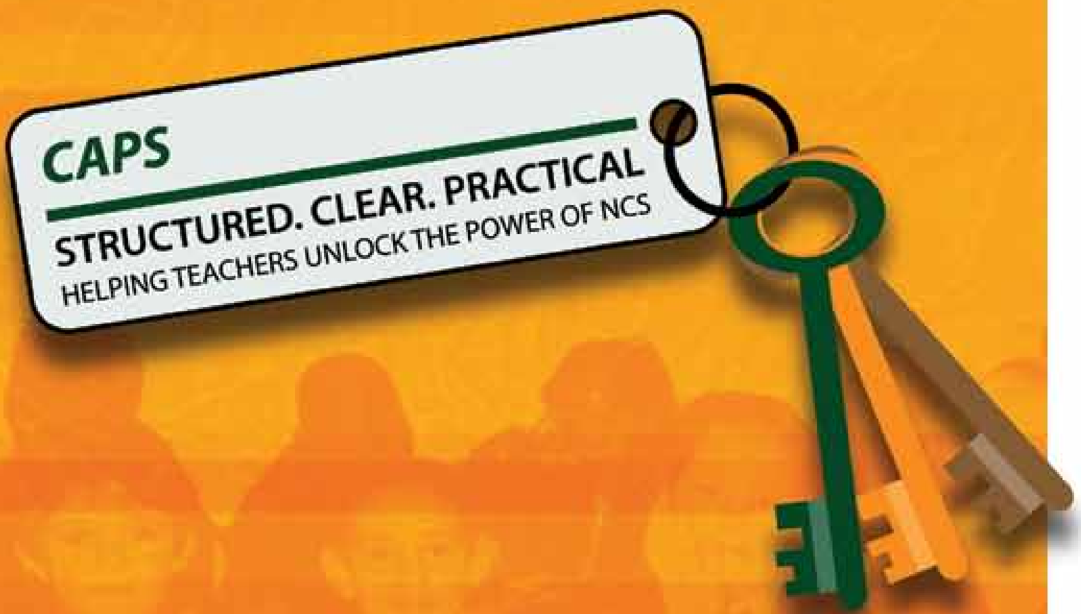
MATHEMATICS

National Curriculum Statement (NCS)

Curriculum and Assessment Policy Statement



Intermediate Phase
Grades 4-6

basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

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FOREWORD BY THE MINISTER

Our national curriculum is the culmination of our efforts over a period of seventeen years to transform the curriculum bequeathed to us by apartheid. From the start of democracy we have built our curriculum on the values that inspired our Constitution (Act 108 of 1996). The Preamble to the Constitution states that the aims of the Constitution are to:

- heal the divisions of the past and establish a society based on democratic values, social justice and fundamental human rights;
- improve the quality of life of all citizens and free the potential of each person;
- lay the foundations for a democratic and open society in which government is based on the will of the people and every citizen is equally protected by law; and
- build a united and democratic South Africa able to take its rightful place as a sovereign state in the family of nations.

Education and the curriculum have an important role to play in realising these aims.

In 1997 we introduced outcomes-based education to overcome the curricular divisions of the past, but the experience of implementation prompted a review in 2000. This led to the first curriculum revision: the *Revised National Curriculum Statement Grades R-9* and the *National Curriculum Statement Grades 10-12* (2002).

Ongoing implementation challenges resulted in another review in 2009 and we revised the *Revised National Curriculum Statement* (2002) and the *National Curriculum Statement Grades 10-12* to produce this document.

From 2012 the two National Curriculum Statements, for *Grades R-9* and *Grades 10-12* respectively, are combined in a single document and will simply be known as the *National Curriculum Statement Grades R-12.* The *National Curriculum Statement for Grades R-12* builds on the previous curriculum but also updates it and aims to provide clearer specification of what is to be taught and learnt on a term-by-term basis.

The *National Curriculum Statement Grades R-12* represents a policy statement for learning and teaching in South African schools and comprises of the following:

(a) Curriculum and Assessment Policy Statements (CAPS) for all approved subjects listed in this document;

(b) *National policy pertaining to the programme and promotion requirements of the National Curriculum Statement Grades R-12*; and

(c) *National Protocol for Assessment Grades R-12.*

MRS ANGIE MOTSHEKGA, MP
MINISTER OF BASIC EDUCATION

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SECTION 1: INTRODUCTION AND BACKGROUND

1.1 BACKGROUND

The *National Curriculum Statement Grades R-12 (NCS)* stipulates policy on curriculum and assessment in the schooling sector.

To improve implementation, the National Curriculum Statement was amended, with the amendments coming into effect in January 2012. A single comprehensive Curriculum and Assessment Policy document was developed for each subject to replace Subject Statements, Learning Programme Guidelines and Subject Assessment Guidelines in Grades R-12.

1.2 OVERVIEW

(a) The *National Curriculum Statement Grades R-12 (January 2012)* represents a policy statement for learning and teaching in South African schools and comprises the following:

(i) Curriculum and Assessment Policy Statements for each approved school subject;

(ii) The policy document, National policy pertaining to the programme and promotion requirements of the National Curriculum Statement Grades R-12; and

(iii) The policy document, National Protocol for Assessment Grades R-12 (January 2012).

(b) The *National Curriculum Statement Grades R-12 (January 2012)* replaces the two current national curricula statements, namely the

(i) Revised National Curriculum Statement Grades R-9, Government Gazette No. 23406 of 31 May 2002, and

(ii) National Curriculum Statement Grades 10-12 Government Gazettes, No. 25545 of 6 October 2003 and No. 27594 of 17 May 2005.

(c) The national curriculum statements contemplated in subparagraphs b(i) and (ii) comprise the following policy documents which will be incrementally repealed by the *National Curriculum Statement Grades R-12 (January 2012)* during the period 2012-2014:

(i) The Learning Area/Subject Statements, Learning Programme Guidelines and Subject Assessment Guidelines for Grades R-9 and Grades 10-12;

(ii) The policy document, National Policy on assessment and qualifications for schools in the General Education and Training Band, promulgated in Government Notice No. 124 in Government Gazette No. 29626 of 12 February 2007;

(iii) The policy document, the National Senior Certificate: A qualification at Level 4 on the National Qualifications Framework (NQF), promulgated in Government Gazette No.27819 of 20 July 2005;

(iv) The policy document, An addendum to the policy document, the National Senior Certificate: A qualification at Level 4 on the National Qualifications Framework (NQF), regarding learners with special needs, published in Government Gazette, No.29466 of 11 December 2006, is incorporated in the policy document, National policy pertaining to the programme and promotion requirements of the National Curriculum Statement Grades R-12; and

(v) The policy document, An addendum to the policy document, the National Senior Certificate: A qualification at Level 4 on the National Qualifications Framework (NQF), regarding the National Protocol for Assessment (Grades R-12), promulgated in Government Notice No.1267 in Government Gazette No. 29467 of 11 December 2006.

(d) The policy document, *National policy pertaining to the programme and promotion requirements of the National Curriculum Statement Grades R-12*, and the sections on the Curriculum and Assessment Policy as contemplated in Chapters 2, 3 and 4 of this document constitute the norms and standards of the *National Curriculum Statement Grades R-12.* It will therefore, in terms of *section 6A* of the *South African Schools Act, 1996 (Act No. 84 of 1996,)* form the basis for the Minister of Basic Education to determine minimum outcomes and standards, as well as the processes and procedures for the assessment of learner achievement to be applicable to public and independent schools.

1.3 GENERAL AIMS OF THE SOUTH AFRICAN CURRICULUM

(a) The *National Curriculum Statement Grades R-12* gives expression to the knowledge, skills and values worth learning in South African schools. This curriculum aims to ensure that children acquire and apply knowledge and skills in ways that are meaningful to their own lives. In this regard, the curriculum promotes knowledge in local contexts, while being sensitive to global imperatives.

(b) The National Curriculum Statement Grades R-12 serves the purposes of:

- equipping learners, irrespective of their socio-economic background, race, gender, physical ability or intellectual ability, with the knowledge, skills and values necessary for self-fulfilment, and meaningful participation in society as citizens of a free country;
- providing access to higher education;
- facilitating the transition of learners from education institutions to the workplace; and
- providing employers with a sufficient profile of a learner's competences.

(c) The National Curriculum Statement Grades R-12 is based on the following principles:

- Social transformation: ensuring that the educational imbalances of the past are redressed, and that equal educational opportunities are provided for all sections of the population;
- Active and critical learning: encouraging an active and critical approach to learning, rather than rote and uncritical learning of given truths;
- High knowledge and high skills: the minimum standards of knowledge and skills to be achieved at each grade are specified and set high, achievable standards in all subjects;
- Progression: content and context of each grade shows progression from simple to complex;

- Human rights, inclusivity, environmental and social justice: infusing the principles and practices of social and environmental justice and human rights as defined in the Constitution of the Republic of South Africa. The National Curriculum Statement Grades R-12 is sensitive to issues of diversity such as poverty, inequality, race, gender, language, age, disability and other factors;
- Valuing indigenous knowledge systems: acknowledging the rich history and heritage of this country as important contributors to nurturing the values contained in the Constitution; and
- Credibility, quality and efficiency: providing an education that is comparable in quality, breadth and depth to those of other countries.

(d) The National Curriculum Statement Grades R-12 aims to produce learners that are able to:

- identify and solve problems and make decisions using critical and creative thinking;
- work effectively as individuals and with others as members of a team;
- organise and manage themselves and their activities responsibly and effectively;
- collect, analyse, organise and critically evaluate information;
- communicate effectively using visual, symbolic and/or language skills in various modes;
- use science and technology effectively and critically showing responsibility towards the environment and the health of others; and
- demonstrate an understanding of the world as a set of related systems by recognising that problem solving contexts do not exist in isolation.

(e) Inclusivity should become a central part of the organisation, planning and teaching at each school. This can only happen if all teachers have a sound understanding of how to recognise and address barriers to learning, and how to plan for diversity.

The key to managing inclusivity is ensuring that barriers are identified and addressed by all the relevant support structures within the school community, including teachers, District-Based Support Teams, Institutional-Level Support Teams, parents and Special Schools as Resource Centres. To address barriers in the classroom, teachers should use various curriculum differentiation strategies such as those included in the Department of Basic Education's *Guidelines for Inclusive Teaching and Learning* (2010).

1.4 TIME ALLOCATION

1.4.1 Foundation Phase

(a) The instructional time in the Foundation Phase is as follows:

SUBJECT	GRADE R (HOURS)	GRADES 1-2 (HOURS)	GRADE 3 (HOURS)
Home Language	10	8/7	8/7
First Additional Language		2/3	3/4
Mathematics	7	7	7
Life Skills	**6**	**6**	**7**
• Beginning Knowledge	(1)	(1)	(2)
• Creative Arts	(2)	(2)	(2)
• Physical Education	(2)	(2)	(2)
• Personal and Social Well-being	(1)	(1)	(1)
TOTAL	**23**	**23**	**25**

(b) Instructional time for Grades R, 1 and 2 is 23 hours and for Grade 3 is 25 hours.

(c) Ten hours are allocated for languages in Grades R-2 and 11 hours in Grade 3. A maximum of 8 hours and a minimum of 7 hours are allocated for Home Language and a minimum of 2 hours and a maximum of 3 hours for Additional Language in Grades 1-2. In Grade 3 a maximum of 8 hours and a minimum of 7 hours are allocated for Home Language and a minimum of 3 hours and a maximum of 4 hours for First Additional Language.

(d) In Life Skills Beginning Knowledge is allocated 1 hour in Grades R – 2 and 2 hours as indicated by the hours in brackets for Grade 3.

