Teachers are encouraged to critically engage with these formats and develop their own.

Developing a Subject Framework (Grades 10-12)

Planning for the teaching of subjects in Grades 10 to 12 should begin with a detailed examination of the scope of the subject as set out in the Subject Statement. No particular format or template is recommended for this first phase of planning but the steps recommended should be used as a checklist.

Although no prescribed document is required for this stage of planning, school-wide planning (timetables, requisitioning, teacher development, classroom allocation) as well as the development of grade-specific work schedules would benefit from short documents which spell out:

- The scope of the subject – the knowledge, skills and values; the content; the contexts or themes; electives etc. to be covered in the three grades for each subject
- A three-year assessment plan for the subject
- The list of LTSM required for the subject

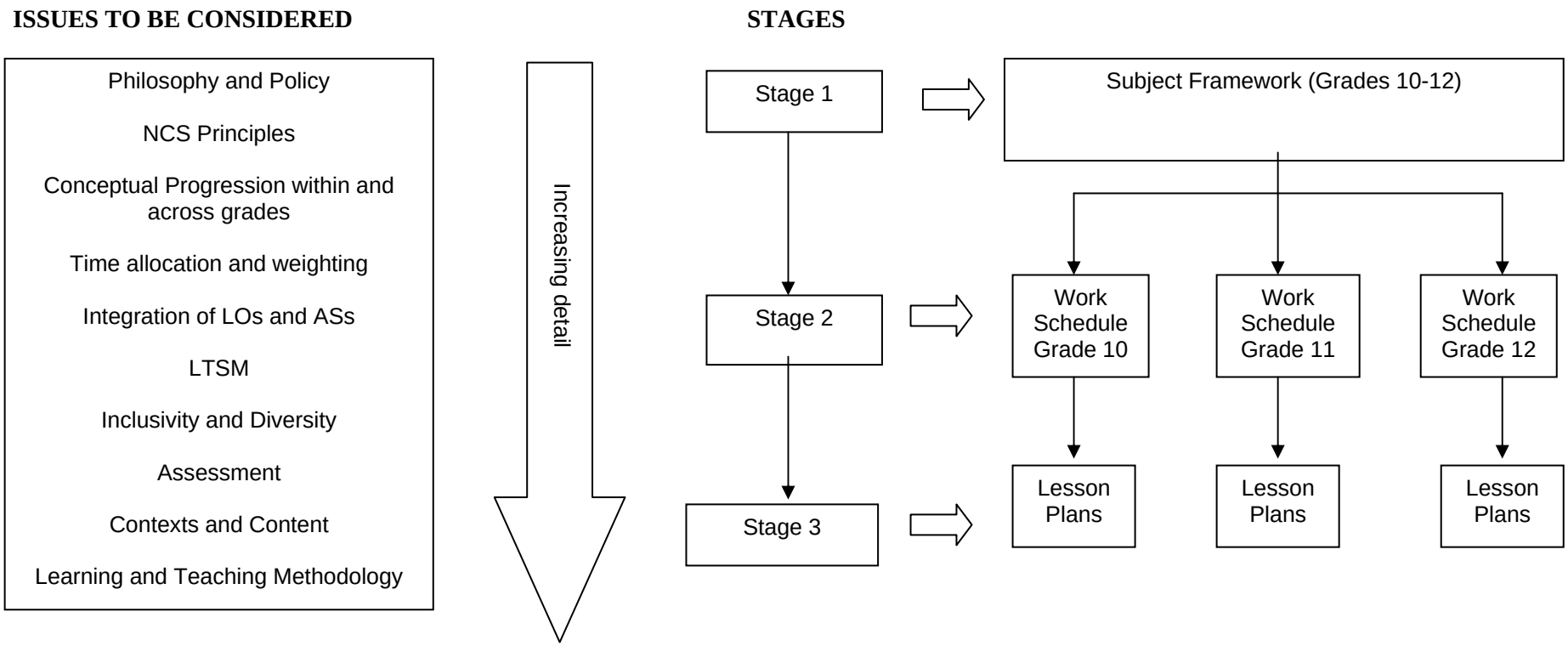
Designing Work Schedules

This is the second phase in the design of a Learning Programme. In this phase teachers develop Work Schedules for each grade. The Work Schedules are informed by the planning undertaken for the Subject Framework. The Work Schedules should be carefully prepared documents that reflect what teaching and assessment will take place in the 36-40 weeks of the school year.

Designing Lesson Plans

Each grade-specific Work Schedule must be divided into units of deliverable learning experiences, that is, Lesson Plans. Lesson Plans are not equivalent to periods in the school timetable. Each Lesson Plan should contain a coherent series of teaching, learning and assessment activities. A Lesson Plan adds to the level of detail for each issue addressed in the Work Schedule. It also indicates other relevant issues to be considered when teaching and assessing a subject.

FIGURE 1: RELATIONSHIP BETWEEN THE 3 STAGES OF PLANNING WHEN DEVELOPING A LEARNING PROGRAMME



SECTION 2
INTRODUCING MATHEMATICAL LITERACY

2.1 WHAT IS MATHEMATICAL LITERACY?

Mathematical Literacy provides learners with an awareness and understanding of the role that mathematics has in the modern world. *Mathematical Literacy* is a subject driven by life-related applications of mathematics. It enables learners to develop the ability and confidence to think numerically and spatially in order to interpret and critically analyse everyday situations and solve problems.

2.2 WHAT IS THE PURPOSE OF MATHEMATICAL LITERACY?

The inclusion of Mathematical Literacy as a fundamental subject in the Grade 10-12 curriculum will ensure that learners are highly numerate consumers of mathematics. In the teaching and learning of Mathematical Literacy learners will be provided with opportunities to engage with real life problems in different contexts and so consolidate and extend basic mathematical skills. Mathematical Literacy will thus result in the ability to understand mathematical terminology and make sense of numerical and spatial information communicated in tables, graphs, diagrams and texts. Mathematical Literacy will, furthermore, develop the use of basic mathematical skills in critically analysing situations and creatively solving everyday problems.

The subject Mathematical Literacy should enable the learner to become a self-managing person, a contributing worker and a participating citizen in a developing democracy. Mathematical Literacy will ensure a broadening of the education of the learner that is suited to the modern world, by ensuring that learners are enabled to become:

A self-managing person

In everyday life a person is continually faced with mathematical demands, which the adolescent and adult should be in a position to handle with confidence. These demands frequently relate to financial issues such as hire purchase, mortgage bonds and investments. There are however others, such as the ability to read a map, follow timetables, estimate and calculate areas and volumes, understand house plans and sewing patterns. Activities such as cooking and the use of medicine require the efficient use of ratio and proportion and are encountered on a daily basis. Here mathematical literacy is required to be a self-managing person.

A contributing worker

The workplace requires the use of fundamental numerical and spatial skills with understanding. To benefit from specialised training for the workplace, a flexible understanding of mathematical principles is often necessary. This literacy must enable the person to, for example, deal with work-related formulas, read statistical charts, deal with schedules and understand instructions involving numerical components. Such literacy will enable the person to be a contributing worker.

A participating citizen

It is essential that the participating citizen acquires a critical stance to mathematical arguments presented in the media and other platforms. The concerned citizen needs to be aware that statistics can often be used to support opposing arguments, say for or against the use of an ecologically sensitive stretch of land for mining purposes. In the information age the power of numbers and mathematical ways of thinking often shape policy. Unless this is appreciated, the citizen will not be in a position to use the vote appropriately.

Across the world, there is evidence that many adults are not able to do any but the simplest arithmetical calculations. They struggle to calculate percentages or interpret interest rates and graphs. The implications for such lack of understanding and facility are far reaching. People are exploited by biased reporting and advertising and ill-equipped to make responsible financial decisions. The pervasive presence of handheld calculators and computers makes it critical that people understand how to interpret results of calculations and that they are able to decide logically what mathematics to use.

The teaching and learning of Mathematical Literacy should thus provide opportunities to analyse problems and devise ways to work mathematically in solving them. Opportunities to engage mathematically in this way will also assist learners to become astute consumers of the mathematics reflected in the media.

In summary, Mathematical Literacy aims to develop four important abilities:

1. The ability to use basic mathematics to solve problems encountered in everyday life and in work situations.
2. The ability to understand information represented in mathematical ways.
3. The ability to engage critically with mathematically based arguments encountered in daily life.
4. The ability to communicate mathematically.

These abilities are not mutually exclusive and depend on the understanding of the logic of mathematical methods and processes and their use in modelling situations. The emphasis in learning should be on enabling learners to develop mathematical knowledge while dealing with issues, rather than on applying mathematics after "learning the basics". Mathematical Literacy should be imbedded in applications and extracted from problems in a variety of contexts.

The most noticeable change in approach to the teaching and learning of mathematics in Mathematical Literacy is the delaying of formal methods (algorithms) in favour of extended opportunities to engage with mathematics in diverse contexts. Learners will often meet problem situations in their adult lives for which there are no ready-made formulas or procedures to provide solutions.

2.3 WHAT IS THE RELATIONSHIP BETWEEN MATHEMATICAL LITERACY AND THE PRINCIPLES OF THE NATIONAL CURRICULUM STATEMENT

The Constitution of the Republic of South Africa (Act 108 of 1996) provided a basis for curriculum transformation and development in South Africa. The National Curriculum Statement Grades 10-12 (General) lays a foundation for the achievement of these goals by stipulating Learning Outcomes and Assessment Standards, and by spelling out the key principles and values that underpin the curriculum. The Mathematical Literacy curriculum supports the application of the nine NCS principles as follows:

2.3.1 Social Transformation

The prevalence of low levels of numeracy skills among the adult population due to limited and poor education in the past, requires intervention to ensure that the trend is broken. Mathematical Literacy seeks to transform this situation.

2.3.2 Outcomes-Based Education

The focus of Mathematical Literacy is on the development of skills, knowledge, attitudes and values related to the use of mathematics in authentic everyday life situations.

2.3.3 High levels of knowledge and skills for all

The subject aims to produce mathematically literate citizens who will apply their skills to improve their lives and participate effectively in a democratic society and contribute to developing the economy of the country.

2.3.4 Integration and applied competence

The applied nature of Mathematical Literacy creates ample opportunities for integration with almost every other subject, whether it is Dance, Design, Hospitality Studies, Business Management or the Natural and Life Sciences. Integrated understanding of mathematical concepts is provided for in the holistic view of the learning outcomes, as well as in the requirement that learners use existing knowledge and understanding to solve problems as a basis for further development.