1.4.2 Intermediate Phase

(a) The instructional time in the Intermediate Phase is as follows:

SUBJECT	HOURS
Home Language	6
First Additional Language	5
Mathematics	6
Natural Sciences and Technology	3,5
Social Sciences	**3**
Life Skills	4
• Creative Arts	(1,5)
• Physical Education	(1)
• Personal and Social Well-being	(1,5)
TOTAL	**27,5**

1.4.3 Senior Phase

(a) The instructional time in the Senior Phase is as follows:

SUBJECT	HOURS
Home Language	5
First Additional Language	4
Mathematics	4,5
Natural Sciences	3
Social Sciences	**3**
Technology	2
Economic Management Sciences	2
Life Orientation	2
Creative Arts	2
TOTAL	**27,5**

1.4.4 Grades 10-12

(a) The instructional time in Grades 10-12 is as follows:

SUBJECT	TIME ALLOCATION PER WEEK (HOURS)
Home Language	**4.5**
First Additional Language	**4.5**
Mathematics	**4.5**
Life Orientation	**2**
A minimum of any three subjects selected from **Group B** Annexure B, Tables B1-B8 of the policy document, *National policy pertaining to the programme and promotion requirements of the National Curriculum Statement Grades R-12,* subject to the provisos stipulated in paragraph 28 of the said policy document.	**12 (3x4h)**
TOTAL	**27,5**

The allocated time per week may be utilised only for the minimum required NCS subjects as specified above, and may not be used for any additional subjects added to the list of minimum subjects. Should a learner wish to offer additional subjects, additional time must be allocated for the offering of these subjects.

SECTION 2: DEFINITION, AIMS, SKILLS AND CONTENT

2.1 INTRODUCTION

In Section 2, the Intermediate Phase Mathematics Curriculum and Assessment Policy Statement (CAPS) provides teachers with a definition of mathematics, specific aims, specific skills, focus of content areas, weighting of content areas and content specification.

2.2 WHAT IS MATHEMATICS?

Mathematics is a language that makes use of symbols and notations to describe numerical, geometric and graphical relationships. It is a human activity that involves observing, representing and investigating patterns and quantitative relationships in physical and social phenomena and between mathematical objects themselves. It helps to develop mental processes that enhance logical and critical thinking, accuracy and problem-solving that will contribute in decision-making.

2.3 SPECIFIC AIMS

The teaching and learning of Mathematics aims to develop:

- a critical awareness of how mathematical relationships are used in social, environmental, cultural and economic relations;
- confidence and competence to deal with any mathematical situation without being hindered by a fear of Mathematics
- a spirit of curiosity and a love for Mathematics
- an appreciation for the beauty and elegance of Mathematics
- recognition that Mathematics is a creative part of human activity
- deep conceptual understanding in order to make sense of Mathematics
- Acquisition of specific knowledge and skills necessary for:
  - the application of Mathematics to physical, social and mathematical problems
  - the study of related subject matter (e.g. other subjects)
  - further study in Mathematics.

2.4 SPECIFIC SKILLS

To develop essential mathematical skills the learner should

- develop the correct use of the language of Mathematics
- develop number vocabulary, number concept and calculation and application skills

- learn to listen, communicate, think, reason logically and apply the mathematical knowledge gained
- learn to investigate, analyse, represent and interpret information
- learn to pose and solve problems
- build an awareness of the important role th at Mathematics plays in real life situations including the personal development of the learner.

2.5 FOCUS OF CONTENT AREAS

Mathematics in the Intermediate Phase covers five Content Areas.

- Numbers, Operations and Relationships;
- Patterns, Functions and Algebra;
- Space and Shape (Geometry);
- Measurement; and
- Data Handling.

Each content area contributes towards the acquisition of specific skills. The table below shows the general focus of the content areas as well as the specific focus of the content areas for the Intermediate Phase.

MATHEMATICS CONTENT KNOWLEDGE		
Content area	**General content focus**	**Intermediate Phase specific content focus**
Numbers, Operations and Relationships	Development of number sense that includes: • the meaning of different kinds of numbers • relationship between different kinds of numbers • the relative size of different numbers • representation of numbers in various ways • the effect of operating with numbers • the ability to estimate and check solutions.	• The range of numbers developed by the end of the Intermediate Phase is extended to at least 9-digit whole numbers, decimal fractions to at least 2 decimal places, common fractions and fractions written in percentage form. • In this phase, the learner is expected to move from counting reliably to calculating fluently in all four operations. The learner should be encouraged to memorise with understanding ,multiply fluently, and sharpen mental calculation skills. • Attention needs to be focused on understanding the concept of place value so that the learner develops a sense of large numbers and decimal fractions. • The learner should recognize and describe properties of numbers and operations, including identity properties, factors, multiples, and commutative, associative and distributive properties.
Patterns, Functions and Algebra	Algebra is the language for investigating and communicating most of Mathematics and can be extended to the study of functions and other relationships between variables. A central part of this content area is for the learner to achieve efficient manipulative skills in the use of algebra. It also focuses on the: • description of patterns and relationships through the use of symbolic expressions, graphs and tables • identification and analysis of regularities and change in patterns, and relationships that enable learners to make predictions and solve problems.	• Numeric and geometric patterns are extended with a special focus on the relationships: - between terms in a sequence - between the number of the term (its place in the sequence) and the term itself. • The study of numeric and geometric patterns develops the concepts of variables, relationships and functions. The understanding of these relationships will enable learners to describe the rules generating the patterns. • This phase has a particular focus on the use of different, yet equivalent, representations to describe problems or relationships by means of flow diagrams, tables, number sentences or verbally.
Space and Shape (Geometry)	The study of Space and Shape improves understanding and appreciation of the pattern, precision, achievement and beauty in natural and cultural forms. It focuses on the properties, relationships, orientations, positions and transformations of two-dimensional shapes and three-dimensional objects.	• The learner's experience of space and shape in this phase moves from recognition and simple description to classification and more detailed description of characteristics and properties of two-dimensional shapes and three-dimensional objects. • Learners should be given opportunities to: - draw two-dimensional shapes and make models of three-dimensional objects - describe location, transformations and symmetry.

MATHEMATICS CONTENT KNOWLEDGE		
Content area	**General content focus**	**Intermediate Phase specific content focus**
Measurement	Measurement focuses on the selection and use of appropriate units, instruments and formulae to quantify characteristics of events, shapes, objects and the environment. It relates directly to the learner's scientific, technological and economic worlds, enabling the learner to: • make sensible estimates • be alert to the reasonableness of measurements and results.	• Learners should be exposed to a variety of measurement activities. • Learners should be introduced to the use of standardised units of measurement and appropriate instruments for measuring. They should be able to estimate and verify results through accurate measurement. • Learners should be able to select and convert between appropriate units of measurement. • Measurement in this phase should also enable the learner to: - informally measure angles, area, perimeter and capacity/volume; - discuss and describe the historical development of measuring instruments and tools • Measurement provides a context for learners to use common fractions and decimal fractions.
Data handling	Data handling involves asking questions and finding answers in order to describe events and the social, technological and economic environment. Through the study of data handling, the learner develops the skills to collect, organize, represent, analyze, interpret and report data. • The study of probability enables the learner to develop skills and techniques for making informed predictions, and describing randomness and uncertainty. It develops awareness that - different situations have different probabilities of occurring - for many situations, there are a finite number of different possible outcomes.	• Learners should focus on all the skills that enable them to move from collecting data to reporting on data.. • Learners should be exposed to: - a variety of contexts for collecting and interpreting data - a range of questions that are posed and answered related to data • Learners should begin to analyse data critically through exposure to some factors that impact on data such as from whom, when and where data is collected. • The focus of probability is to perform repeated events in order to list, count and predict outcomes.. • Learners are *not* expected to calculate the probability of events occurring

2.6 WEIGHTING OF CONTENT AREAS

- The weighting of Mathematics content areas serves two primary purposes:
- guidance regarding the time needed to adequately address the content within each content area guidance on the spread of content in the examination (especially end- of-the year summative assessment). The weighting of the content areas is the same for each grade in this phase.

WEIGHTING OF CONTENT AREAS			
Content Area	**Grade 4**	**Grade 5**	**Grade 6**
Numbers, Operations and Relationships*	50%	50%	50%
Patterns, Functions and Algebra	10%	10%	10%
Space and Shape (Geometry)	15%	15%	15%
Measurement	15%	15%	15%
Data handling	10%	10%	10%
	100%	**100%**	**100%**
* The weighting of Number, Operations and Relationships has been increased to 50% for all three grades. This is an attempt to ensure that learners are sufficiently numerate when they enter the Senior Phase.			

2.7 SPECIFICATION OF CONTENT

The Specification of Content in Section 2 shows progression in terms of concepts and skills from Grade 4 to Grade 6 for each Content Area. However, in certain topics the concepts and skills are similar in two or three successive grades. The Clarification of Content in Section 3 provides guidelines on how progression should be addressed in these cases. The Specification of Content in Section 2 should therefore be read in conjunction with the Clarification of Content in Section 3.

SPECIFICATION OF CONTENT (PHASE OVERVIEW)

NUMBERS, OPERATIONS AND RELATIONSHIPS

- The main progression in Numbers, Operations and Relationships happens in three ways:
  - the number range increases
  - different kinds of numbers are introduced
  - the calculation techniques change.
- The number range for doing calculations is different from the number range for ordering numbers and for finding multiples and factors.
- As the number range for doing calculations increases up to Grade 6, learners should develop more efficient techniques for calculations, including using columns and learning how to use the calculator. These techniques however should only be introduced and encouraged once learners have an adequate sense of place value and understanding of the properties of numbers and operations.
- Contextual problems should consider the number range for the grade as well as the calculation competencies of learners.
- Contexts for solving problems should build awareness of other subject and content areas, as well as social, economic and environmental issues.

TOPICS	GRADE 4	GRADE 5	GRADE 6
1.1 **Whole numbers**	**Mental calculations involving**: • Addition and subtraction of: - units - multiples of 10 - multiples of 100 - multiples of 1 000 • Multiplication of whole numbers to at least 10 x 10 • Multiplication facts of: - units by multiples of 10 - Units by multiples of 100	**Mental calculations involving**: • Addition and subtraction of: - units - multiples of 10 - multiples of 100 - multiples of 1 000 • Multiplication of whole numbers to at least 10 x 10 • Multiplication facts of: - units by multiples of 10 - units by multiples of 100 - units by multiples of 1 000 - units by multiples of 10 000	**Mental calculations involving**: • Addition and subtraction of: - units - multiples of 10 - multiples of 100 - multiples of 1 000 • Multiplication of whole numbers to at least 12 x 12 • Multiplication facts of: - units and tens by multiples of 10 - units and tens by multiples of 100 - units and tens by multiples of 1 000 - units and tens by multiples of 10 000

TOPICS	GRADE 4	GRADE 5	GRADE 6
1.1 **Whole numbers**	**Number range for counting, ordering, comparing and representing, and place value of digits** • Count forwards and backwards in 2s, 3s, 5s, 10s, 25s, 50s, 100s between 0 and at least 10 000. • Order, compare and represent numbers to at least 4-digit numbers • Represent odd and even numbers to at least 1 000. • Recognize the place value of digits in whole numbers to at least 4-digit numbers • Round off to the nearest 10, 100, 1 000 **Number range for calculations** • Addition and subtraction of whole numbers of at least 4 digits • Multiplication of at least whole 2-digit by 2-digit numbers • Division of at least whole 3-digit by 1-digit numbers **Calculation techniques** • Use a range of techniques to perform and check written and mental calculations of whole numbers including - estimation - building up and breaking down numbers - rounding off and compensating - doubling and halving - using a number line - using addition and subtraction as inverse operations - using multiplication and division as inverse operations	**Number range for counting, ordering, comparing, representing and place value of digits** • Count forwards and backwards in whole number intervals up to at least 10 000 • Order, compare and represent numbers to at least 6-digit numbers • Represent odd and even numbers to at least 1 000. • Recognize the place value of digits in whole numbers to at least 6 digit numbers. • Round off to the nearest 5, 10, 100 and 1 000 **Number range for calculations** • Addition and subtraction of whole numbers of at least 5 digits • Multiplication of at least whole 3-digit by 2-digit numbers • Division of at least whole 3-digit by 2-digit numbers **Calculation techniques** • Using a range of techniques to perform and check written and mental calculations of whole numbers including: - estimation - adding and subtracting in columns - building up and breaking down numbers - using a number line - rounding off and compensating - doubling and halving - using addition and subtraction as inverse operations - using multiplication and division as inverse operations	**Number range for counting, ordering, comparing, representing and place value of digits** • Order, compare and represent numbers to at least 9-digit numbers • Represent prime numbers to at least 100 • Recognizing the place value of digits in whole numbers to at least 9-digit numbers • Round off to the nearest 5, 10, 100, 1 000, 100 000, and 1 000 000 **Number range for calculations** • Addition and subtraction of whole numbers of at least 6 digits • Multiplication of at least whole 4-digit by 3-digit numbers • Division of at least whole 4-digit by 3-digit numbers • Multiple operations on whole numbers with or without brackets **Calculation techniques** • Using a range of techniques to perform and check written and mental calculations of whole numbers including: - estimation - adding, subtracting and multiplying in columns - long division - building up and breaking down numbers - rounding off and compensating - using addition and subtraction as inverse operations - using multiplication and division as inverse operations - using a calculator

TOPICS	GRADE 4	GRADE 5	GRADE 6
1.1 **Whole numbers**	**Number range for multiples and factors** • Multiples of 1-digit numbers to at least 100 **Properties of whole numbers** • Recognize and use the commutative, associative, and distributive properties with whole numbers **Solving problems** • Solve problems in contexts involving whole numbers, including - financial contexts - measurement contexts • Solve problems involving whole numbers, including - comparing two or more quantities of the same kind (ratio) - comparing two quantities of different kinds (rate) - grouping and equal sharing with remainders	**Number range for multiples and factors** • Multiples of 2-digits whole numbers to at least 100 • Factors of 2-digit whole numbers to at least 100 **Properties of whole numbers** • Recognize and use the commutative, associative, distributive properties of whole numbers • 0 in terms of its additive property • 1 in terms of its multiplicative property **Solving problems** • Solve problems involving whole numbers, including - financial contexts - measurement contexts • Solve problems involving whole numbers, including - comparing two or more quantities of the same kind (ratio) - comparing two quantities of different kinds (rate) - grouping and equal sharing with remainders	**Number range for multiples and factors** • Multiples of 2-digit and 3-digit numbers • Factors of 2-digit and 3-digit whole numbers • Prime factors of numbers to at least 100 **Properties of whole numbers** • Recognize and use the commutative, associative, distributive properties of whole numbers • 0 in terms of its additive property • 1 in terms of its multiplicative property **Solving problems** • Solve problems involving whole numbers and decimal fractions, including - financial contexts - measurement contexts • Solve problems involving whole numbers, including - comparing two or more quantities of the same kind (ratio) - comparing two quantities of different kinds (rate) - grouping and equal sharing with remainders

TOPICS	GRADE 4	GRADE 5	GRADE 6
1.2 **Common Fractions**	**Describing and ordering fractions:** • Compare and order common fractions with different denominators (halves; thirds, quarters; fifths; sixths; sevenths; eighths) • Describe and compare common fractions in diagram form **Calculations with fractions:** • Addition of common fractions with the same denominators • Recognize, describe and use the equivalence of division and fractions **Solving problems** • Solve problems in contexts involving fractions, including grouping and equal sharing **Equivalent forms:** • Recognize and use equivalent forms of common fractions (fractions in which one denominator is a multiple of another)	**Describing and ordering fractions:** • Count forwards and backwards in fractions • Compare and order common fractions to at least twelfths **Calculations with fractions:** • Addition and subtraction of common fractions with the same denominators • Addition and subtraction of mixed numbers • Fractions of whole numbers which result in whole numbers • Recognize, describe and use the equivalence of division and fractions **Solving problems** • Solve problems in contexts involving common fractions, including grouping and sharing **Equivalent forms**: • Recognize and use equivalent forms of common fractions (fractions in which one denominator is a multiple of another)	**Describing and ordering fractions:** • Compare and order common fractions, including tenths and hundredths **Calculations with fractions:** • Addition and subtraction of common fractions in which one denominator is a multiple of another • Addition and subtraction of mixed numbers • Fractions of whole numbers **Solving problems** • Solve problems in contexts involving common fractions, including grouping and sharing **Percentages** • Find percentages of whole numbers **Equivalent forms:** • Recognize and use equivalent forms of common fractions with 1-digit or 2-digit denominators (fractions in which one denominator is a multiple of another) • Recognize equivalence between common fraction and decimal fraction forms of the same number • Recognize equivalence between common fraction, decimal fraction and percentage forms of the same number

TOPICS	GRADE 4	GRADE 5	GRADE 6
1.3 **Decimal fractions**			**Recognizing, ordering and place value of decimal fractions** • Count forwards and backwards in decimal fractions to at least two decimal places • Compare and order decimal fractions to at least two decimal places • Place value of digits to at least two decimal places **Calculations with decimal fractions** • Addition and subtraction of decimal fractions with at least two decimal places • Multiply decimal fractions by 10 and 100 **Solving problems** • Solve problems in context involving decimal fractions **Equivalent forms**: • Recognize equivalence between common fraction and decimal fraction forms of the same number • Recognize equivalence between common fraction, decimal fraction and percentage forms of the same number

SPECIFICATION OF CONTENT (PHASE OVERVIEW)

PATTERNS, FUNCTIONS AND ALGEBRA

- The main progression in Patterns, Functions and Algebra occurs in the range and complexity of relationships between numbers in the patterns.
- In Patterns, Functions and Algebra, learners are given opportunities to:
  - complete and extend patterns
  - represent patterns in different forms
  - identify and describe patterns.

  This prepares learners to describe rules for patterns, which become more formalized in algebraic work in the Senior Phase.
- In this phase, the emphasis is on practice with completing and extending number patterns as well as representing patterns in different forms.
- Patterns, Functions and Algebra also provide opportunities to develop an understanding of the properties of operations with whole numbers e.g. commutative, distributive, and inverse operations.
- Finding input and output values gives learners practice in thinking about and describing functional relationships between numbers.
- Writing and solving number sentences prepares learners for writing algebraic expressions and solving equations in the Senior Phase. Writing and solving number sentences also provides opportunity to consolidate learners' number knowledge.

TOPICS	GRADE 4	GRADE 5	GRADE 6
2.1 **Numeric patterns**	**Investigate and extend patterns** • Investigate and extend numeric patterns looking for relationships or rules of patterns: - sequences involving a constant difference or ratio - of learner's own creation • Describe observed relationships or rules in learner's own words **Input and output values** • Determine input values, output values and rules for patterns and relationships using - flow diagrams - tables	**Investigate and extend patterns** • Investigate and extend numeric patterns looking for relationships or rules of patterns: - sequences not limited to a constant difference or ratio - of learner's own creation • Describe observed relationships or rules in learner's own words **Input and output values** • Determine input values, output values and rules for the patterns and relationships using flow diagrams - flow diagrams - tables	**Investigate and extend patterns** • Investigate and extend numeric patterns looking for relationships or rules of patterns: - sequences not limited to a constant difference or ratio - of learner's own creation - represented in tables • Describe the general rules for the observed relationships **Input and output values** • Determine input values, output values and rules for the patterns and relationships using: - flow diagrams - tables

TOPICS	GRADE 4	GRADE 5	GRADE 6
2.1 **Numeric patterns**	**Equivalent forms** Determine equivalence of different descriptions of the same relationship or rule presented • verbally • in a flow diagram • in a table • by a number sentence	**Equivalent forms** Determine equivalence of different descriptions of the same relationship or rule presented • verbally • in a flow diagram • in a table • by a number sentence	**Equivalent forms** Determine equivalence of different descriptions of the same relationship or rule presented • verbally • in a flow diagram • in a table • by a number sentence
2.2 **Geometric patterns**	**Investigate and extend patterns** • Investigate and extend geometric patterns looking for relationships or rules of patterns - represented in physical or diagram form - sequences not limited to a constant difference or ratio - of learner's own creation • Describe observed relationships or rules in learner's own words **Input and output values** Determine input values, output values and rules for the patterns and relationships using flow diagrams **Equivalent forms** • Determine equivalence of different descriptions of the same relationship or rule presented - verbally - in a flow diagram - by a number sentence	**Investigate and extend patterns** • Investigate and extend geometric patterns looking for relationships or rules of patterns - represented in physical or diagram form - sequences not limited to a constant difference or ratio - of learner's own creation • Describe observed relationships or rules in learner's own words **Input and output values** Determine input values, output values and rules for the patterns and relationships using flow diagrams **Equivalent forms** • Determine equivalence of different descriptions of the same relationship or rule presented - verbally - in a flow diagram - by a number sentence	**Investigate and extend patterns** • Investigate and extend geometric patterns looking for relationships or rules of patterns - represented in physical or diagram form - sequences not limited to a constant difference or ratio - of learner's own creation - represented in tables • Describe the general rules for the observed relationships **Input and output values** Determine input values, output values and rules for the patterns and relationships using • flow diagrams • tables **Equivalent forms** • Determine equivalence of different descriptions of the same relationship or rule presented - verbally - in a flow diagram - in a table - by a number sentence

TOPICS	GRADE 4	GRADE 5	GRADE 6
2.3 **Number sentences** (Introduction to Algebraic Expressions)	**Number sentences** • Write number sentences to describe problem situations • Solve and complete number sentences by - inspection - trial and improvement • Check solution by substitution	**Number sentences** • Write number sentences to describe problem situations • Solve and complete number sentences by - inspection - trial and improvement • Check solution by substitution	**Number sentences** • Write number sentences to describe problem situations • Solve and complete number sentences by - inspection - trial and improvement • Check solution by substitution

SPECIFICATION OF CONTENT (PHASE OVERVIEW)

SPACE AND SHAPE (GEOMETRY)

- The main progression in Space and Shape (Geometry) is achieved by a focus on new properties and characteristics of 2-D shapes and 3-D objects in each grade.
- Learners are given opportunities to identify and describe characteristics of 2-D shapes and 3-D objects and to develop their abilities to classify shapes and objects in the Senior Phase

TOPICS	GRADE 4	GRADE 5	GRADE 6
3.1 **Properties of 2-D shapes**	**Range of shapes** • Recognize, visualize and name 2-D shapes in the environment and geometric settings - regular and irregular polygons – triangles, squares, rectangles, other quadrilaterals, pentagons, hexagons - circles **Characteristics of shapes** • Describe, sort and compare 2-D shapes in terms of - straight and curved sides - number of sides	**Range of shapes** • Recognize, visualize and name 2-D shapes in the environment and geometric setting, focusing on • regular and irregular polygons - triangles, squares, rectangles, other quadrilaterals, pentagons, hexagons, heptagons • circles • similarities and differences between squares and rectangles **Characteristics of shapes** • Describe, sort and compare 2-D shapes in terms of - straight and curved sides - number of sides - lengths of sides - angles in shapes, limited to ◊ right angles ◊ angles smaller than right angles ◊ angles greater than right angles **Further activities** • Draw 2-D shapes on grid paper	**Range of shapes** • Recognize, visualize and name 2-D shapes in the environment and geometric settings, focusing on - regular and irregular polygons - triangles, squares, rectangles, parallelograms, other quadrilaterals, pentagons, hexagons, heptagons, octagons - circles - similarities and differences between rectangles and parallelograms **Characteristics of shapes** • Describe, sort and compare 2-D shapes in terms of - number of sides - lengths of sides - sizes of angles ◊ acute ◊ right ◊ obtuse ◊ straight ◊ reflex ◊ revolution **Further activities** • Draw 2-D shapes on grid paper • Draw circles, patterns in circles and patterns with circles using a pair of pair of compasseses