2.3.5 Progression

Assessment standards for each learning outcome imply an increasingly more complex, deeper and broader understanding of knowledge, skills, attitudes and values to be achieved in each of Grades 10, 11 and 12. These go hand in hand with increasingly complex situations in which mathematical thinking must be applied. Such situations become more realistic and meaningful to learners as they mature through Grades 10 to 12.

2.3.6 Articulation and portability

The Learning Outcomes and Assessment Standards for Mathematical Literacy have been designed to align with the Unit Standards for Mathematical Literacy at NQF levels 2, 3 and 4. This will ensure portability between the formal school sector and the colleges or other workplace related learning programmes registered on the NQF.

2.3.7 Human rights, inclusivity, environmental and socio-economic justice

The subject is designed with the aim of providing access to mathematics through contexts that interest learners and relate to their aspirations. The challenge for teachers of Mathematical Literacy will be to choose contexts that will interest female as well as male learners, and contexts that learners from different socio-economic backgrounds can access. It is expected that many learners who choose Mathematical Literacy will have a negative view of their ability to make sense of mathematics. Care should be taken to use contexts that will inspire learners to reach for opportunities to extend their general knowledge to situations different from their own, while making sense of the mathematics involved.

2.3.8 Valuing indigenous knowledge systems

Learners in Grades 10-12 are from the many cultures that make up the school going population of South Africa and must be made aware of the mathematics that is embedded in these cultures. The local environment of learners needs to be focused on from a mathematical perspective in order to inject into Learning Programmes activities that will capitalise on the mathematics evident, for example in local artefacts and architecture. Ethnomathematics in South Africa contributes to the growing body of knowledge in this area.

When learners are allowed to bring their existing knowledge to bear in problem solving and communicating about mathematics, indigenous knowledge systems will be accessed. Teachers must

build on ways in which African languages describe mathematical concepts. An example of the descriptive power of indigenous languages is the isiZulu phrase “pinda-pinda” for multiplication. There are many more examples. Contexts like the building and decoration of shelters and houses provides opportunities for engaging with challenging and aesthetically pleasing mathematical content.

2.3.9 Credibility, quality, efficiency and relevance

The teaching of Mathematical Literacy and the choice and the design of support materials will determine whether the subject is relevant to learners. Parents, learners and institutions for Higher Education will judge the credibility of the subject based on evidence from learners exiting Grade 12.

2.4 PROFILE OF A MATHEMATICAL LITERACY LEARNER

2.4.1 Skills, Knowledge and Values of the Mathematical Literacy learner entering the Further Education and Training Band

The learning achieved in Mathematics in Grades R-9 provides an essential base from which to proceed into the demands of Mathematical Literacy in Grades 10-12. Learners exiting Grade 9 have been exposed to Mathematics in Grades R-9 and will therefore possess the following knowledge and skills relevant to Mathematical Literacy:

- Application of Mathematics to physical, social, cultural, economic and mathematical situations.
- Insight into dealing with mathematical and contextualised problems.
- Describe situations using mathematical notation and language.

2.4.2 Interpretation of Learning Outcomes to facilitate progression from General Education and Training to Further Education and Training

The table below shows how the learning outcomes for Mathematical Literacy build on and extend the learning outcomes for Mathematics in the NCS Grades R-9.

<table>
<tr><th>The Learning Outcomes for Mathematics in the NCS Grades R-9</th><th>The Learning Outcomes for Mathematical Literacy in the NCS Grades 10-12</th></tr>
<tr><td>LO 1: Numbers, operations and relationships</td><td>LO 1: Numbers and operations applied in context</td></tr>
<tr><td>LO 2: Patterns, Functions and Algebra</td><td>LO 2: Functional relationships</td></tr>
<tr><td>LO 3: Space and Shape</td><td rowspan="2">LO 3: Shape, Space and Measurement</td></tr>
<tr><td>LO 4: Measurement</td></tr>
<tr><td>LO 5: Data Handling</td><td>LO 4: Data Handling</td></tr>
</table>

The mathematical knowledge developed in Grades R-9 is revisited and embedded in authentic contexts. In this way Mathematical Literacy provides the opportunity for learners to build confidence in their ability to address and make sense of mathematically based situations, while they strengthen and extend existing knowledge and skills.

2.5 THE RELATIONSHIP BETWEEN MATHEMATICAL LITERACY LEARNING OUTCOMES AND THE CRITICAL AND DEVELOPMENTAL OUTCOMES

Education and Training in South Africa has 7 Critical Outcomes and 5 Developmental Outcomes, which derive from the Constitution. Each of them describes an essential characteristic of the type of South African citizen the education sector hopes to produce. These Critical Outcomes should therefore be reflected in the teaching approaches and methodologies that Mathematical Literacy teachers use. Both teachers and learners should be aware of and focus on these Critical and Developmental outcomes, which will be addressed through Mathematical Literacy teaching and learning.

The focus of each learning outcome is described in the subject statement for Mathematical Literacy.

Learning Outcome 1: Number and Operations applied in context

The learner is able to use numbers and their relationships to estimate and calculate, investigate and monitor the financial aspects of personal, business and national issues and to investigate and solve problems in other contexts.

Learning Outcome 2: Functional Relationships

The learner is able to recognise, analyse, interpret, describe and represent various functional relationships in order to solve problems in real and simulated contexts

Learning Outcome 3: Shape, Space and Measurement

The learner is able to measure using appropriate instruments, to estimate and calculate physical quantities and to describe and represent properties of, and relationships between 2D-shapes and 3D-objects in a variety of orientations and positions.

Learning Outcome 4: Data Handling

The learner is able to collect, summarise, display and analyse data and apply knowledge of statistics and probability to communicate, justify, predict and critically interrogate findings and draw conclusions.

The Mathematical Literacy Outcomes are of central importance to the attainment of the Critical outcomes. The way in which this subject is taught must provide authentic opportunities for learners to work towards achieving the critical outcomes.

CO 1: Identify and solve problems and make decisions using critical and creative thinking

Mathematical Literacy develops through solving problems and in finding applications. Learners are required to solve problems by using critical, creative and logical thinking. This means that learners can make use of their own methods based on their previous knowledge and their understanding of problem situations. When they engage with mathematics used in the media or in financial contexts like hire purchase contracts, they pose critical questions and investigate the situation based on those questions.

CO 2: Work effectively with others as a member of a team, group, organisation and community

In the Mathematical Literacy classroom learners get opportunities to discuss their methods for addressing issues and conclusions reached. They assist each other by active and critical listening to make sense of the mathematics. In an effective Mathematical Literacy classroom, learners will experience that their opinions are valued and interrogated with respect. They will feel safe that they

will not be belittled when they make mistakes and they will take shared responsibility for reaching the goal of understanding the mathematics embedded in daily life contexts.

CO 3: Organise and manage themselves and their activities responsibly and effectively

Teaching Mathematical Literacy should specifically make provision for and create opportunities for learners to work on extended assignments and projects. Instructions and guidelines should be clear, but should not force lock-step execution of tasks. Allow learners to engage with problem situations where they pose intermediate questions themselves and insist that they justify answers and methods logically.

CO 4: Collect, analyse, organise and critically evaluate information

This outcome is realised when learners are allowed to discuss and argue about their methods and answers. When learners actively listen to each other, they evaluate the information provided by the speaker. In a broader sense, learners must get opportunities to interrogate and analyse mathematical information contained in magazine and newspaper articles. A well-developed base of general knowledge will contribute to learners' ability to evaluate information critically. Teachers should take trouble to make newspaper articles, radio discussions and informative television programmes sources of information.

CO 5: Communicate effectively using visual, symbolic and/or language skills in various modes

When learners are required to share their opinions and methods with their peers, they experience the need to communicate effectively. This outcome is realised when learners are allowed to model situations from their own understanding rather than from prescribed methods. They make use of drawings, symbols and descriptive language to convey their thinking.

CO 6: Use science and technology effectively and critically, showing responsibility towards the environment and the health of others

The most pervasive piece of technology in the classroom is the handheld calculator. In Mathematical Literacy learners are encouraged to work with calculators. However, since they are required to communicate their mathematical thinking and to justify methods and answers, they have to reflect on what it is that they do with the calculator and why it works. Teachers must guard against learners becoming dependent on calculators for the simplest of calculations.

CO 7: Demonstrate an understanding of the world as a set of related systems by recognising that problem-solving does not exist in isolation

Embedding Mathematical Literacy in application and problem-solving and insisting on the communication of mathematical processes rather than the execution of prescribed methods provide opportunities to relate mathematics to other systems. Once again, the role of general knowledge should not be underestimated.

DO 1: Reflecting on and exploring a variety of strategies to learn more effectively

Effective learning of mathematics requires an attitude of questioning and reasoning. Different mathematical content needs different approaches to learning. For example, learners need access to practical, life-related, hands-on activities to learn to measure effectively and to develop understanding of spatial aspects. They need access to information about the conventions used in mathematics, like the correct use of symbols (e.g., the use of exponents in scientific notation). Most importantly they need a wide variety of well-designed context based problems and texts to develop mathematical habits of mind.

DO 2: Participating as a responsible citizen in the life of local, national and global communities

Mathematical Literacy makes provision for engaging with authentic application of mathematical concepts. Projects that can make a difference in communities where learners live and learn should be part of the learning programme.

DO 3: Exploring education and career opportunities

Mathematical Literacy allows for the use of contexts from other subjects and careers that learners are interested in.

DO 4: Developing entrepreneurial abilities

Again, Teachers should use entrepreneurial contexts to embed mathematical literacy where possible.

2.6 WAYS TO ACHIEVE MATHEMATICAL LITERACY LEARNING OUTCOMES

Attempting to achieve the Learning Outcomes and Assessment Standards in the same linear sequence they are written in is often not very efficient. Once teachers have a good understanding of the Learning Outcomes and Assessment Standards, they could combine these Assessment Standards into coherent and logically sequenced clusters. This will enrich the learning experiences provided to learners.

Teachers should choose meaningful contexts to embed the content gleaned from the Assessment Standards in clusters across the Learning Outcomes where possible. This means that Assessment Standards from different Learning Outcomes can and should be attained by exploring different problems in the same context whenever possible. For example, in the context of sport measurement of distances, heights and times (LO 3), calculations related to the cost of housing sports events (LO 1), calculations to optimise food provision (LO 2) and data related to attendance over time (LO 4) can be integrated to attain various Assessment Standards.