TOPICS	GRADE 4	GRADE 5	GRADE 6
3.1 **Properties of 2-D shapes**	**Further activities** • Draw 2-D shapes on grid paper	**Angles** • Recognize and describe angles in 2-D shapes: - right angles - angles smaller than right angles - angles greater than right angles	**Angles** • Recognize and name the following angles in 2-D shapes: - acute - right - obtuse - straight - reflex - revolution
3.2 **Properties of 3-D objects**	**Range of objects** • Recognize, visualize and name 3-D objects in the environment and geometric settings, focusing on: - rectangular prisms, - spheres - cylinders - pyramids **characteristics of objects** • Describe, sort and compare 3-D objects in terms of - shapes of faces - flat and curved surfaces **Further activities** • Make 3-D models using cut out polygons	**Range of objects** • Recognize, visualize and name 3-D objects in the environment and geometric settings, focusing on: - rectangular prisms and other prisms - cubes - cylinders - cones - pyramids - similarities and differences between cubes and rectangular prisms **characteristics of objects** • Describe, sort and compare 3-D objects in terms of - shape of faces - number of faces - flat and curved surfaces **Further activities** • Make 3-D models using cut out polygons • Cut open boxes to trace and describe their nets	**Range of objects** • Recognize, visualize and name 3-D objects in the environment and geometric settings, focusing on - rectangular prisms - cubes - tetrahedrons - pyramids - similarities and differences between tetrahedrons and other pyramids **characteristics of objects** • Describe, sort and compare 3-D objects in terms of - number and shape of faces - number of vertices - number of edges **Further activities** • Make 3-D models using: - drinking straws, toothpicks etc - nets

TOPICS	GRADE 4	GRADE 5	GRADE 6
3.3 **Symmetry**	**Symmetry** • Recognize, draw and describe line(s) of symmetry in 2-D shapes	**Symmetry** • Recognize, draw and describe line(s) of symmetry in 2-D shapes	**Symmetry** • Recognize, draw and describe line(s) of symmetry in 2-D shapes
3.4 **Transformations**	**Build composite shapes** • Put 2-D shapes together to make different composite 2-D shapes including some shapes with line symmetry.	**Use transformations to make composite shapes** • Make composite 2-D shapes including shapes with line symmetry by tracing and moving a 2-D shape in one or more of the following ways: - by rotation - by translation - by reflection	
	Tessellations • Pack out 2-D shapes to make tessellated patterns including some patterns with line symmetry.	**Use transformations to make tessellations** • Make tessellated patterns including some patterns with line symmetry by tracing and moving 2-D shapes in one or more of the following ways - by rotation - by translation - by reflection	**Enlargement and reductions** • Draw enlargement and reductions of 2-D shapes to compare size and shape of - triangles - quadrilaterals
	Describe patterns • Refer to lines, 2-D shapes, 3-D objects and lines of symmetry when describing patterns - in nature - from modern everyday life - our cultural heritage	**Describe patterns** • Refer to lines, 2-D shapes, 3-D objects, lines of symmetry, rotations, reflections and translations when describing patterns - in nature - from modern everyday life - from our cultural heritage	**Describe patterns** • Refer to lines, 2-D shapes, 3-D objects, lines of symmetry, rotations, reflections and translations when describing patterns - in nature - from modern everyday life - from our cultural heritage
3.5 **Viewing of objects**	**Position and views** • Match different views of everyday objects • Identify everyday objects from different views	**Position and views** Links the position of viewer to views of: • single everyday objects • collections of everyday objects or everyday scenes	**Position and views** Links the position of viewer to views of: • single everyday objects or collections of objects • single or composite geometric objects

TOPICS	GRADE 4	GRADE 5	GRADE 6
3.6 **Position and movement**	**Location and directions** • Locate position of objects, drawings or symbols on a grid with alpha-numeric grid references • Locate positions of objects on a map by using alpha-numeric grid references	**Location and directions** • Locate position of objects, drawings or symbols on a grid with alpha-numeric grid references • Locate positions of objects on a map by using alpha-numeric grid references • Follow directions to trace a path between positions on a map	**Location and directions** • Locate position of objects, drawings or symbols on a grid with alpha-numeric grid references • Locate positions of objects on a map by using alpha-numeric grid references • Give directions to move between positions or places on a map

SPECIFICATION OF CONTENT (PHASE OVERVIEW)

MEASUREMENT

- The main progression in measurement across the grades is achieved by
  - the introduction of new measuring units, particularly in Grades 4 and 6.
  - the increase in number range and complexity of calculations that learners are able to do in each grade
- Practical measuring using measuring instruments is central to measurement in this phase.
- In the sequencing of measurement topics within each grade, cognizance should be taken of the number work that has already been covered in that year, particularly with regard to calculations and solving problems.

TOPICS	GRADE 4	GRADE 5	GRADE 6
4.1 **Length**	**Practical measuring** of 2-D shapes and 3-D objects by • estimating • measuring • recording • comparing and ordering **Measuring instruments:** rulers, metre sticks, tape measures, trundle wheels **Units:** millimetres (mm), centimetres (cm), metres (m), kilometres (km) **Calculations and problem-solving involving length** • Solve problems in contexts involving length • Conversions include converting between - millimetres (mm), and centimetres (cm) - centimetres (cm) and metres (m) - metres (m) and kilometres (km) • Conversions limited to whole numbers and common fractions	**Practical measuring** of 2-D shapes and 3-D objects by • estimating • measuring • recording • comparing and ordering **Measuring instruments:** rulers, metre sticks, tape measures, trundle wheels **Units:** millimetres (mm), centimetres (cm), metres (m), kilometres (km) **Calculations and problem-solving involving length** • Solve problems in contexts involving length • Conversions include converting between any of the following units: - millimetres (mm) - centimetres (cm) - metres (m) - kilometres (km) • Conversions limited to whole numbers and common fractions	**Practical measuring** of 2-D shapes and 3-D objects by • estimating • measuring • recording • comparing and ordering **Measuring instruments:** rulers, metre sticks, tape measures, trundle wheels **Units:** millimetres (mm), centimetres (cm), metres (m), kilometres (km) • **Calculations and problem-solving involving length** • Solve problems in contexts involving length • Conversions include converting between any of the following units: - millimetres (mm) - centimetres (cm) - metres (m) - kilometres (km) • Conversions should include common fraction and decimal fractions to 2 decimal places

TOPICS	GRADE 4	GRADE 5	GRADE 6
4.2 **Mass**	**Practical measuring** of 3-D objects by • estimating • measuring • recording • comparing and ordering **Measuring instruments:** bathroom scales, kitchen scales and balances **Units:** grams (g) and kilograms (kg); **Calculations and problem-solving involving mass include:** • problems in contexts involving mass • converting between grams and kilograms limited to examples with whole numbers and fractions	**Practical measuring** of 3-D objects by • estimating • measuring • recording • comparing and ordering **Measuring instruments:** bathroom scales, kitchen scales and balances **Units:** grams (g) and kilograms (kg); **Calculations and problem-solving involving mass include:** • problems in contexts involving mass • converting between grams and kilograms limited to examples with whole numbers and fractions	**Practical measuring** of 3-D objects by • estimating • measuring • recording • comparing and ordering **Measuring instruments:** bathroom scales (analogue and digital); , kitchen scales (analogue and digital) and balances **Units:** grams (g) and kilograms (kg); **Calculations and problem-solving involving mass include:** • problems in contexts involving mass • converting between grams and kilograms • conversions should include fraction and decimal forms (to 2 decimal places)
4.3 **Capacity/Volume**	**Practical measuring** of 3-D objects by • estimating • measuring • recording • comparing and ordering **Measuring instruments:** measuring spoons, measuring cups, measuring jugs **Units:** millilitres (ml) , litres (l) **Calculations and problem solving involving capacity/volume include:** • problems in contexts involving capacity/volume • converting between litres and millilitres limited to examples with whole numbers and fractions	**Practical measuring** of 3-D objects by • estimating • measuring • recording • comparing and ordering **Measuring instruments:** measuring spoons, measuring cups, measuring jugs **Units:** millilitres (ml) , litres (l) **Calculations and problem solving involving capacity/volume include:** • problems in contexts involving capacity/volume • converting between litres and millilitres limited to examples with whole numbers and fractions	**Practical measuring** of 3-D objects by • estimating • measuring • recording • comparing and ordering **Measuring instruments:** measuring jugs **Units:** millilitres (ml), litres (l) and kilolitres (kl) **Calculations and problem solving involving capacity/volume include:** • problems in contexts involving capacity/volume • converting between kilolitres, litres and millilitres - conversions should include fraction and decimal forms (to 2 decimal places)

TOPICS	GRADE 4	GRADE 5	GRADE 6
4.4 **Time**	**Reading time and time instruments** • Read, tell and write time in 12-hour and 24-hour formats on both analogue and digital instruments in - hours - minutes - seconds • Instruments include clocks and watches **Reading calendars** **Calculations and problem solving time include** • problems in contexts involving time • calculation of the number of days between any two dates within the same or consecutive years • calculation of time intervals where time is given in minutes or hours only **History of time** Know some ways in which time was measured and represented in the past	**Reading time and time instruments** • Read, tell and write time in 12-hour and 24-hour formats on both analogue and digital instruments in - hours - minutes - seconds • Instruments include clocks, watches and stopwatches **Reading calendars** **Calculations and problem solving time include** • problems in contexts involving time • calculation of time intervals where time is given in - seconds and/or minutes - minutes and/or hours - hours and/or days - days, weeks and/or months - years and/or decades **History of time** Know some ways in which time was measured and represented in the past	**Reading time and time instruments** • Read, tell and write time in 12-hour and 24-hour formats on both analogue and digital instruments in - hours - minutes - seconds • Instruments include clocks, watches and stopwatches **Reading calendars** **Calculations and problem solving time include** • problems in contexts involving time • reading time zone maps and calculating time differences based on time zones • calculation of time intervals where time is given in - seconds and/or minutes - minutes and/or hours - hours and/or days - days, weeks and/or months - years and/or decades - centuries, decades and/or years **History of time** Know some ways in which time was measured and represented in the past.

TOPICS	GRADE 4	GRADE 5	GRADE 6
4.5 **Temperature**		**Practical measuring of temperature by** • estimating • measuring • recording • comparing and ordering **Measuring instruments:** • thermometers **Units:** • degrees Celsius **Calculations and problem-solving related to temperature include:** • problems in contexts related to temperatures • calculating temperature differences limited to positive whole numbers	**Practical measuring of temperature by** • estimating • measuring • recording • comparing and ordering **Measuring instruments:** • thermometers (analogue and digital) **Units:** • degrees Celsius **Calculations and problem-solving related to temperature include:** • problems in contexts related to temperatures • calculating temperature differences limited to positive whole numbers
4.6 **Perimeter, surface area and volume**	**Perimeter** Measure perimeter using rulers or measuring tapes **Measurement of area** • Find areas of regular and irregular shapes by counting squares on grids in order to develop an understanding of square units **Measurement of volume** • Find volume/capacity of objects by packing or filling them in order to develop an understanding of cubic units	**Perimeter** Measure perimeter using rulers or measuring tapes **Measurement of area** • Find areas of regular and irregular shapes by counting squares on grids in order to develop an understanding of square units **Measurement of volume** • Find volume/capacity of objects by packing or filling them in order to develop an understanding of cubic units	**Perimeter** Measure perimeter using rulers or measuring tapes **Measurement of area** • Continue to find areas of regular and irregular shapes by counting squares on grids • Develop rules for calculating the areas of squares and rectangles **Measurement of volume** • Continue to find volume/capacity of objects by packing or filling them • Develop an understanding of why the volume of rectangular prisms is given by length multiplied by width multiplied by height **Investigate** • Relationship between perimeter and area of rectangles and squares. • Relationship between surface area and volume of rectangular prisms

TOPICS	GRADE 4	GRADE 5	GRADE 6
4.7 **History of measurement**			Know some ways in which people measured and recorded measurement in the past.