Teachers should view the learning outcomes as integrated and connected. This will allow learners to develop a more coherent view of mathematics. For example, one may start from a context which focuses on data handling (Learning Outcome 4) and look for opportunities in that context to pose questions or investigations where learners will calculate, estimate and solve problems or procedures which are described in Learning Outcome 1.

The diagram in Figure 2.1 communicates a vision of the integration of learning outcomes in teaching and learning mathematical literacy.

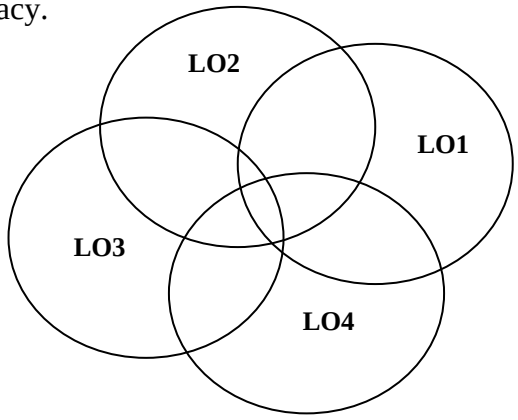


Figure 2.1

The choice of a good theme or real life situation allows one to start a learning sequence in one of the overlapping areas. One can then plan to "move out" to focus on a specific learning outcome and "move back" or "across" to apply extended knowledge and skills. This approach allows one to plan and sequence teaching and learning according to the learning outcomes. It also gives teachers the freedom to use situations that are prominent in local communities and in the media. Teachers, naturally, also have the freedom to use well-designed simulated problems as context. Integrating learning outcomes also provides opportunities to revisit learning outcomes, which might have been the focus earlier in the learning programme.

The Assessment Standards describe the kind of evidence expected from learners who attained the learning outcome. They describe mathematical processes as well as knowledge and skills and must be interpreted in the light of the critical outcomes. Some examples of assessment questions that address the assessment standards will be provided. The examples are not as extensive as they could be, and teachers may help to refine and expand them during ongoing monitoring and support. Refer to the Teacher Guide for Mathematical Literacy (Department of Education, 2006) for extensive information on ways to achieve Mathematical Literacy outcomes.

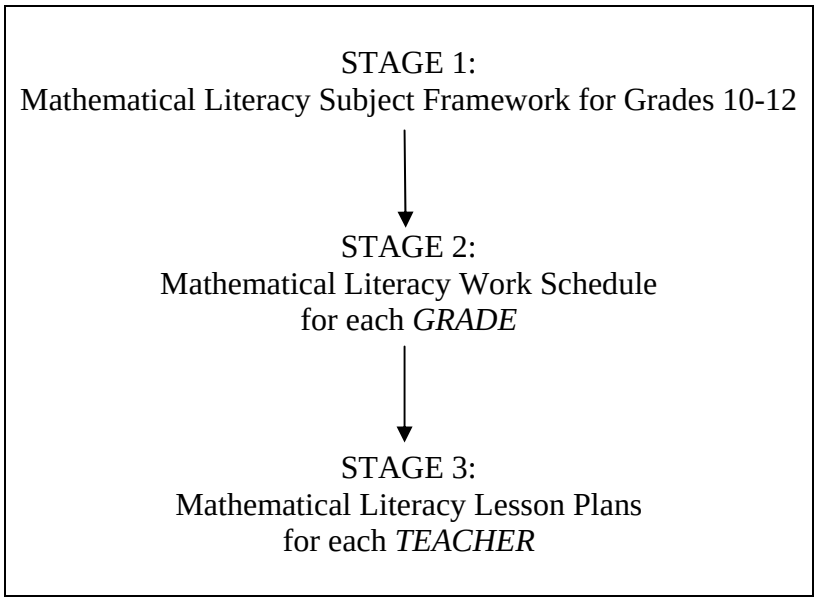
SECTION 3

DESIGNING A LEARNING PROGRAMME FOR MATHEMATICAL LITERACY

3.1 INTRODUCTION

A Learning Programme is a tool to plan for sequenced learning, teaching and assessment across Grades 10-12 so that all four Learning Outcomes in Mathematical Literacy are achieved in a progressive manner. It is recommended that the Mathematical Literacy teachers at a school first put together a broad subject outline (i.e. Subject Framework) for Grades 10-12 to arrive at an understanding of the progression which needs to take place across the grades (see Section 3.3.1). This will assist with the demarcation of content for each grade. Thereafter, Mathematical Literacy teachers teaching the same grade need to work together and draw from the content and context identified for their grade in the Subject Framework, to develop a Work Schedule in which they indicate the sequence in which the content and context will be presented for Mathematical Literacy in that particular grade (see Section 3.3.2). Finally, the individual Mathematical Literacy teacher should design Lesson Plans using the grade-specific Work Schedule as the starting point. The Lesson Plans should include learning, teaching and assessment activities (see Section 3.3.3).

An outline of the process involved in the design of a Learning Programme for Mathematical Literacy is provided in the diagram below:



The process to be followed in the development of a Learning Programme is not a neatly packaged sequence of numbered steps that follow one another in a particular order. Teachers may find themselves moving back and forth in the process as they plan and critically reflect on decisions taken before moving on to the next decision in the process. The process is therefore not strictly linear and is reflective in nature. For this reason the steps provided in this Section are a guide and should be used as a checklist in the planning process.

3.2 ISSUES TO ADDRESS WHEN DESIGNING A LEARNING PROGRAMME

The issues to be addressed in the development of a Mathematical Literacy Learning Programme are presented in a tabular format to indicate the implications of each issue at each of the three stages of the development of a Learning Programme:

- Stage 1 – Subject Framework
- Stage 2 – Work Schedule
- Stage 3 – Lesson Plan

3.2.1 Policies and Principles

STAGE 1 **Subject Framework** **STAGE 2** **Work Schedule** **STAGE 3** **Lesson Plan**	The various Policies that impact on curriculum implementation should be considered throughout the planning process. *NCS:* • Principles: Refer to Section 2.3 to see how Mathematical Literacy supports the application of the nine principles of the NCS • Critical and Developmental Outcomes: Refer to Section 2.5 to see how Mathematical Literacy supports the application of the Critical and Developmental Outcomes *Other Policies and Legislation:* • White Paper 6, Language in Education Policy, Religion and Education Policy, HIV/AIDS Policy– all have implications for LTSM and teaching methods in Mathematical Literacy • White Paper 7 – gives an indication on the use of computers in the classroom and therefore has implications for LTSM and teaching methods in Mathematical Literacy

3.2.2 Content

In the NCS Grades 10-12 content means the combination of knowledge, skills and values.

STAGE 1 **Subject Framework**	The content is provided by the ASs. These give an indication of the knowledge, skills and values (KSVs) to be covered in each of the three grades. The Subject Framework sets out the content for the three years (i.e. Grades 10, 11 and 12).
STAGE 2 **Work Schedule**	The Work Schedule sets out the content for one year. Here the focus falls on the grade-specific KSVs required by the NCS.
STAGE 3 **Lesson Plan**	The Lesson Plans set out the content to be covered in each coherent series of learning, teaching and assessment activities. Each Lesson Plan can be one or more weeks in duration.

3.2.3 Integration

Integration involves the grouping of Assessment Standards according to natural and authentic links.

STAGE 1 **Subject Framework**	Integration within the subject should be considered in broad terms during discussions at this stage. All Grade 10-12 teachers should consider integration of ASs within and across the grades.
STAGE 2 **Work Schedule**	The integration and sequencing of the ASs is undertaken in the Work Schedule to ensure that all ASs for a particular grade are covered in the 40-week contact period.

STAGE 3 Lesson Plan	The same groupings of LOs and ASs as arrived at in the Work Schedule should be used to develop a coherent series of learning, teaching and assessment activities for each Lesson Plan.

3.2.4 Conceptual Progression

STAGE 1 Subject Framework	The Subject Framework should indicate the increasing depth of difficulty across Grades 10-12. Progression across the three grades is shown in the ASs per Learning Outcome.
STAGE 2 Work Schedule	Progression in a grade is evident in the increasing depth of difficulty in that particular grade. Grade-specific progression is achieved by appropriately sequencing the groupings of integrated LOs and AS in the Work Schedule.
STAGE 3 Lesson Plan	In the individual Mathematical Literacy classroom increasing depth of difficulty is shown in the activities and Lesson Plans. Progression is achieved by appropriately sequencing the activities contained within each Lesson Plan and in the series of Lesson Plans.

3.2.5 Time Allocation and Weighting

STAGE 1 Subject Framework	4 hours per week is allocated to Mathematical Literacy in the NCS. This is approximately 160 hours per year. The teachers of the subject should plan how this time will be used for the teaching of Mathematical Literacy in the three grades.
STAGE 2 Work Schedule	The groupings of ASs as arrived at in the integration process should be paced across the 40 weeks of the school year to ensure coverage of the curriculum.
STAGE 3 Lesson Plan	The amount of time to be spent on activities should be indicated in the Lesson Plans.

3.2.6 LTSM

LTSM refers to any materials that facilitate learning and teaching. LTSM need to be chosen judiciously because they have cost implications for the school and the learner. The NCS provides scope for the use of a variety of resources. All teachers and learners must have a textbook. However, teachers are required to go beyond the textbook. They do not necessarily need exotic, specialised materials. Rather common and readily available items can be used.

STAGE 1 Subject Framework	Compile a list of general LTSM (text books and other resources) that will be necessary and useful in the teaching, learning and assessment of the content. This assists with the requisition and availability of LTSM at a school.
STAGE 2 Work Schedule	List grade-specific LTSM (resources) required in the learning, teaching and assessment process for the grade.
STAGE 3 Lesson Plan	Identify specific resources related to the individual activities contained within a Lesson Plan.

3.2.7 Assessment

All Grade 10 and 11 learners are expected to complete eight internal tasks for Mathematical Literacy. Of the eight tasks, two must be tests, two must be examinations and the remaining four tasks can take any form suitable to the teaching and assessment of Mathematical Literacy. Grade 12 learners are expected to complete seven internal tasks, including two tests and two examinations. The remaining three tasks can take any form suitable to the teaching and assessment of

Mathematical Literacy. In addition, Grade 12 learners are expected to complete an external examination. See Section 3 of the Subject Assessment Guidelines for Mathematical Literacy for further information.

In order to administer effective assessment one must have a clearly defined purpose. It is important that all the tasks are well covered as spelt out in the Subject Assessment Guideline document. By answering the following questions the teacher can decide what assessment activity is most appropriate:

- What concept, skill or knowledge needs to be assessed?
- What should the learners know?
- At what level should the learners be performing?
- What type of knowledge is being assessed: reasoning, memory or process?