SPECIFICATION OF CONTENT (PHASE OVERVIEW)

DATA HANDLING

- The main progression in Data Handling across the grades is achieved by
  - working with new forms of data representation
  - developing new analytic tools for interpreting and reporting data.
- Learners should work through the full data cycle a few times a year – this involves collecting, organizing, representing, analyzing, interpreting and reporting data.
- Some of the above aspects of data handling can also be dealt with as discrete activities.
- Data handling contexts should be selected to build awareness of social, economic and environmental issues.
- Learners should become sensitized to how data-gathering contexts can impact on the interpretations and predictions of the data.
- Data handling also provides the opportunity for completing projects

TOPICS	GRADE 4	GRADE 5	GRADE 6
5.1 **Collecting and Organising data**	**Collecting and organising data** • Collect data using tally marks and tables for recording	**Collecting and organising data** • Collect data using tally marks and tables for recording • Order data from smallest group to largest group	**Collecting and organising data** • Collect data - using tally marks and tables for recording - using simple questionnaires (yes/no type response) • Order data from smallest group to largest group
5.2 **Representing data**	**Representing data** Draw a variety of graphs to display and interpret data including: • pictographs (one-to-one correspondence between data and representation) • bar graphs	**Representing data** Draw a variety of graphs to display and interpret data including: • pictographs (many-to-one correspondence) • bar graphs	**Representing data** Draw a variety of graphs to display and interpret data including: • pictographs (many-to-one correspondence) • bar graphs and double bar graphs

TOPICS	GRADE 4	GRADE 5	GRADE 6
5.3 **Analysing, Interpreting and Reporting data**	**Interpreting data** Critically read and interpret data represented in • words • pictographs • bar graphs • pie charts **Analysing data** Analyse data by answering questions related to data categories **Reporting data** Summarise data verbally and in short written paragraphs	**Interpreting data** Critically read and interpret data represented in • words • pictographs • bar graphs • pie charts **Analysing data** Analyse data by answering questions related to: • data categories • data sources and contexts **Reporting data** Summarise data verbally and in short written paragraphs that include • drawing conclusions about the data • making predictions based on the data **Ungrouped data** Examine ungrouped numerical data to determine the most frequently occurring score in the data set (mode)	**Interpreting data** Critically read and interpret data represented in • words • pictographs • bar graphs • double bar graphs • pie charts **Analysing data** Analyse data by answering questions related to: • data categories, including data intervals • data sources and contexts • central tendencies – (mode and median) **Reporting data** Summarise data verbally and in short written paragraphs that includes. • drawing conclusions about the data • making predictions based on the data **Ungrouped data** Examine ungrouped numerical data to determine • the most frequently occurring score in the data set (mode) • the middlemost score in the data set (median)
5.4 **Probability**	**Probability experiments** • Perform simple repeated events and list possible outcomes for experiments such as: - tossing a coin - rolling a die	**Probability experiments** • Perform simple repeated events and list possible outcomes for experiments such as: - tossing a coin - rolling a die - spinning a spinner • Count and compare the frequency of actual outcomes for a series of trials up to 20 trials	**Probability experiments** • Perform simple repeated events and list possible outcomes for experiments such as: - tossing a coin - rolling a die - spinning a spinner • Count and compare the frequency of actual outcomes for a series of trials up to 50 trials

SECTION 3: CLARIFICATION OF CONTENT

3.1 INTRODUCTION

- In this section, content clarification includes
  - teaching guidelines
  - suggested sequencing of topics per term
  - suggested pacing of topics over the year
- Each content area has been broken down into Topics. The sequencing of topics within terms provides an idea of how content areas can be spread and re-visited throughout the year.
- Teachers may choose to sequence and pace the contents differently from the recommendations in this section. However, cognisance should be taken of the relative weighting and number of teaching hours of the content areas for this phase.

3.2 ALLOCATION OF TEACHING TIME

Time has been allocated in the following way:

- 10 weeks per term, with 6 hours for Mathematics per week
- Between 3 and 6 hours have been allocated for revision per term. In addition 6 hours have been allocated for summative assessment for all subjects in Terms 2 and 4.
- Therefore, 210 notional hours have been distributed across the aontent areas.
- The distribution of time per topic, has taken account of the weighting for the Content Area as specified for the Intermediate Phase in section 2.
- The weighting of content areas represents teaching hours; therefore, the recommended distribution of hours may vary slightly across grades.

3.3 CLARIFICATION NOTES WITH TEACHING GUIDELINES

The tables below provide the teacher with:

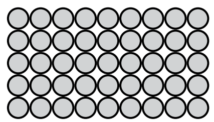
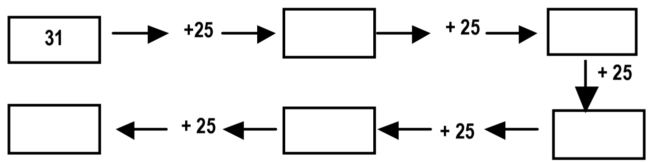
- content areas and topics per grade per term;
- concepts and skills per term;
- clarification notes with teaching guidelines; and
- the duration of time allocated per topic in hours.

TIME ALLOCATION PER TOPIC: GRADE 4							
Term 1		**Term 2**		**Term 3**		**Term 4**	
Topic	**Time**	**Topic**	**Time**	**Topic**	**Time**	**Topic**	**Time**
Mental Mathematics (10 minutes daily)	**8 hours**	Mental Mathematics (10 minutes daily)	**7 hours**	Mental Mathematics (10 minutes daily)	**8 hours**	Mental Mathematics (10 minutes daily)	**7 hours**
Whole numbers: counting, ordering, comparing, representing and place value (3-digit numbers)	**2 hours**	Whole numbers: counting, ordering, comparing, representing and place value (4-digit numbers)	**1 hour**	Capacity/volume	**6 hours**	Whole numbers: counting, ordering, comparing, representing and place value (4-digit numbers)	**1 hour**
Number sentences	**3 hours**	Whole numbers: addition and subtraction (4-digit numbers)	**4 hours**	Common fractions	**5 hours**	Whole numbers: addition and subtraction (4-digit numbers)	**4 hours**
Whole numbers: addition and subtraction (3-digit numbers)	**8 hours**	Common fractions	**6 hours**	Whole numbers: counting, ordering, comparing, representing and place value (4-digit numbers)	**1 hour**	Mass	**6 hours**
Numeric patterns	**4 hours**	Length	**7 hours**	Whole numbers: addition and subtraction (4-digit numbers)	**4 hours**	Properties of 3-D objects	**4 hours**
Whole numbers: multiplication and division (1-digit by 1 digit)	**4 hours**	Whole number: multiplication (2-digit by 2-digit)	**6 hours**	Viewing objects	**2 hours**	Common fractions	**5 hours**
Time	**6 hours**	Properties of 3-D objects	**5 hours**	Properties of 2-D shapes	**4 hours**	Whole numbers: dvision (3-digit by 1-digit)	**3 hours**
Data handling	**10 hours**	Geometric patterns	**4 hours**	Data handling	**7 hours**	Perimeter , area & volume	**7 hours**
Properties of 2-D shapes	**5 hours**	Symmetry	**2 hours**	Numeric patterns	**4 hours**	Position and movement	**2 hours**
Whole numbers: multiplication and division (2-digit by 1- digit)	**5 hours**	Whole numbers: addition and subtraction (4-digit numbers)	**4 hours**	Whole numbers: addition and subtraction (4-digit numbers)	**4 hours**	Transformations	**3 hours**
		Whole numbers: division (3-digit by 1- digit)	**4 hours**	Whole numbers: multiplication (2-digit by 2-digit)	**5 hours**	Geometric patterns	**2 hours**
				Number sentences	**3 hours**	Whole numbers: addition and subtraction (4-digit numbers)	**3 hours**
				Transformations	**3 hours**	Probability	**2 hours**
Revision	**5 hours**	Revision	**4 hours**	Revision	**4 hours**	Revision	**5 hours**
		Assessment (all subjects)	**6 hours**			Assessment (all subjects)	**6 hours**
Total: 60 hours		**Total: 60 hours**		**Total: 60 hours**		**Total: 60 hours**	

3.3.1 Clarification of content for Grade 4

GRADE 4 TERM 1				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
NUMBERS, OPERATIONS AND RELATIONSHIPS	**Mental Mathematics**	**Mental calculations involving**: • Addition and subtraction facts for: - units - multiples of 10 - multiples of 100 - multiples of 1 000 • Multiplication of whole numbers to at least 10 x 10 • Multiplication facts for: - units by multiples of 10 - units by multiples of 100 **Number range for counting, ordering, comparing and representing, and place value of digits** • Count forwards and backwards in 2s, 3s, 5s, 10s, 25s, 50s, 100s between 0 and at least 10 000 • Order, compare and represent numbers to at least 4-digit numbers. • Represent odd and even numbers to at least 1 000 • Recognize the place value of digits in whole numbers to at least 4-digit numbers • Round off to the nearest 10, 100, 1 000	The mental Mathematics programme should be developed systematically over the year. Learners should not be asked to do random calculations each day. As learners cover topics and develop calculating **techniques** in the main part of the lesson, so aspects of these can be incorporated into the mental Mathematics programme. Concepts and skills are developed through the main lesson, and then practised, with smaller number ranges in the mental Mathematics programme. Keep the number range lower in Term 1 and increase it during the year. At the start of the year, number ranges and calculations techniques can be based on those developed in Grade 3. The mental Mathematics should systematically develop three aspects of learners' number knowledge: • Number facts - number bonds: addition and subtraction facts for: ◊ units ◊ multiples of 10 - times tables involving multiplication of whole numbers to at least 10 x 10 • Calculation techniques - doubling and halving, - using multiplication to do division, - multiplying by 10 and 100 - multiplying by multiples 10 and 100 - dividing by 10, 100 and 1 000 - rounding off to the nearest 10 and compensating - building up and breaking down numbers, - adding and subtracting units, multiples of 10 and multiples of 100 to/from any 3-digit number - using the inverse relationship between addition and subtraction	**10 minutes every day**

GRADE 4 TERM 1				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
NUMBERS, OPERATIONS AND RELATIONSHIPS		**Calculation techniques** Use a range of techniques to perform and check written and mental calculations of whole numbers including • estimation • building up and breaking down numbers • rounding off and compensating • doubling and halving • using a number line • using addition and subtraction as inverse operations • using multiplication and division as inverse operations **Number range for multiples and factors** Multiples of 1-digit numbers to at least 100 **Properties of whole numbers** Recognize and use the commutative; associative; and distributive properties of whole numbers	• Number concept - counting: ◊ count forwards and backwards in 2s, 3s, 5s, 10s, 25s, 50s, between 0 and at least 500 ◊ count forwards and backwards in 100s between 0 and at least 1 000 - ordering and comparing up to 3-digit numbers - place value of up to 3-digit numbers - odd and even numbers - multiples Some mental Mathematics can be done without apparatus, but it is often useful to do mental Mathematics with apparatus. **Recommended apparatus** • a number line (structured and empty) • a number grid • place value cards (flash cards) • counting beads	

GRADE 4 TERM 1				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers:** counting, ordering, comparing, representing and place value of digits	**Number range for counting, ordering, comparing, representing and place value of digits** • Count forwards and backwards in 2s, 3s, 5s,10s 25s, 50s and 100s between 0 and at least 10 000 • Order, compare and represent numbers to at least 4-digit numbers • Represent odd and even numbers to at least 1 000 • Recognize the place value of digits in whole numbers to at least 4-digit numbers • Round off to the nearest 10, 100, 1 000	In Term 1, learners should revise and consolidate work done in Grade 3. The **list on the left is required by the end of the year**. Recommended specifications are provided below. **What is different to Grade 3?** • Rounding off to the nearest **Counting** • Count forwards and backwards in 2s, 3s, 5s, 10s, 25s, 50s, 100s between 0 and at least 1 000 • Counting should not only be thought of as verbal counting. Learners should count using apparatus such as - counters - counting beads - number grids - structured, semi-structured and empty number lines - pictures of objects, especially pictures of large numbers of objects that are presented in a grouped or structured way. An example of a picture of objects suitable for counting is provided at the end of the Grade 4 section of Numbers, Operations and Relationships. - arrays or diagrams of arrays e.g.  - other diagrams for counting e.g. 	**2 hours**

GRADE 4 TERM 1				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers:** counting, ordering, comparing, representing and place value of digits		• Counting should not always start on the first multiple, nor should it always start on any other multiple e.g. counting in 2s can start from 5 or 27 or 348. **Place value** (number range 0 to 999) • Learners should be able to break up numbers into hundreds, tens and units using - the number names (number words) - place value or flash cards - expanded notation • Recommended apparatus: place value/flash cards; Dienes blocks **Compare and order** (number range 0 to 999) • Learners should be given a range of exercises such as: - Arrange the given numbers below from the smallest to the biggest or biggest to smallest - Fill in missing numbers in ◊ a sequence ◊ on a number grid - Show a given number on a structured or semi-structured number line, e.g. show which number is halfway between 340 and 350 on a number line - Indicate which of two numbers is greater or smaller e.g. 5 431 or 5 413 - Replace * with <,= or > **Example:** 89 * 98, 109 * 190 • All work developed here can be practised throughout the year in the mental Mathematics programme.	

GRADE 4 TERM 1				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
PATTERNS, FUNCTIONS AND ALGEBRA	**2.1** **Number sentences** (introduction to algebraic expressions)	**Number sentences** • Write number sentences to describe problem situations • Solve and complete number sentences by: - inspection - trial and improvement - substitution	Writing number sentences can be seen as a way of preparing learners to write algebraic equations. Number sentences can be used to describe problem situations. Number sentences can also be used as an equivalent form of expression to sections of flow diagram or tables. Sometimes learners in the Intermediate Phase work with number sentences in isolation. However, it is more common for learners to work with number sentences and other forms of representation e.g. problems specified in words, numbers and calculations represented in flow diagrams. Examples of the above should be included at appropriate times throughout the year. Number sentences are also a way of showing equivalence. It seems obvious that what is written on the one side of the equal sign is equal to what is written on the other side. However but learners need to be trained to understand the equivalence. In the Intermediate Phase it is useful to use number sentences as statements of equivalence. Patterns made up of number sentences will assist learners to make sense of and learn the following: • **Patterns in addition and subtraction number bonds for:** - multiples of 10 - multiples of 100 - multiples of 1 000 • **The inverse relationship between addition and subtraction** • **The commutative, associative, and distributive properties** of whole numbers and how we can use these properties to build up and break down numbers when we add and subtract The steps in any calculation are sets of equivalent statements. Exploring, understanding and learning the logic of the equivalent statements by working through patterns made up of number sentences, helps learners to learn calculating techniques. At the start of the year learners can work with number sentences that help them to understand and learn about how to use the commutative and associative properties when calculating whole numbers. This will prepare them for the calculations that follow.	**3 hours**

GRADE 4 TERM 1				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
PATTERNS, FUNCTIONS AND ALGEBRA	**2.1** **Number sentences** (introduction to algebraic expressions)		• Using number sentences to help learners understand and use the fact that addition and subtraction are inverse operations Subtraction can undo what addition does and addition can undo what subtraction does if you keep the numbers the same. Learners are not expected to use the expression “inverse operations”. They are expected to know that - they can use addition to check subtraction calculations - they can use subtraction to check addition calculations - if they add and subtract the same number from a number, the number remains unchanged **Examples:** 58 – 58 = ☐ 264 – 264 = ☐ 304 – ☐ = 304 After completing a number of similar examples, they can be asked to explain what they notice in their own words. Learners are expected to be able to say “When you subtract a number from itself you get zero”. **Further examples:** 37 – 4 + 4 = ☐ 27 + 6 – 6 = ☐ After completing a number of similar examples, the learners can be asked to explain what they notice in their own words. Learners are expected to be able to say “When you add a number and then take away the same number you end with the number you started with”. As an extension of the above calculations, learners can work with pairs of equivalent number sentences, in which the numbers in each pair of addition – subtraction number sentences are the same. • **Using number sentences helps learners develop addition and subtraction techniques** **Examples:** 36+13 = ☐ therefore 49 – 13 = ☐ 261+36 = ☐ therefore 297 – 36 = ☐	

GRADE 4 TERM 1				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
PATTERNS, FUNCTIONS AND ALGEBRA	**2.1** **Number sentences** (introduction to algebraic expressions)		After completing a number of similar examples, they can be asked to explain what they notice in their own words. Learners are expected to be able to say “You can use addition to check subtraction”. • **Commutative property of addition** Numbers can be added in any order. **Example:** 29 + 19 = 19 + 26 **Further Examples:** 13 + 49 = ☐ or 49 + 13 = ☐ 36 + 297= ☐ or 297 + 36= ☐ 27 + 94 = ☐ or 94 + 27= ☐ After completing a number of similar examples, they can be asked to explain what they notice in their own words. Learners are not expected to know the names of the properties of operations e.g. commutative property. They only need to know how to use this property to make their calculations easier or to make a number sentence true. • **Associative property of addition** The associative property allows numbers to be grouped in different ways when adding more than wo numbers, without it affecting the answer. **Examples:** (31 + 26) + 19= ☐ is the same as 31 +(26+ 19) = ☐ 51 +(13 + 49) = ☐ is the same as (51 + 13) + 49 = ☐ After completing a number of similar examples, they can be asked to explain what they notice in their own words. Learners are not expected to know the names of the properties of operations e.g. associative property. They only need to know how to use them to make their calculations easier or to make a number sentence true. In many calculations where learners break up numbers before adding, they change the way numbers are grouped. **Example:** • When learners write 349 + 273 = 300 + 200 + 40 + 70 + 9 + 3, they are in effect changing the way the numbers are grouped. They are using the commutative and associative properties of addition simulteneously. • When learners calculate by rounding off and compensating or filling up to tens or hundreds, they are also changing the way the numbers are grouped, e.g. 489 + 27 = 489 + (11 + 16) = (489 + 11) + 16 = 500 + 16 = 516	

GRADE 4 TERM 1				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
PATTERNS, FUNCTIONS AND ALGEBRA	**2.1** **Number sentences** (introduction to algebraic expressions)		• **Order of subtraction**: When you change the order in which you subtract numbers, the answers will NOT be the same. The commutative property does NOT hold for subtraction. **Example**: 26 – 19 ≠ 19 – 26 Since learners do not work with negative numbers yet, learners cannot complete pairs of number sentences with the same numbers but subtracted in different order. Here it is best to use number sentences with True and False. **Examples:** - True or false? 49 – 13 = 13 – 49 - True or false? 297 – 36 = 36 – 297 • **Using number sentences to help learners see and use patterns in addition and subtraction number bonds for:** - 10 - multiples of 10 - multiples of 100 **Examples:** • Ten 3 + 7= □ 4 + 6 = □ 2 + 8 = □ 5 + 5 = □ 7 + □= 10 4 + □= 10 8 + □= 10 3 + □= 10 10 – 7 = □ 10 – □= 4 10 – □= 6 10 – □= 5 • Multiples of 10 13 + 7 = □ 14 + 6 = □ 12 + 8= □ 15 + 5 = □ 17 + □= 20 1 4 + □= 20 8 + □= 20 3 + □= 20 20 – 7 =□ 20 – □= 4 20 – □= 6 20 – □= 5 Similar examples can be given for other multiples of such as 30; 40; 50; 60; 70; 80; 90 • Multiples of 100 Similar examples can be given for multiples of 100 such as 200; 300; 400; 500; 600; 700; 800; 900 All concepts and techniques developed here can be practised throughout the year in the mental Mathematics programme.	

GRADE 4 TERM 1				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Addition and subtraction	**Number range for calculations** Addition and subtraction of whole numbers to at least 4 digits. **Calculation techniques** Use a range of techniques to perform and check written and mental calculations of whole numbers including • estimation • building up and breaking down numbers • rounding off and compensating • doubling and halving • using a number line • using addition and subtraction as inverse operations • using multiplication and division as inverse operations **Properties of whole numbers** Recognize and use the commutative and associative properties of whole numbers **Solving problems** Solve problems in contexts involving whole numbers, including financial contexts	Numbers, operations and relationships make up half the Mathematics that learners do in the Intermediate Phase. Rather than do all the addition and subtraction in one block, it is recommended that learners revisit calculations regularly. In this suggested sequencing of work, learners do addition and subtraction in each term in Grade 4. Eight hours are allocated to addition and subtraction in Term 1. In Term 1, learners should revise and consolidate work done in Grade 3. Learners add and subtract numbers up to 3-digits numbers. **What is different to Grade 3?** Rounding off to the nearest 10 and 100 as a way of estimating answers. **Learners should solve problems in contexts and do context free calculations.** It helps learners to become more confident in and more independent at Mathematics, if they have techniques to: • check their solutions themselves • judge the reasonableness of their solutions **Judging reasonableness of solutions** Learners should be trained to judge the reasonableness of solutions. One way to do this is to estimate the answers before calculating. They can round off the numbers involved in the calculations. When adding or subtracting 2-digit numbers, learners can round off to the nearest 10 When adding or subtracting 3-digit numbers, learners can round off to the nearest 100 When adding two numbers that are close to each other e.g. 345 and 340, learners can use doubling as a way of estimating the answers. **Checking solutions** Learners should know that they can • check an addition calculation by subtraction. **Example:** If 96 +48 =144, then 144 – 48 = 96 • check a subtraction calculation by adding. **Example:**144 – 48 = 96, then 96 + 48 = 144 Using the inverse operation to check solutions, is one reason for teaching addition and subtraction simulteneously.	**8 hours**

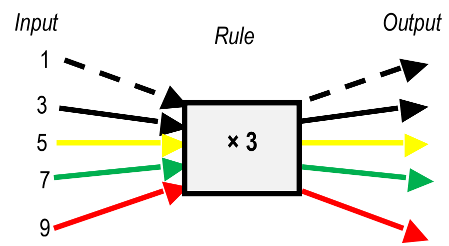
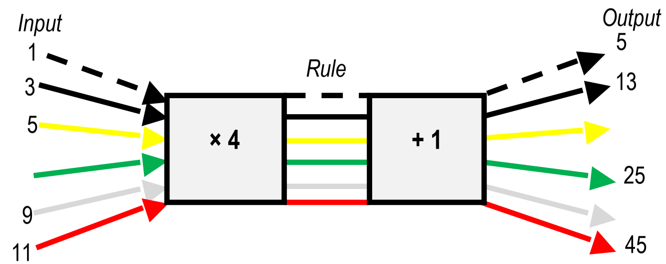
GRADE 4 TERM 1				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Addition and subtraction		Another reason for doing the two operations at the same time is that when learners solve problems, it is sometimes possible to solve the same problem by doing either addition or subtraction. **Example**: Veli's shopping costs R163. He pays with a R200 note. How much change does he get? Some learners may add on from R163 to get R200 e.g. R163 + R7= R170 →R170 + R30 = R200. Veli gets R37 change. **Most calculation techniques that learners use in Grade 4 involve breaking down numbers.** • **Breaking down all numbers according to place value parts to add** **Example**: Calculate 362 + 486 362 + 486 = 300 + 60 + 2 + 400 + 80 + 6 2 + 6 = 8 = 300 + 400 + 60 + 80 + 2 + 6 **OR** and 60 + 80 = 14 = 700 + 140 + 8 and 300 + 400 = 700 = 848 means 362 + 486 = 848 • **Adding on (by breaking down the number to be added)** **Example**: Calculate 362 + 486 362 + 400 → 762 + 80 → 842 + 6 → 848 • **Filling up tens (by breaking down the number to be added).** This can also be called rounding off and compensating. **Example:** Calculate 96 + 48 96 + 48 = 96 + 4 – 4 + 48 = 100 + 48 – 4 = 100 + 44 = 144 • **Breaking down both numbers according to place value parts to subtract** **Example:** Calculate 687 – 143 687 – 143 = 600 + 80 + 7 – 100 – 40 – 3 7 – 3 = 4 = 600 – 100 + 80 – 40 + 7 – 3 **OR** and 80 – 40 = 40 = 500 + 40 + 4 and 600 – 100 = 500 = 544 means 687 – 143 = 544	