Observation-based assessment requires that learner performance be assessed while the learner is actually performing a skill in the classroom as there will be no concrete product for the teacher to assess after the performance. Not all observations need to culminate in a formally recorded assessment of learner performance. **Performance-based** assessment relies on the availability of a product as evidence of learner performance that can be assessed by the teacher after the completion of the performance. **Test-based** assessment focuses on assessing the presentation and application of knowledge.

STAGE 1 Subject Framework	Develop a three-year assessment plan using the Subject Assessment Guidelines for Mathematical Literacy. This should ensure the use of a variety of assessment forms relevant to the subject and progression across the three grades.
STAGE 2 Work Schedule	Use the Subject Assessment Guidelines for Mathematical Literacy to develop a grade-specific assessment plan. The forms of assessment listed must facilitate the achievement of the particular LOs and ASs in each grouping.
STAGE 3 Lesson Plan	Indicate more classroom-specific assessment strategies, by mentioning the methods, forms and tools that will be used to assess learner performance in each activity. HINT: Not all activities need to be assessed – some may just be introductory in nature or for enrichment. The choice of an assessment strategy is determined by the LOs and ASs that have been grouped together for a particular Lesson Plan. The assessment strategy chosen must facilitate the achievement of these particular LOs and ASs in the classroom.

3.2.8 Inclusivity and Diversity

The following steps can be taken to effectively address diversity in the classroom when planning Mathematical Literacy teaching activities:

- consider individual past experiences, learning styles and preferences;
- develop questions and activities that are aimed at different levels of ability;
- provide opportunity for a variety of participation levels such as individual, pairs and small group activities;
- consider the value of individual methods ; and
- assess learners based on individual progress.

STAGE 1 Subject Framework **STAGE 2 Work Schedule**	Teachers should be sensitive to inclusivity and diversity when identifying content, teaching styles and methods, forms of assessment and LTSM (Resources). Diversity should be accommodated in the following areas: • Learning styles: provide optional activities / different ways of doing same activity • Pace of learning: provide for both slower and faster learners by providing optional extra activities, reading or research, as well as multiple assessment opportunities • Differences in levels of achievement: provide optional extra activities, challenges and materials that cater for these differences between learners. • Gender diversity: ensure that teachers do not inadvertently allow or contribute towards discrimination against boys or girls in the classroom on the basis of gender. • Cultural diversity: recognise, celebrate and be sensitive when choosing content, assessment tasks and LTSM.
STAGE 3 Lesson Plan	This is catered for as EXPANDED OPPORTUNITIES in the Lesson Plan. Enrichment is provided for high achievers and remediation or other relevant opportunities for learners requiring additional support. It is not necessary to develop an activity to cater for each type of diversity which arises in the classroom. Teachers may find it possible to cater for different diversities within one activity with effective planning.

3.2.9 Learning and Teaching Methodology

STAGE 1 Subject Framework **STAGE 2 Work Schedule**	It is not necessary to record Teaching Methods for either of these stages.
STAGE 3 Lesson Plan	This is catered for as TEACHING METHOD in the Lesson Plan. It provides an indication of how teaching and learning will take place, that is, how each activity will be presented in the classroom.

3.3 DESIGNING A LEARNING PROGRAMME

A detailed description of the process involved in the design of a Learning Programme for Mathematical Literacy is provided in this section (see Sections 3.3.1 – 3.3.3). The process presented here is a suggestion of how to go about designing a Learning Programme.

3.3.1 Subject Framework (Grades 10-12) for Mathematical Literacy

Planning for the teaching of Mathematical Literacy in Grades 10 to 12 should begin with a detailed examination of the scope of the subject as set out in the Subject Statement. No particular format or template is recommended for this first phase of planning but the five steps below should be used as a checklist.

Although no prescribed document is required for this stage of planning, school-wide planning (timetables, ordering, teacher development, classroom allocation) as well as the development of grade-specific work schedules would benefit from short documents which spell out:

- The scope of the subject – the knowledge, skills and values; the content; the contexts or themes; electives etc. to be covered in the three grades
- A three-year assessment plan
- The list of LTSM required

❶ Clarify the Learning Outcomes and Assessment Standards.

The essential question for Mathematical Literacy is: What Learning Outcomes do learners have to master by the end of Grade 12 and what Assessment Standards should they achieve to show that they are on their way to mastering these outcomes?

All learning, teaching and assessment opportunities must be designed down from what learners should know, do and produce by the end of Grade 12. The Learning Outcomes and Assessment Standards that learners should master by the end of Grade 12 are specified in the Mathematical Literacy Subject Statement.

❷ Study the conceptual progression across the three grades.

Study the Assessment Standards for Mathematical Literacy across the three grades. Progression should be clearly evident across the grades.

❸ Identify the content to be taught.

Analyse the Assessment Standards to identify the skills, knowledge, attitudes and values to be addressed in each grade. Also consider the content and context in which they will be taught.

❹ Identify three-year plan of assessment.

Use the Subject Assessment Guidelines to guide the three-year assessment plan. Consider what forms of assessment will be best suited to each of the Learning Outcomes and Assessment Standards. This ensures that assessment remains an integral part of the learning and teaching process in Mathematical Literacy and that learners participate in a range of assessment activities.

❺ Identify possible LTSM (resources).

Consider which LTSM will be best suited to the learning, teaching and assessment of each Learning Outcome in the three grades using the Assessment Standards as guidance.

3.3.2 Designing Work Schedules for Mathematical Literacy

This is the second phase in the design of a Learning Programme. In this phase teachers develop Work Schedules for each grade. The Work Schedules are informed by the planning undertaken for the Subject Framework. The Work Schedules should be carefully prepared documents that reflect what teaching and assessment will take place in the 40 weeks of the school year. See Annexure 1 for extracts from Work Schedules for Grades 10, 11 and 12 and Annexures 2, 3 and 4 for examples of Grade 10, 11 and 12 Work Schedules.

The following steps provide guidelines on how to approach the design of a Work Schedule per grade for Mathematical Literacy:

❶ Package the content.

Study the Learning Outcomes and Assessment Standards prescribed for the particular grade in Mathematical Literacy and group these according to natural and authentic links.

❷ **Sequence the content.**

Determine the order in which the groupings of Learning Outcomes and Assessment Standards will be presented in the particular grade in Mathematical Literacy. Besides the conceptual progression in the Assessment Standards for Mathematical Literacy, *context* can also be used to sequence groupings in Mathematical Literacy.

❸ **Pace the content.**

Determine how much time in the school year will be spent on each grouping of Learning Outcomes and Assessment Standards in the particular grade.

❹ **Review forms of assessment.**

Revisit the forms of assessment listed for the particular grade in the Subject Assessment Guidelines, and refine them to address each grouping of Learning Outcomes and Assessment Standards as developed in Step 1.

❺ **Review LTSM.**

Revisit the LTSM (resources) listed for the particular grade in the Subject Framework, and refine them to address each grouping of Learning Outcomes and Assessment Standards as developed in Step 1.

3.3.3 Designing Lesson Plans for Mathematical Literacy

Each grade-specific Work Schedule for MATHEMATICAL LITERACY must be divided into units of deliverable learning experiences, that is, Lesson Plans. A Lesson Plan adds to the level of detail in the Work Schedule. It also indicates other relevant issues to be considered when teaching and assessing Mathematical Literacy.

A Lesson Plan is not equivalent to a subject period in the school timetable. Its duration is dictated by how long it takes to complete the coherent series of activities contained in it.

❶ **Indicate the content, context, Learning Outcomes and Assessment Standards.**

Copy this information from the Work Schedule for the particular grade.

❷ **Develop activities and select teaching method.**

Decide how to teach the Learning Outcomes and Assessment Standards indicated in Step 1 and develop the activity or activities that will facilitate the development of the skills, knowledge, attitudes and values in the particular grouping. Thereafter, determine the most suitable teaching method(s) for the activities and provide a description of how the learners will engage in each activity.

❸ **Consider diversity.**

Explore the various options available within each activity that will allow expanded opportunities to those learners that require individual support. The support provided must ultimately guide learners to develop the skills, knowledge, attitudes and values indicated in the grouping of Learning Outcomes and Assessment Standards.

❹ **Review assessment and LTSM.**

Indicate the details of the assessment strategy and LTSM to be used in each activity.

❺ **Allocate time.**

Give an indication of how much time will be spent on each activity in the Lesson Plan.

3.3.4 Reflection and review of the Mathematical Literacy Learning Programme

After the Learning Programme has been delivered by means of Lesson Plans in the classroom, the teacher should reflect on what worked, how well it worked and what could be improved. Teachers need to note these while the experience is still fresh in their minds, so that if necessary, they can adapt and change the affected part of the Mathematical Literacy Learning Programme for future implementation. It is advisable to record this reflection on the Lesson Plan planning sheets.

ANNEXURE 1: EXTRACTS FROM WORK SCHEDULES FOR MATHEMATICAL LITERACY

An extract from a possible Work Schedule for Mathematical Literacy Grade 10 (first 4 weeks)