GRADE 4 TERM 1				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Addition and subtraction		• **Breaking down all numbers according to place value parts to add using compensation (counterbalance)** Learners cannot subtract 4 from 3 or 80 from 40. Instead of breaking down 743 into 700 + 40 + 3 they will break down 743 into 600 + 130 + 13. Then they can subtract 4 from 13 and 80 from 130. **Example**:Calculate: 743 – 684 743 – 684 = 700 + 40 + 3 – 600 – 80 – 4 = 600 + 130 + 13 – 600 – 80 – 4 (Break up 743 into 600 + 130 + 13) = 600 - 600 + 130 – 80 + 13 – 4 = 50 + 9 = 59 • **Subtracting by breaking down the number to be subtracted** **Example:** Calculate 687 – 143 687 – 100 → 587 – 40 → 547 – 3 = 544 **or** 687 – 140 – 3 = 547 – 3 = 544 **Kinds of problems** Summation, increase and decrease, comparison by difference See the description of problem types at the end of the grade notes	

ASSESSMENT:

At this stage learns should have been assessed on:

- 3-digit numbers
- adding and subtracting with 3-digit numbers
- working with number sentences as well as the additive property of 0 and the properties of operations

GRADE 4 TERM 1				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
PATTERNS, FUNCTIONS AND ALGEBRA	**2.1** **Numeric patterns**	**Concepts, skills and number range for Term 1** **Investigate and extend patterns** • Investigate and extend numeric patterns looking for relationships or rules of patterns: - sequences involving a constant difference or ratio - of learner's own creation • Describe observed relationships or rules in learner's own words **Input and output values** Determine input values, output values and rules for patterns and relationships using flow diagrams **Equivalent forms** Determine equivalence of different descriptions of the same relationship or rule presented: • verbally • in a flow diagram • by a number sentence	**What is different to Grade 3?** In Grade 3 learners copy, extend and describe patterns made with numbers. The descriptions are only verbal. In Grade 4 learners also work with flow diagrams, as a form of input-output diagram. The kinds of patterns become more complex in Grade 4. **Sequences of numbers:** Examples of the above are illustrated in Term 3. For Term 1 the recommendation is to focus on using input-output diagrams, with a focus on developing multiplication tables and the properties of operations. **Patterns given in input-output diagrams** Input-output diagrams are sometimes called function diagrams, function machines or flow diagrams because they are a way of introducing learners to functional relationships diagrammatically. Functional relationships become very important in the Senior Phase and FET Mathematics. The forms of input-output diagrams that learners use in the Intermediate Phase most often are flow diagrams or spidergrams. When using flow diagrams, the correspondence between input and output values should be clear in its representational form i.e. the first input produces the first output, the second input produces the second output, etc. **Examples**  	**4 hours**

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<tr><th colspan="5">GRADE 4 TERM 1</th></tr>
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<tr><td>PATTERNS, FUNCTIONS AND ALGEBRA</td><td>2.1
Numeric patterns</td><td></td><td>An input-output diagram can allow learners to see or work out the
• input values, if the rule and a corresponding output value are given
• output values, if the rule and a corresponding input values are given
• rule, if the rule works for every given input value and its corresponding output value
Tables are a useful way to record patterns in Grades 4 & 5. In Grade 4 it is useful to sometimes include the rule in a table.
Example:
<table>
<tr><td></td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td></tr>
<tr><td>x 6</td><td>6</td><td>12</td><td>18</td><td></td><td>30</td><td></td><td></td><td></td><td></td><td>60</td></tr>
</table>
In Term 1 it is recommended that number patterns be used to develop concepts and skills that will be used in multiplication and division. The focus can be on input-output flow diagrams that help learners to understand and learn about
• the inverse operation between multiplication and division
• the multiplication of units by multiples of ten
• the associative property with whole numbers and how we can use this property when we multiply by multiples of 10
Using flow diagrams help learners to understand and use the fact that multiplication and division are inverse operations
Learners are not expected to use the expression “inverse operations”. They are expected to know that
• they can use multiplication to check division calculations
• they can use division to check multiplication calculations</td><td></td></tr>
</table>

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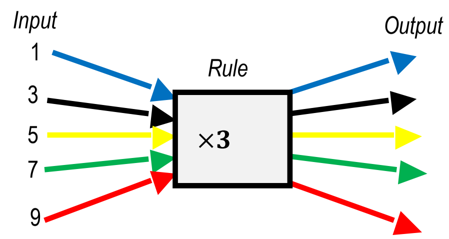
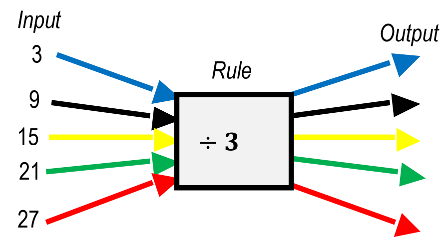
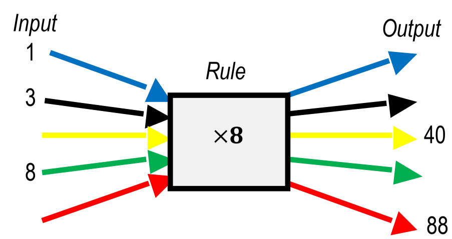
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
PATTERNS, FUNCTIONS AND ALGEBRA	**2.1** **Numeric patterns**		**Examples:**   After completing a number of similar examples, learners can be asked to explain what they notice in their own words. If learners write pairs of matching number sentences based on the input and output values in the flow diagrams, they can discuss using multiplication to check division and using division to check multiplication. **Further example** Learners can use the above knowledge to indicate how they could complete the missing input numbers in a flow diagram  Once learners have completed the flow diagram, they can discuss how they found the missing input values from the corresponding output values and rule.	

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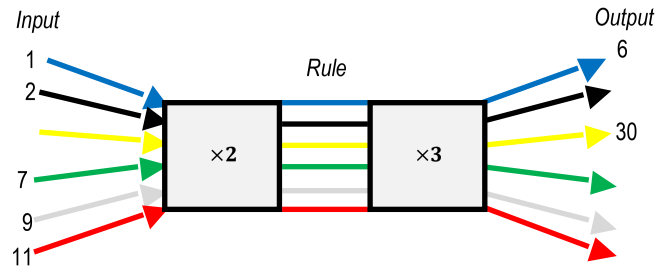
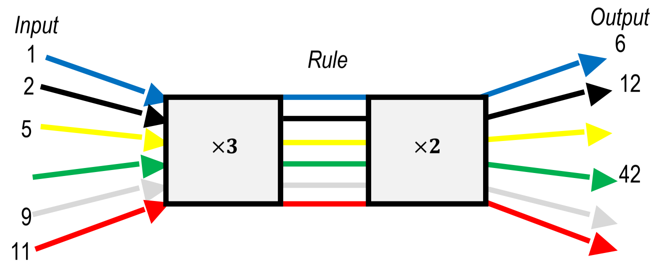
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
PATTERNS, FUNCTIONS AND ALGEBRA	**2.1** **Numeric patterns**		**Using flow diagrams to help learners develop multiplication and division techniques** **Associative property** Numbers can be multiplied in any order. **Example**: 11 x (3 x 2) = (11 x 3) x 2   Learners can discuss what they notice when they compare the examples. Learners are not required to know the names of the properties. They are only expected to use them to make calculations easier or use equivalent number sentences.	

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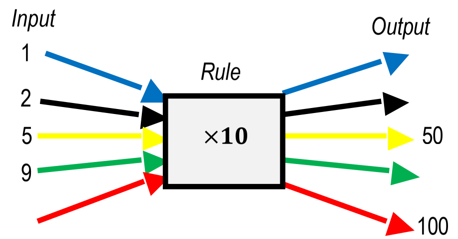
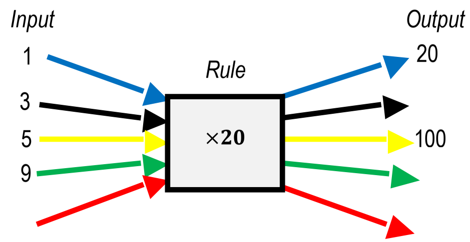
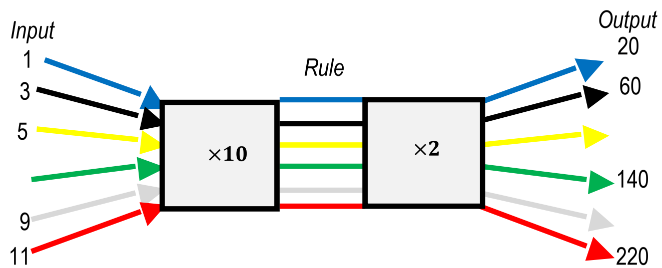
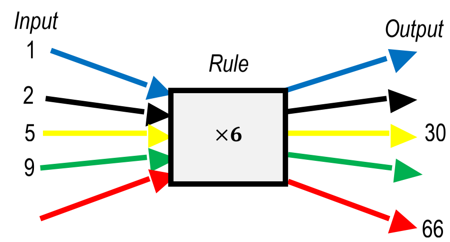
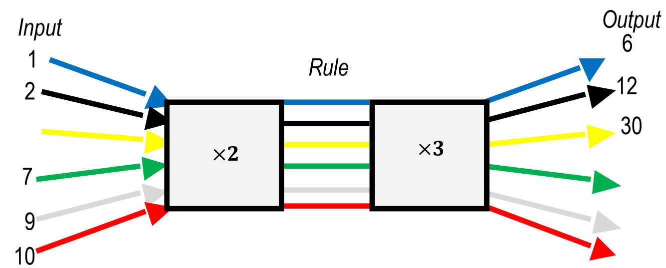
PATTERNS, FUNCTIONS AND ALGEBRA	**2.1** **Numeric patterns**		**Using flow diagrams to help learners think about and use techniques for multiplying by 10** Learners complete a flow diagram like the one below. They then explain using their own words what they notice about the input and output values  **Using flow diagrams to help learners think about and use techniques for multiplying by multiples of 10** Learners complete a flow diagram like the one below. They then explain using their own words what they notice when they compare the flow diagrams.  	

GRADE 4 TERM 1				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
PATTERNS, FUNCTIONS AND ALGEBRA	**2.1** **Numeric patterns**		Do further examples involving multiplying by other multiples of 10 **Further examples** Let learners compare the flow diagrams below   Learners can then be asked: "What is another way to multiply by 6?" Learners can develop fast mental and written **techniques** based on this. All concepts and calculating techniques developed here can be practised throughout the year in the mental Mathematics programme.	

<table>
<tr><th colspan="5">GRADE 4 TERM 1</th></tr>
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<tr>
<td>NUMBERS, OPERATIONS AND RELATIONSHIPS</td>
<td>1.1
Whole numbers
Multiplication
and
division</td>
<td>Number range for calculations
• Multiplication of at least whole 2-digit by 2-digit numbers
• Division of at least whole 3-digit by 1-digit numbers
Calculation techniques
Use a range of techniques to perform and check written and mental calculations of whole numbers including
• estimation
• building up and breaking down numbers
• rounding off and compensating
• doubling and halving
• using a number line
• using addition and subtraction as inverse operations
• using multiplication and division as inverse operations
Number range for multiples and factors
Multiples of 1-digit numbers to at least 100
Properties of whole numbers
Recognize and use the commutative; associative; and distributive properties ofwhole numbers
Solving problems
• Solve problems in contexts involving whole numbers:
- financial contexts
- measurement contexts</td>
<td>Rather than do all the multiplication and division in one time frame, it is recommended that learners revisit calculations regularly. In this suggested sequencing of work, learners do multiplication and division in 3 of the 4 terms in Grade 4. Nine hours are allocated to multiplication and division for Term 1, but this is split into 2 different sections.
Learners can first consolidate multiplying 1-digit numbers by numbers up to ten, dividing numbers up to 99 by 1-digit numbers and discover which properties of operations are valid for multiplication and division. In the first section on multiplication and division in Term 1, it is recommended that learners develop and practise multiplication tables.
What is different to Grade 3?
In Grade 3, learners do not learn multiplication tables.
In this section of work Grade 4 learners should
• move from skip counting and repeated addition to seeing the patterns in multiplication tables up to 10 x 10
• learn short cuts and fast techniques for multiplying by one digit numbers and by ten
Once learners have understood the basics of each multiplication table, they should learn it. The tables can be practised in the daily mental Mathematics programme.
Learners should solve problems in contexts and do context free calculations.
Learners can use pictures of grouped objects to count in groups. Learners can also use diagrams of arrays to count in groups. They can then complete tables like the one below.
Example
<table>
<tr><th></th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th><th>8</th><th>9</th><th>10</th></tr>
<tr><td>x 7</td><td>7</td><td>14</td><td>21</td><td></td><td>35</td><td></td><td></td><td></td><td></td><td>70</td></tr>
</table>
Learners can also use flow diagrams to record multiplication facts.</td>
<td>4 hours</td>
</tr>
</table>