Weeks	Context	Lesson focus, activities and resources	Learning Outcome(s)	Assessment Standard(s) (bold text is used to highlight the areas addressed by the lesson)	Assessment Task
1 & 2	Understanding your water account	**Supply learners with water consumption tariffs for two different municipalities and let them:** • Calculate the cost of water for a range of consumption levels in each of the municipalities (LO1) • Draw graphs for the different municipalities on the same graph paper and determine which municipality is more economical for different consumption levels. (LO2) • Relate the answers determined by calculation to the answers read of the graph. (LO1 & LO2)	LO1: Numbers and Operations in Context (The learner is able to use knowledge of numbers and their relationships to investigate a range of different contexts which include financial aspects of personal, business and national issues.); LO2: Functional Relationships (The learner is able to recognise, interpret, describe and represent various functional relationships to solve problems in real and simulated contexts.); LO3: Space, Shape and Measurement (The learner is able to measure using appropriate instruments, to estimate and calculate physical quantities, and to interpret, describe and represent properties of and relationships between 2- dimensional shapes and 3-dimensional objects in a variety of orientations and positions.); LO4: Data Handling (The learner is able to collect, summarise, display and analyse data and to apply knowledge of statistics and probability to communicate, justify, predict and critically interrogate findings and draw conclusions.)	10.1.1 **Solve problems in various contexts, including financial contexts, by estimating and calculating accurately using mental, written and calculator methods where appropriate, inclusive of:** • **working with simple formulae** (e.g. A = P(1+i)n); • using the relationships between arithmetical operations (including the commutative, distributive and associative laws) to simplify calculations where possible; • working with positive exponents and roots. 10.1.2 **Relate calculated answers correctly and appropriately to the problem situation by**: • interpreting fractional parts of answers in terms of the context; • **reworking a problem if the first answer is not sensible, or if the initial conditions change;** • **interpreting calculated answers logically in relation to the problem and communicating processes and results.** 10.2.1 **Work with numerical data and formulae in a variety of real-life situations, in order to establish relationships between variables by:** • **finding the dependent variable;** • **finding the independent variable;** • **describing the rate of change.** 10.2.2 **Draw graphs in a variety of real-life situations by:** • **point-by-point plotting of data;** • **working with formulae to establish points to plot;** • **using graphing software where available.** 10.3.1 **Solve problems in 2-dimensional and 3-dimensional contexts by**: • estimating, **measuring** and calculating values which involve: o lengths and distances, o perimeters and areas of common polygons and circles, o **volumes of right prisms**, o angle sizes (0˚-360˚); • **checking values for solutions against the contexts in terms of suitability and degree of accuracy.** 10.4.1 **Investigate situations in own life by:** • **formulating questions on issues such as those related to:** o **social, environmental** and political factors, o people's opinions, o human rights and inclusivity; • collecting or finding data by appropriate methods (e.g. interviews, questionnaires, the use of data bases) suited to the purpose of drawing conclusions to the questions. 10.4.2 **Select, justify and use a variety of methods to summarise and display data in statistical charts and graphs inclusive of**: • tallies; • tables; • pie charts; • **histograms (first grouping the data);** • **single bar and compound bar graphs;** • line and broken-line graphs.	Assignment
2 & 3		**Have learners measure the amount of water different typical daily activities use using appropriate measuring instruments** • Combine data for the class discussing why different people got different values for similar activities (LO3) **Have learners keep a water use diary for their home recoding how many of each typical daily activity occurs for each day of a week.** • Summarise class data by means of appropriate data graphs (LO4)			Investigation
4		**Consolidate the mathematical knowledge and skills that the activities have addressed. Namely:** • Calculating values based on information/formulae provided in tables • Drawing algebraic graphs based in values calculated • Measuring using a measuring instrument • Recording values • Converting between metric units (ml to l) • Summarising data and drawing data graphs			Homework/classwork

An extract from a possible Work Schedule for Mathematical Literacy Grade 11

<table>
<tr><th>Weeks</th><th>Context</th><th>Lesson focus, activities and resources</th><th>Learning Outcome(s)</th><th>Assessment Standard(s) (bold text is used to highlight the areas addressed by the lesson)</th><th>Assessment Task</th></tr>
<tr><td>6</td><td rowspan="3">Using formulae and solving equations – bank costs</td><td>Supply learners with fee brochures for a range of banks:
• Study the various different fees that each of the banks charges
• Identify the different ways in which banks determine the cost of a transaction. There are typically the following:
o Fixed fee for a transaction:
statement request = R 4,00
o Basic plus a percentage of the transaction amount
deposit = R 2.50 + 0,9% × amount
o Percentage up to a maximum
cheque = 1,1% × amount, max fee R16,25
o etc.
• Provide a worksheet with many examples for students to calculate</td><td rowspan="3">LO1: Numbers and Operations in Context
(The learner is able to use knowledge of numbers and their relationships to investigate a range of different contexts which include financial aspects of personal, business and national issues.);

LO2: Functional Relationships
(The learner is able to recognise, interpret, describe and represent various functional relationships to solve problems in real and simulated contexts.);</td><td rowspan="3">11.2.1 Work with numerical data and formulae in a variety of real-life situations, including:
• Finding break-even points involving linear functions by solving simultaneous equations
(Types of relationships to be dealt with include linear and inverse proportion relationships)

11.2.2 Draw graphs (by hand and/or by means of technology where available) as required by the situations and problems being investigated.

11.2.3 Critically interpret tables and graphs in a variety of real-life and simulated situations by:
• estimating input and output values;

11.1.1 In a variety of contexts, find ways to explore and analyse situations that are numerically based, by:
• estimating efficiently;
• working with formulae by hand and with a calculator;
• showing awareness of the significance of digits;
• checking statements and results by doing relevant calculations;
(The range of problem types includes percentage, ratio, rate and proportion).

11.1.2 Relate calculated answers correctly and appropriately to the problem situation by:
• interpreting answers in terms of the context;
• reworking a problem if the first answer is not sensible or if the initial conditions change;
• interpreting calculated answers logically in relation to the problem, and communicating processes and results.

11.1.3 Apply mathematical knowledge and skills to plan personal finances and investigate opportunities for entrepreneurship inclusive of:
• specifying and calculating the value of income and expenditure items;
• estimating and checking profit</td><td rowspan="3">Research task & regular informal classroom based assessment</td></tr>
<tr><td>7</td><td>Tabulate the fees for a range of transaction amounts for the same transaction type.
• Have students develop a table of values for a given transaction type and a range of different transaction amounts. Make sure the transaction amounts increase in reasonable steps.
• Repeat for several different transactions
• Repeat for different banks

By looking at the different tables for different banks identify situations where the one bank will be more expensive for smaller transaction amounts than another bank but less expensive for larger transaction amounts.
• Attempt to guess the break-even amount for the two banks in the situations using trial-and-improvement techniques</td></tr>
<tr><td>8</td><td>Have students develop graphs for a particular kind of transaction.
• Plot the values determined in the tables on the graphs and draw lines through the points (if appropriate)
• Use the graphs to determine the break-even points for the two banks, i.e. determine the transaction value for which both banks will charge the same amount
• Repeat for several other transaction types to allow students to develop the skills of determining the break even point</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

An extract from a possible Work Schedule for Mathematical Literacy Grade 12

Weeks	Context	Lesson focus, activities and resources	Learning Outcome(s)	Assessment Standard(s) (bold text is used to highlight the areas addressed by the lesson)	Assessment Task
7	Conversions – exchange rates and units of measurement	**International exchange rates** • Look at a number of advertisements from international magazines etc. that quote prices in other currencies • Source exchange rates for the currencies used in the advertisement(s) and convert the price to S.A. Rands • Practice converting between a variety of currencies and the S.A. Rand (use a worksheet)	LO1: Numbers and Operations in Context (The learner is able to use knowledge of numbers and their relationships to investigate a range of different contexts which include financial aspects of personal, business and national issues.); LO2: Functional Relationships (The learner is able to recognise, interpret, describe and represent various functional relationships to solve problems in real and simulated contexts.); LO3: Space, Shape and Measurement (The learner is able to measure using appropriate instruments, to estimate and calculate physical quantities, and to interpret, describe and represent properties of and relationships between 2-dimensional shapes and 3-dimensional objects in a variety of orientations and positions.);	12.1.3 **Analyse and critically interpret the a variety of financial situations mathematically, inclusive of**: • **personal and business finances**; • the effects of taxation, inflation and changing interest rates • **the effects of currency fluctuations**; • critical engagement with debates about socially responsible trade. 12.2.3 **Critically interpret tables and graphs in real life situations including in the media, inclusive of:** • **graphs with negative values on the axes (dependant variable in particular);** • **more than one graph on a system of axes.** 12.3.1 **Solve problems in 2-dimensional and 3-dimensional contexts by:** • **estimating, measuring and calculating values which involve**: ▪ **lengths and distances,** ▪ **perimeters and areas of polygons,** ▪ **volumes of right prisms, right circular cylinders,** ▪ surface areas of right prisms, right circular cylinders, • **making adjustments to calculated values to accommodate measurement errors and inaccuracies due to rounding.** 12.3.2 **Convert units of measurement between different scales and systems using conversion tables provided as required in dealing with problems.** 12.3.3 **Use and interpret scale drawings of plans to:** • **estimate and calculate values according to scale, and build models.**	Control test
8		**Exchange rates over time** • Given a graph that shows exchange rates between the S.A. Rand and various currencies; o Develop tables of values for the given period from the graph • Identify trends in the exchange rate if possible and answer questions such as: o When was the exchange rate greatest – i.e. when would the item have cost the most in S.A. Rand? o When was the exchange rate lowest – i.e. when would the item have cost the least in S.A. Rand? o If you had to buy the item in 6 months time, how much do you think it will cost? Justify your answer.			
9		**Measurement conversions** • Source examples of scale drawings and plans on which the dimensions are given in imperial units & supply conversion charts to convert from imperial to metric units o Calculate the actual dimensions for the measurements shown on the plans and scale drawings o Convert the dimensions of the actual items shown on the plans/drawing into metric units using the conversion tables provided o Calculate areas, volumes and other dimensions appropriate to the items depicted in the plans/drawings in metric units			
10		**Consolidation of mathematical concepts** • Consolidate conversions as an application of rate. • Recognise that while exchange rates can vary, conversion rates for dimensions are constant etc.			

ANNEXURE 2: EXAMPLE OF A GRADE 10 WORK SCHEDULE FOR MATHEMATICAL LITERACY

Grade 10 Mathematical Literacy Work Schedule (Based on the Core Assessment Standards)

Week	Learning Outcomes and Assessment Standards		Context	Assessment	Resources
1 - 2	10.1.3	Apply mathematical knowledge and skills to plan personal finances, inclusive of: • income and expenditure • the impact of interest (simple and compound) within personal finance contexts.	Payroll; Investments; Bank loans; Etc.	Daily Assessment Tasks	Textbook; Calculator; Pencil and paper; Newspaper.
	10.1.1	Solve problems in various contexts, including financial contexts, by estimating and calculating accurately using mental, written and calculator methods where appropriate, inclusive of: • work with simple formulae • simplify calculations (distributive property) [The range of problem type includes percentage, ratio, rate and proportion]			
	10.1.2	Relate answers to problem situation by: • interpreting answers in relation to problem • reworking a problem • communicating processes and results			
3	10.3.1	Solve 2-D and 3-D problems • estimate, measure and calculate lengths/distances, perimeters, area (polygons and circles) and volumes (right prisms) • check solutions for suitability and accuracy	House plans; Carpentry; Solids; Etc.	Daily Assessment Tasks	Textbook; Calculator; Graph paper; Worksheets; Mathematics sets
	10.3.2	Convert units of measurement within metric systems			
4	10.1.1	Solve problems in various contexts, including financial contexts by estimating and calculating accurately using mental, written and calculator methods where appropriate, inclusive of: • work with simple formulae • simplify calculations (distributive property) [The range of problem type includes percentage, ratio, rate and proportion]	Payroll; Investments; Bank loans; Etc.	Daily Assessment Tasks **Investigation**	Textbook; Calculator.
5	10.3.4	Use grids and maps to determine locations and plan trips	Local maps	Daily Assessment Tasks	Textbook; Calculator; Local maps.
6	10.3.3	Draw and interpret scale drawings to represent and describe situations	House plans; Town maps.	Daily Assessment Tasks	Textbook; Graph paper; Worksheets; Mathematics sets.

Week	Learning Outcomes and Assessment Standards		Context	Assessment	Resources
7 - 8	10.4.1	Investigate situations in own life: • Formulate questions on - social, environmental, political factors - people's opinions - human rights and inclusivity • Collect data (interviews, questionnaires, data bases) suited to the purpose of drawing conclusions to the questions	Reports on drug abuse; Elections; HIV/AIDS; Etc	Daily Assessment Tasks	Textbook; Calculator; News papers; Worksheets; Mathematics sets.
9	10.2.1	Work with data and formulae (linear and inverse proportion) • determine output for given input • determine input for given output	Telephone tariffs; Parking tariffs; Etc.	Daily Assessment Tasks **Test**	Textbook; Calculator.
10	10.2.2 10.2.3	Draw graphs • point-by-point plotting • use formulae to determine points Critically interpret tables and graphs: • find variables at certain points • describe overall trends • identify maxima and minima • describe trends (in terms of rates of change)	Telephone tariffs; Parking tariffs; Electricity tariffs; Road accidents; Birth rates; Etc.	Daily Assessment Tasks	Textbook; Calculator; Graph paper; Worksheets; Mathematics sets.
11	10.4.4	Critically interpret data and representations of data (conclusions, predictions, critique)	Advertisements; HIV/AIDS reports; Etc.	Daily Assessment Tasks	Textbook; Calculator; Newspapers.
12	10.4.2 10.4.6	Select, justify and use methods to display data • tallies and tables • pie charts • histograms • single and compound graphs • line- and broken line graphs Effectively communicate conclusions and predictions (trend, increase, decrease, constant, impossible, likely, fifty-fifty chance)	Advertisements; HIV/AIDS reports; Gambling; Etc.	Daily Assessment Tasks	Textbook; Calculator; Graph paper; Worksheets; Mathematics sets.
13	10.3.4 10.3.3	Use grids and maps to determine locations and plan trips determine locations Draw and interpret scale drawings to represent and describe situations	House plans; Town maps.	Daily Assessment Tasks	Textbook; Calculator; Graph paper; Mathematics sets.

Week	Learning Outcomes and Assessment Standards		Context	Assessment	Resources
14	10.3.2 10.1.1 10.1.2	Convert units of measurement within metric system Solve problems in various contexts, including financial contexts by estimating and calculating accurately using mental, written and calculator methods where appropriate, inclusive of: • work with simple formulae • simplify calculations (distributive property) [The range of problem type includes percentage, ratio, rate and proportion] Relate answers to problem situation by: • interpreting answers in relation to problem • reworking a problem • communicating processes and results	Payroll; Investments; Bank loans; Etc.	Daily Assessment Tasks **Assignment**	Textbook; Calculator; Pencil and paper; Newspaper.
15	10.2.2 10.1.3	Draw graphs • point-by-point plotting • use formulae to determine points Apply maths to personal finance • income and expenditure • impact of interest (simple and compound) on personal finances	Budgets; Investments; Etc.	Daily Assessment Tasks	Textbook; Calculator; Graph paper; Worksheets; Mathematics sets.
16 - 18	10.2.1 10.2.3	Work with data and formulae (linear and inverse proportion) • determine output for given input • determine input for given output Critically interpret tables and graphs: • find variables at certain points • describe overall trends • identify maxima and minima • describe trends (in terms of rates of change)	Telephone tariffs; Parking tariffs; Electricity tariffs; Road accidents; Birth rates; Etc.	Daily Assessment Tasks	Textbook; Calculator; Newspapers.
19 - 20	**Examinations**				

Week	Learning Outcomes and Assessment Standards		Context	Assessment	Resources
21 – 24	10.4.5 10.1.1	Work with likelihood and probability • express probability in terms of fractions, ratios and percentages Solve problems in various contexts, including financial contexts by estimating and calculating accurately using mental, written and calculator methods where appropriate, inclusive of: • work with simple formulae • simplify calculations (distributive property) [The range of problem type includes percentage, ratio, rate and proportion]	Throwing a die; Payroll; Investments; Bank loans; Etc.	Daily Assessment Tasks **Investigation**	Textbook; Calculator; Pencil and paper; Newspaper.
	10.1.2	Relate answers to problem situation by: • interpreting answers in relation to problem • reworking a problem • communicating processes and results			
25 - 27	10.3.1	Solve 2-D and 3-D problems • estimate, measure and calculate lengths/distances, perimeters, area (polygons and circles) and volumes (right prisms) • check solutions for suitability and accuracy	House plans; Carpentry; Solids; Etc.	Daily Assessment Tasks	Textbook; Calculator; Graph paper; Worksheets; Mathematics sets.
	10.3.2	Convert units of measurement within metric system			
28 - 30	10.4.4 10.4.1	Critically interpret data and representations of data (conclusions, predictions, critique) Investigate situations in own life: • Formulate questions on - social, environmental, political factors - people's opinions - human rights and inclusivity • Collect data (interviews, questionnaires, data bases)	Crime; Reports on drug abuse; Elections; HIV/AIDS; Etc	Daily Assessment Tasks	Textbook; Newspapers; Journals.
31 - 33	10.4.2 10.4.3	Select, justify and use methods to display data • tallies and tables • pie charts • histograms • single and compound graphs • line- and broken line graphs Understand the summarising and comparing of data / using measures of central tendency and spread (one set of data), viz.: mean, median, mode and range	Crime; Reports on drug abuse; Elections; HIV/AIDS; Etc.	Daily Assessment Tasks **Test**	Textbook; Newspapers; Calculator; Journals.

Week	Learning Outcomes and Assessment Standards		Context	Assessment	Resources
34 - 36	10.2.2 10.2.3	Draw graphs • point-by-point plotting • use formulae to determine points Critically interpret tables and graphs: • find variables at certain points • describe overall trends • identify maxima and minima • describe trends (in terms of rates of change)	Telephone tariffs; Parking tariffs; Electricity tariffs; Road accidents; Birth rates; Etc.	Daily Assessment Tasks **Project**	Textbook; Calculator; Graph paper; Worksheets; Mathematics sets.
	10.2.1	Work with data and formulae (linear and inverse proportion) • determine output for given input • determine input for given output			
37 - 38	10.1.3	Apply maths to personal finance • income and expenditure • impact of interest (simple and compound) on personal finances	Personal budgets; Bank charges; Hire purchases; Etc.	Daily Assessment Tasks	Textbook; Calculator; Newspaper.
39- 40	**Examinations**				

NOTES

- For more details on Learning Outcomes and Assessment Standards, this Work Schedule is to be used in conjunction with the Subject Assessment Guidelines of Mathematical Literacy.
- The suggested context should not be regarded as prescribed, other contexts may be used in addressing the Assessment Standards. It may also be necessary to explain some mathematical concepts out of context, e.g. algorithms.
- Daily Assessment Tasks may take the form of home/class work and responses to questions posed by the teacher and learners.
- Formal Assessment Tasks, written in bold, should be in accordance with the Formal Programme of Assessment.
- While resources should not be limited to the ones that are mentioned, it should be ensured that each learner has a textbook and a calculator.

ANNEXURE 3: EXAMPLE OF A GRADE 11 WORK SCHEDULE FOR MATHEMATICAL LITERACY

EXAMPLE 1: Grade 11 Mathematical Literacy Work Schedule (Based on the Core Assessment Standards)

Week	Learning Outcomes and Assessment Standards		Context	Assessment	Resources
1 – 2	11.1.1	Explore and analyse situations that are numerically based, by: • estimating efficiently; • working with formulae by hand and with a calculator; • showing awareness of the significance of digits; • checking statements and results by doing relevant calculations. (Percentages; Ratio; Rate; and Proportion)	Personal finance; Financial statements; Budgets; Etc.	Daily Assessment Tasks	Textbook; Calculator; Pencil and paper; Newspaper.
3 - 4	11.1.2	Relate calculated answers correctly and appropriately to the problem situation by: • interpreting answers in terms of the context; • reworking a problem if the first answer is not sensible or if the initial conditions change; • interpreting calculated answers logically in relation to the problem, and communicating processes and results.	Personal finance; Financial statements; Budgets; Etc.	Daily Assessment Tasks	Textbook; Calculator.
5 - 6	11.1.3 11.2.1 11.2.2	Cost price and selling price; profit margins Break-even points; Optimal ranges Relationships between variables [Linear equations; quadratic equations; simultaneous equations (linear); compound growth; quadratic functions]	Sales and price increases; Critique of cell-phone packages; Car hire companies; Parking tariffs; Etc.	Daily Assessment Tasks **Assignment**	Textbook; Calculator; Graph paper; Adverts in newspapers.
7 - 8	11.2.3	Critically interpret tables and graphs	Population growth; Exam results; Crime rate; Sales; Etc.	Daily Assessment Tasks	Textbook; Calculator; Newspaper; Journals; Magazines.

Week	Learning Outcomes and Assessment Standards		Context	Assessment	Resources
9 - 10	11.3.2	Convert km to m; mm^3 to litres; miles to km; kg to lb; work with international times	Packaging; Travelling; Etc.	Daily Assessment Tasks **Control Test**	Textbook; Calculator; Appliance manual
11 - 12	11.3.1	Problems in 2 and 3 dimensions (Length and distance; perimeter and area; volume and surface area using regular and irregular shapes)	House plans; Solids.	Daily Assessment Tasks	Textbook; Calculator; Worksheets
13 -14	11.3.1	Problems in 2 and 3 dimensions	House plans; Solids	Daily Assessment Tasks	Textbook; Calculator; Graph paper; Worksheets; Mathematics sets
15 -16	11.4.1 11.4.2	Investigation of various social, environmental and political issues Population and sample; Comparing data.	Political and social surveys	Daily Assessment Tasks **Investigation**	Textbook; Newspapers; Journals.
17 - 18	11.4.2	Tallies; tables; pie charts; single and compound bar graphs; Line and broken line graphs; ogives of cumulative frequencies	House prices; Health statistics; Etc.		Textbook; Newspapers; Journals.
19 - 20	**Revision and Examination**				

Week	Learning Outcomes and Assessment Standards		Context	Assessment	Resources
21 - 23	11.1.1	Explore and analyse situations that are numerically based, by: • estimating efficiently; • working with formulae by hand and with a calculator; • showing awareness of the significance of digits; • checking statements and results by doing relevant calculations. (Percentages; Ratio; Rate; and Proportion)	Variations in petrol price; gold price; incidence of HIV and AIDS. (Estimate quantities in various contexts; verify estimation by doing calculations involving appropriate formulae; speed, distance and time; water and electricity consumption)	Daily Assessment Tasks **Project**	Textbook; Calculator; Newspaper.
	11.2.2	Relate calculated answers correctly and appropriately to the problem situation by: • interpreting answers in terms of the context; • reworking a problem if the first answer is not sensible or if the initial conditions change; • interpreting calculated answers logically in relation to the problem, and communicating processes and results.			
	11.1.3	Investigate opportunities for entrepreneurship inclusive of: • specifying and calculating the value of income and expenditure items; • estimating and checking profit			
24 - 25	11.2.1	Solving problems using real-life data;	Rate of working; Population growth; Path of a cricket ball; etc.	Daily Assessment Tasks	Textbook; Calculator; Newspaper; Journals; Magazines.
	11.2.2	Simultaneous equations; inverse proportion; compound growth; quadratic functions (given appropriate formulae); Draw graphs			
26 - 27	11.2.3	Interpret tables and graphs depicting relationships between two variables in a variety of real life situations.	Expand on context used.	Daily Assessment Tasks	Textbook; Calculator

Week	Learning Outcomes and Assessment Standards		Context	Assessment	Resources
28 - 29	11.3.1 11.3.2	Estimate, measure and calculate: • lengths and distances, • perimeters and areas of polygons, • volumes of right prisms and right circular cylinders, • surface areas of right prisms and right circular cylinders, (Accommodate measurement errors and inaccuracies due to rounding). Convert units of measurement.	House plans; School building plans; Town plans; Etc.	Daily Assessment Tasks	Textbook; Calculator; Mathematics sets.
30	11.3.3	Use and interpret scale drawings.	House plans; School building plans; Town plans; Etc.	Daily Assessment Tasks **Control Test**	Textbook; Calculator; Mathematics sets; Software (if available)
31 - 32	11.3.4	Cartesian plane and compass directions to determine locations and positions.	Local maps; Cinema/stadium seating; Room numbers in multi-level buildings	Daily Assessment Tasks	Textbook; Calculator; Newspaper; Journals; Magazines
33 - 35	11.4.4 11.4.5 11.4.6	Interpretation of 2 sets of data Simple notion of likelihood/probability Use data to justify opposing conclusions	Compare data from tracking devises, cell phone deals, or supermarket prices.	Daily Assessment Tasks **Investigation**	Textbook; Calculator; Newspapers; Journals
36 - 37	11.4.5	Simple notion of likelihood/probability (Drawing tree diagrams)	Possible outcomes of events, e.g. chances of rainfall.	Daily Assessment Tasks	Textbook; Newspapers
38	11.4.6	Use data to justify opposing conclusions (Interpret data from different perspectives)	Reports on crime, road accidents, etc.	Daily Assessment Tasks	Textbook; Newspapers
39-40	**Revision and Examination**				

NOTES

- For more details on Learning Outcomes and Assessment Standards, this Work Schedule is to be used in conjunction with the Subject Assessment Guidelines of Mathematical Literacy.
- The suggested context should not be regarded as prescribed, other contexts may be used in addressing the Assessment Standards. It may also be necessary to explain some mathematical concepts out of context, e.g. algorithms.
- Daily Assessment Tasks may take the form of home/class work and responses to questions posed by the teacher and learners.
- Formal Assessment Tasks, written in bold, should be in accordance with the Formal Programme of Assessment.
- While resources should not be limited to the ones that are mentioned, it should be ensured that each learner has a textbook and a calculator.

EXAMPLE 2: Grade 11 Mathematical Literacy Work Schedule (Based on the **Mathematical Literacy Teacher Guide, Department of Education 2006**)

NOTE: This Work Schedule reflects the first two of the four school terms.

WEEK	TITLE	LEARNERING OUTCOMES AND ASSESSMENT STANDARDS	CONTENT	RESOURCES	ASSESSMENT
1	PERSONAL FINANCE Context: Elsie's Chicken Food* (* *Mathematical Literacy Teacher Guide, DoE 2006*)	11.1.3 Apply mathematical knowledge and skills to plan personnel finances and investigate opportunities for entrepreneurship. 11.1.1 In a variety of contexts, find ways to explore and analyse situations that are numerically based. 11.1.2 Relate calculated answers correctly and appropriately to the problem situation.	• Calculate the costs of items by division, rounding up and rounding down. • List different forms of income	• Data on page 7 of Teacher's Guide* • Paper and Pencil • Calculator • Ruler	• Classwork
2			• List different expenses in running a stall. • Develop Income and Expenditure statement by estimating the values for a week, fortnight, a month, etc.	The resources above	• Classwork
3			• Development of income and expenditure statements continues. • Decide which statements best describe the developed income and expenditure statements: - Income < Expenses - Income = Expenses - Income > Expenses	All resources in week 1	• Classwork
4	SPACE AN SHAPE (2D – 3D problems) Context: Baking Cookies*	11.3.1 Solve problems in 2D-dimensional and 3D- dimensional context. 11.3.2 Convert units of measurement between different scales and systems using conversion tables provided.	• Scale drawings for a number of baking trays and of the square and round cookies. • Number of different types of cookies to be baked at a time on each baking tray. • Maximum number of each kind of cookies to be baked in the oven at any time.	• Data on page 9 of Teacher's Guide* • Ruler • Compass • Pair of scissors • Pencil • Calculator • Metric • Conversion tables • Hand drawing charts	• Practical Work • Interview (10%)

5			• Volume of round and square cookies. • Number of round and square cookies in a packet, e.g. 250g packet • How long it takes to bake round/ square cookies, i.e. time taken to bake square/ round cookies.	• Exercise books • Calculator	• Classwork and Homework • Assignment
6	Ratio, Proportion and Rate Context: 1. Comparing quantities by means of difference and ratio* 2. Planning a trip* (Shosholoza Meyl) 3. Seating at the World Cup*	11.1.1 In a variety of contexts, find ways to explore and analyse situations that are numerically based. 11.3.4 Use grids and maps and compass directions. 11.3.3 Use and interpret scale drawings of plans to estimate and calculate values according to scale.	• Compare quantities by means of difference and ratio. • The meanings of proposition and rate. • Ration/ proportion problems • Rate problems	• Conversion tables • Calculator	• Classwork • Homework
7			• Draw the different routes onto a map. • Travel from town to town • Plan an event • Distance, speed and time (rate)	• The Shosholoza Meyl timetables on page 45 of the Teacher's Guide* • A copy of a map of South Africa with as many of the towns listed in the above time-tables as possible	• Classwork • Homework
8			• Calculate the distance to the field of play from different seats. • Maths development scale • Convert between currencies.	• Scale of drawings of the soccer stadium on page 47 of the Teacher's Guide*	• Classwork
9	Data Handling Context: Using Electricity*	11.4.1 Investigate a problem on issues such as those related to: • Social environments • People's opinion • Human rights and inclusivity	• Calculate electricity costs for the use of an appliance. • Collect data-power rating of appliances • Calculate costs • Collect data – use of appliances. • Calculate electricity costs for the home based on electricity use log.	• The data on page 22 of the Teacher's Guide* • Power ratings of appliances from home • Use of appliances at home • Basic calculator	• Classwork • Assignment • Homework • Control test (15%)
10			• Represent data using graphs. • Compare predicted use with costs. • Combine the information of the class	• Graph paper • Protractor • Pencil Eraser • Electricity statements	• Classwork • Homework
11	Formulae and Equations Context: Tariffs and Banking	11.2.1 Work with numerical data and formulae in a variety of situations 11.2.2 Critically interpret tables and	• Calculate water costs • Calculate sewerage costs • Calculate electrically costs • Calculate refuse collection costs	• Data on page 17 of Teacher's Guide* • Local Municipality tariffs • Tariffs for other two municipalities	• Classwork

12	cost*	graphs in a variety of real-life and simulated situations.	• Solve equations based on the banking cost information. • Solve first degree equations	• Data on page 41 of Teacher's Guide* • A range of fee brochures from different banks	• Classwork
13			• Solve equations by - Trial and Improvement - Means of Manipulation	• Data on pages 42 and 43 of Teacher's Guide*	• Classwork
14	Graphs in the Media (data graphs) Context: • Spending* • Energy consumption*	11.4.4 Critically interpret data and representations thereof in order to draw conclusions and problems investigated and make predictions and then critique other interpretations. 11.4.2 Select, justify and use a variety of methods to summarise and display data in statistical charts and graphs. 11.4.6 Demonstrate an awareness of how it is possible to use data in different ways to justify opposing conclusions	• Develop research questions. • Organise, summarise and represent data • Mathematical development calculating energy burned	• Data on page 52 and 53 of the Teacher's Guide* on spending energy • Table for the activities not listed on page53 • Watches to record the time spent on different activities • Basic calculator	• Classwork • Homework • Research task (10%)
15			• Plan lifestyle modifications. • Summarise the data for the whole class. • Develop research questions • Develop data collection instruments and collect data	• Data on week 14 • Data on pages 54 and 55 of the Teacher's Guide* on Energy Consumption • Nutritional Information	• Classwork • Homework
16			• Organise, summarise and represent data energy consumed. • Draw conclusions. • Summarise data for the whole class.	• Data on energy consumption • Basic calculator • Nutritional information for different foodstuffs	• Classwork • Homework
17	Examination				Exam (30%)
18	Using maps and Timetable Context: Shosholoza Meyl and testing at Soccer World Cup*	11.3.4 Use grid and maps, and compass direction in order to: - Determine locations - Describe relative positions. 11.3.3. Use and interpret scale drawing of plans to estimate and calculate values according to scale.	• Draw the different routes onto a map. • Travel from town to town. • Plan an event.	• Data on page 45 on Teacher's Guide* • A copy of a map of SA with towns listed in the above data • Graph paper, basic calculator • String for measuring the distances between towns	• Classwork • Homework

19		11.1.1. In a variety of contexts find ways to explore and analyse situations that are numerically based. 11.1.2. Relate calculated answers correctly and appropriately to the problem situation.	• Distance, speed and time • Calculate the distance to the field of play from different seats.	• Resource in week 18 • Data on page 47 or Teacher's Guide* • Basic Calculator	• Classwork • Homework
20			• Mathematical Development –scale • Convert between currencies • Trends in graphs	• Data on page 47 and Teacher's Guide* • Basic Calculator	• Classwork • Homework

ANNEXURE 4: EXAMPLE OF A GRADE 12 WORK SCHEDULE FOR MATHEMATICAL LITERACY

Grade 12 Mathematical Literacy Work Schedule (Based on the Core Assessment Standards)

Week	Learning Outcomes & Assessment Standards	Context	Assessment	Resources
1-3	12.1.3 Analyse and critically interpret a variety of financial situations mathematically, inclusive of: • personal and business finances; • the effects of taxation, inflation and changing interest rates; • the effects of currency fluctuations; • critical engagements with debates about socially responsible trade. 12.1.1 Correctly apply problem-solving and calculation skills to situations and problems dealt with (percentage, ratio, rate and proportion) 12.1.2 Relate calculated answers correctly and appropriately to the problem situation by: • interpreting answers in terms of the context; • reworking a problem if the first answer is not sensible or if the initial conditions change; • interpreting calculated answers logically in relation to the problem, and communicating processes and results.	Sales and price increases; Critique of cell-phone packages; Car hire companies; Personal finance; Etc.	Daily Assessment Tasks	Textbook; Calculator; Graph paper; Adverts in newspapers.
4-5	12.3.1 Solve problems in 2-dimensional and 3-dimensional contexts by: • estimating, measuring and calculating values which involve: ▪ lengths and distances, ▪ perimeters and areas of polygons, ▪ volumes of right prisms and right circular cylinders, ▪ surface areas of right prisms and right circular cylinders. ▪ making adjustments to calculated values to accommodate measurement errors and inaccuracies due to rounding. 12.3.2 Convert units of measurement between different scales and systems using conversion tables provided as required in dealing with problems.	House plans; Solids; Etc.	Daily Assessment Tasks **Investigation/ Project**	Textbook; Calculator; Graph paper; Worksheets; Mathematics sets

Week	Learning Outcomes & Assessment Standards	Context	Assessment	Resources
6-8	12.1.1 Correctly apply problem-solving and calculation skills to situations and problems dealt with (percentage, ratio, rate and proportion) 12.3.4 Use grids and maps, and compass directions, in order to: • Determine locations; • Describe relative positions. 12.3.3 Use and interpret scale drawings of plans to: estimate and calculate values according to scale, and build models.	House plans; School building plans; Town plans; Local maps; Cinema/stadium seating; Room numbers in multi-level buildings; Etc.	Daily Assessment Tasks **Test**	Textbook; Calculator; Newspaper; Journals; Magazines; Mathematics sets; Software (if available)
9-10	12.4.1 Investigate a problem on issues such as those related to: • social, environmental and political factors; • people's opinions; • human rights and inclusivity by: ▪ collecting or finding data by appropriate methods (e.g. interviews, questionnaires, the use of data bases) suited to the purpose of drawing conclusions to the questions. ▪ using appropriate statistical methods; ▪ selecting a representative sample from a population with due sensitivity to issues relating to bias; ▪ comparing data from different sources and samples.	Political and social surveys	Daily Assessment Tasks	Newspaper reports
11-12	12.2.1 Work with numerical data and formulae in a variety of real-life situations, in order to: • solve planning problems; • investigate the impact of compound change on situations. 12.2.3 Critically interpret tables and graphs in real life situations including in the media, inclusive of: • graphs with negative values on the axes (dependent variable in particular); • more than one graph on a system of axes.	Rate of working; Population growth; Path of a cricket ball; Etc.	Daily Assessment Tasks	Textbook; Calculator; Newspaper; Journals; Magazines.
13-15	12.4.4 Critically interpret data, in order to draw conclusions on problems investigated to predict trends and to critique other interpretations. 12.4.2 Select, justify and use a variety of methods to summarise and display data in statistical charts and graphs to: • describe trends	Compare data from tracking devises, cell phone deals, or supermarket prices.	Daily Assessment Tasks **Assignment**	Textbook; Calculator; Newspapers; Journals.

Week	Learning Outcomes & Assessment Standards	Context	Assessment	Resources
16-18	12.3.4 Use grids and maps, and compass directions, in order to: • Determine locations; • Describe relative positions. 12.3.3 Use and interpret scale drawings of plans to: • estimate and calculate values according to scale and build models. 12.3.2 Convert units of measurement between different scales and systems using conversion tables provided as required in dealing with problems. 12.1.1 Correctly apply problem-solving and calculation skills to situations and problems dealt with (percentage, ratio, rate and proportion) 12.1.2 Relate calculated answers correctly and appropriately to the problem situation by: • interpreting answers in terms of the context; • reworking a problem if the first answer is not sensible or if the initial conditions change; • interpreting calculated answers logically in relation to the problem, and communicating processes and results.	Local maps; Cinema/stadium seating; Room numbers in multi-level buildings	Daily Assessment Tasks	Textbook; Calculator; Newspaper; Journals; Magazines
19-20	**Examinations**			
21-22	12.4.5 Work with simple notions of likelihood/probability in order to make sense of statements involving these notions. 12.1.1 Correctly apply problem-solving and calculation skills to situations and problems dealt with (percentage, ratio, rate and proportion) 12.1.2 Relate calculated answers correctly and appropriately to the problem situation by: • interpreting answers in terms of the context; • reworking a problem if the first answer is not sensible or if the initial conditions change; • interpreting calculated answers logically in relation to the problem, and communicating processes and results.	Possible outcomes of events, e.g. chances of rainfall.	Daily Assessment Tasks	Textbook; Calculator; Newspaper;

Week	Learning Outcomes & Assessment Standards	Context	Assessment	Resources
23-25	12.2.2 Draw graphs (by hand and/or by means of technology where available) as required by the situations and problems being investigated. 12.2.3 Critically interpret tables and graphs in real life situations including in the media, inclusive of: • graphs with negative values on the axes (dependent variable in particular); • more than one graph on a system of axes. 12.2.1 Work with numerical data and formulae in a variety of real-life situations, in order to: • solve planning problems; • investigate the impact of compound change on situations. 12.1.3 Analyse and critically interpret a variety of financial situations mathematically, inclusive of: • personal and business finances; • the effects of taxation, inflation and changing interest rates; • the effects of currency fluctuations; • critical engagements with debates about socially responsible trade.	Parking tariffs; Budgets; Bank charges; Tax returns; Trading; Etc	Daily Assessment Tasks **Test**	Textbook; Calculator; Graph paper; Adverts in newspapers.
26-27	12.3.1 Solve problems in 2-dimensional and 3-dimensional contexts by: • estimating, measuring and calculating values which involve: ▪ lengths and distances, ▪ perimeters and areas of polygons, ▪ volumes of right prisms and right circular cylinders, ▪ surface areas of right prisms and right circular cylinders. • making adjustments to calculated values to accommodate measurement errors and inaccuracies due to rounding. 12.3.2 Convert units of measurement between different scales and systems using conversion tables provided as required in dealing with problems.	House plans; Solids; Etc.	Daily Assessment Tasks	Textbook; Calculator; Graph paper; Worksheets; Mathematics sets
28	**Revision and Examination**			

Week	Learning Outcomes & Assessment Standards	Context	Assessment	Resources
29-30	12.4.4 Critically interpret data, in order to draw conclusions on problems investigated to predict trends and to critique other interpretations. 12.4.1 Investigate a problem on issues such as those related to: • social, environmental and political factors; • people's opinions; • human rights and inclusivity by: ▪ collecting or finding data by appropriate methods (e.g. interviews, questionnaires, the use of data bases) suited to the purpose of drawing conclusions to the questions. ▪ using appropriate statistical methods; ▪ selecting a representative sample from a population with due sensitivity to issues relating to bias; ▪ comparing data from different sources and samples. 12.4.2 Select, justify and use a variety of methods to summarise and display data in statistical charts and graphs to: • describe trends 12.4.3 Understand that data can be summarised and compared in different ways by calculating, and using measures of central tendency and spread (distribution), including: • mean; • median; • mode; • quartiles; (INTERPRETATION ONLY) • percentiles. (INTERPRETATION ONLY)	Reports on crime; Reports on HIV/AIDS; Reports on elections; Political and social surveys;	Daily Assessment Tasks	Textbook; Calculator; Newspaper; Journals; Magazines

Week	Learning Outcomes & Assessment Standards	Context	Assessment	Resources
31-33	12.1.3 Analyse and critically interpret a variety of financial situations mathematically, inclusive of: • personal and business finances; • the effects of taxation, inflation and changing interest rates; • the effects of currency fluctuations; • critical engagements with debates about socially responsible trade. 21.1.1 Correctly apply problem-solving and calculation skills to situations and problems dealt with (percentage, ratio, rate and proportion) 12.1.2 Relate calculated answers correctly and appropriately to the problem situation by: • interpreting answers in terms of the context; • reworking a problem if the first answer is not sensible or if the initial conditions change; • interpreting calculated answers logically in relation to the problem, and communicating processes and results. 12.2.1 Work with numerical data and formulae in a variety of real-life situations, in order to: • solve planning problems; • investigate the impact of compound change on situations.	Sales and price increases; Critique of cell-phone packages; Car hire companies; Personal finance; Etc.	Daily Assessment Tasks	Textbook; Calculator; Graph paper; Adverts in newspapers.
34-35	12.2.2 Draw graphs (by hand and/or by means of technology where available) as required by the situations and problems being investigated. 12.2.3 Critically interpret tables and graphs in real life situations including in the media, inclusive of: • graphs with negative values on the axes (dependent variable in particular); • more than one graph on a system of axes. 12.2.1 Work with numerical data and formulae in a variety of real-life situations, in order to: • solve planning problems; • investigate the impact of compound change on situations.	Telephone tariffs; Water tariffs; Parking tariffs; Birth Rates; Etc.	Daily Assessment Tasks **Assignment**	Textbook; Calculator; Graph paper; Worksheets; Mathematics sets
36-40	**Examinations**			

NOTES

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- Daily Assessment Tasks may take the form of home/class work and responses to questions posed by the teacher and learners.
- Formal Assessment Tasks, written in bold, should be in accordance with the Formal Programme of Assessment.
- While resources should not be limited to the ones that are mentioned, it should be ensured that each learner has a textbook and a calculator.