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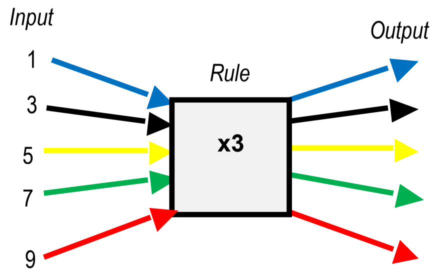
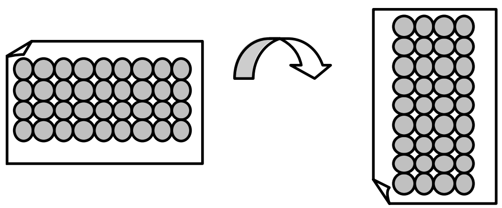
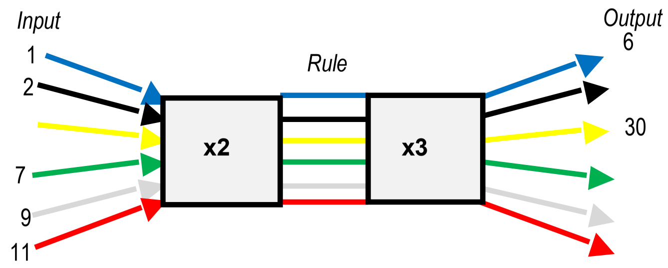
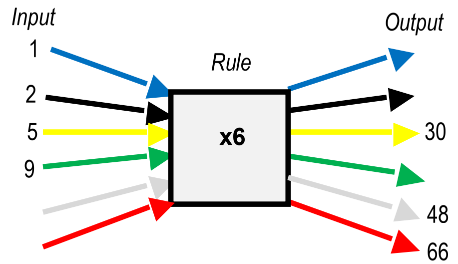
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Multiplication and division	• Solve problems involving whole numbers: - comparing two or more quantities of the same kind (ratio) - comparing two quantities of different kinds (rate) - grouping and equal sharing with remainders	**Example:**  **Commutative property of multiplication** Numbers can be multiplied in any order. **Example:** 3 x 4 = 4 x 3 Learners can be convinced of this by providing them with an array of counters, which can be turned **Example** This array shows 36 counters.  Learners can write a multiplication number sentence for the array before and after it is turned. This allows them to see that 4 x 9 = 9 x 4 Learners can also write division number sentences for the array: 36 ÷ 4 = 9 and 36 ÷ 9 = 4 This helps learners to see that multiplication and division are inverse operations. **Breaking up numbers to multiply** Learners can compare flow diagrams to learn useful ways to break up numbers for multiplying.	

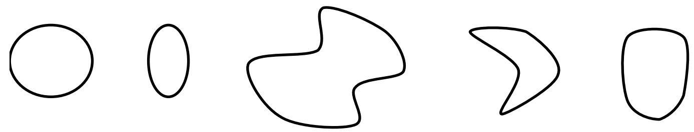
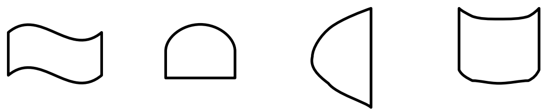
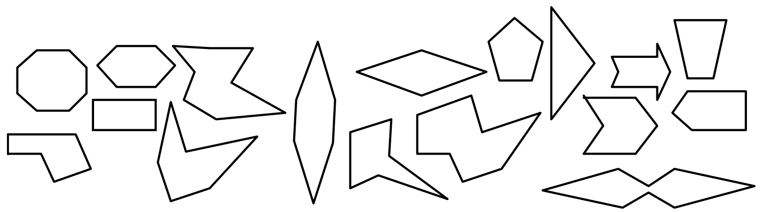
GRADE 4 TERM 1				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Multiplication and division		**Example:**   Learners can discuss what they notice when they compare the examples. Some easy calculations techniques can be covered in this way ☐ x 6 = ☐ x 2 x 3 Multiplying by both 2 and *3*, is the same as multiplying by 6. ☐ x 8 = ☐ x 2 x 2 x 2 ☐ x 9 = ☐ x 3 x 3 ☐ x 5 = ☐ x 10 ÷ 2 Multiplying by 10 and then dividing by 2 is the same as multiplying by 5 **Multiplication and division as inverse operations** It is important that learners understand that they can change any division statement into a multiplication statement. **Example:** 48 ÷ 8 = ☐ can be changed into ☐ x 8 = 48 **or** 8 x ☐ = 48. **Further Examples** 5 x ☐ = 35 35 ÷ 5 = ☐ 6 x ☐ = 24 24 ÷ 6 = ☐ 8 x ☐ = 56 56 ÷ 8 = ☐	

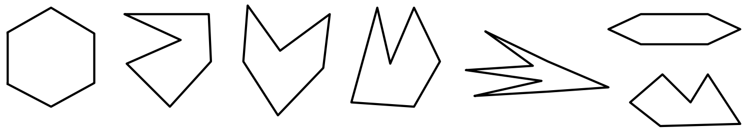
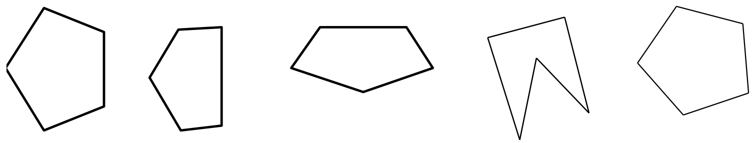
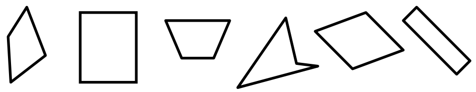
GRADE 4 TERM 1				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Multiplication and division		Learners can also use arrays to investigate the relationship between multiplication and division. There are two kinds of problems that result in division. It is important that learners experience both of these, namely • **problems involving sharing**: 6 learners share 32 sweets. How many sweets does each learner get? • **problems involving grouping**: Samkele has one large packet with 32 sweets. How many smaller packets can she make with 6 sweets in each? Some problems and calculations should have a remainder, and some should not. **Kinds of problems** Multiplication as repeated addition, treating groups as units, see the description of problem types at the end of the Grade 4 notes All work developed here can be practised throughout the year in the mental Mathematics programme.	
MEASUREMENT	**4.4** **Time**	**Reading time and time instruments** Read, tell and write time in 12-hour and 24-hour formats on both analogue and digital instruments in: • hours • minutes • seconds Instruments include clocks and watches **Reading calendars** **Calculations and problem solving with time include** • Calculation of the number of days between any two dates within the same or consecutive years • Calculation of time intervals where time is given in minutes or hours only **History of time** Knows how time was measured and represented in ancient times	**What is different to Grade 3?** In Grade 3 learners work with analogue and digital clocks using 12-hour format. In Grade 4 learners move onto digital 24-hour format. Once learners have been lernt to tell the time, further practise can take place during mental mathematics time. Learners continue to read calendars. **Calculations and problem-solving with time include** • calculation of the number of days between any two dates within the same or consecutive years • calculation of time intervals where time is given in minutes and/or hours only • calculations should be limited to whole numbers and common fractions Learners should continue to read clocks and tell the time at frequent intervals during the entire year. This can be done during the mental Mathematics time or just before or after break time or before learners go home, or when they come in from a class in another venue.	**6 hours**

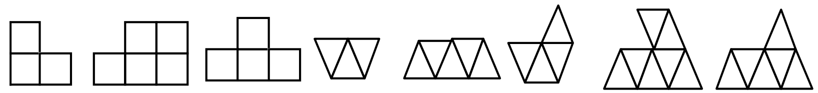
GRADE 4 TERM 1				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
ASSESSMENT: At this stage learners should have been assessed on: • time • multiplying and dividing with single-digit numbers • number patterns				

GRADE 4 TERM 1				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
DATA HANDLING	**5.1** **Collecting and organising data**	Collect data using tally marks and tables for recording	**What is different to Grade 3?** The following are new in Grade 4 • learners read, interpret, analyse and summarise pie charts, where the information is presented in fractions only • learners read, analyse data represented in word i.e. short paragraphs - the data presented in words should be represented in other forms and then analysed • learners summarise the information in the graph by writing a short paragraph Teachers in the phase should ensure that different topics are chosen for data collection and analysis in each of the grades.	**10 hours**
	5.2 **Representing data**	Draw a variety of graphs to display and interpret data including: • pictographs (one-to-one representation) • bar graphs	**Complete data cycle including making class bar graph: context personal data** The complete data cycle includes asking a question, collecting data, organising data, representing data, analyzing and interpreting data and reporting on the data. The class works through the whole data cycle to make a class bar graph using contexts that relate to themselves, their class, their school or their family. Making a class graph allows you to assess and consolidate the knowledge and skills learners have learned and remembered from Grade 3 e.g. Do they know • where and how to label the graph (graph title)? • where and how to label the axes (axes titles)? • how to place the bars? • how to read the graph? In the first example of the year, you will need to guide learners on how to write a complete paragraph that summarises the data. Suitable topics include: • favourite sports / favourite movies / favourite music / favourite TV programmes / foods or cool drinks/ favourite colours, etc. • models/makes of cars passing the school grounds	

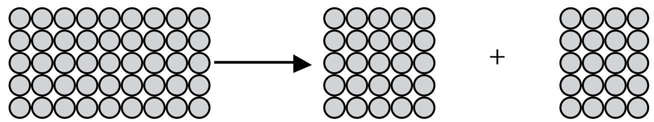
GRADE 4 TERM 1				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
	5.3 **Analysing, interpreting and reporting data**	Critically read and interpret data represented in • words • pictographs • bar graphs • pie charts Analyse data by answering questions related to data categories	**Analysing graphs** Analyse graphs on environmental or socio-economic contexts by answering questions on graphs. Both graphs and questions to be provided by teacher or textbook. Learners should work with at least • 2 pie graphs: where the information is given in fraction-form and not percentages • 1 pictograph • 1 bar graph Suitable topics include: • quantities of materials recycled in the town, province, country • quantities of recycling materials collected by schools around the country • sources of lighting and heating in SA • kinds of toilets in SA homes • kinds of homes in SA	
		Summarise data verbally and in short written paragraphs	**Complete data cycle including drawing bar graph: context environmental data** Work through whole data cycle to create an individual bar graph using an environmental context. Suitable topics include: • how much water is used per family/per household per day • amount and kinds of litter in school playgrounds • amount and kinds of recycling material collected by the school	

GRADE 4 TERM 1				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
SPACE AND SHAPE	**3.1** **Properties of** **2-D shapes**	**Shapes learners need to know and name** • Regular and irregular polygons: - triangles - squares, rectangles - other quadrilaterals - pentagons - hexagons • Circles **The characteristics which learners use to distinguish, describe, sort and compare shapes** • straight and/curved sides • number of sides **Further activities to focus onthe characteristics of shapes** Draw 2-D shapes on grid paper	**What is different to Grade 3?** Pentagons, hexagons and irregular quadrilaterals are new shapes. Learners were not taught to count the number of sides of straight-sided 2-D shapes (polygons) **Shapes and their distinguishing** characteristics There are two ways in which learners distinguish shapes in Grade 4. 1. Check whether the shapes have straight or curved sides. Two dimensional shapes can be grouped as follows: • *Closed shapes with curved sides only*: **Examples**  The only 2-D shape that has curved sides that learners are expected to name is the circle. They should, however, be exposed to other shapes with curved sides which they are not expected to name, e.g. all the shapes above have curved sides. • *Closed shapes with curved and straight sides*: **Examples**  Learners are not expected to name any of these shapes. • *Closed shapes with straight sides only*: **Examples** of polygons. 	

GRADE 4 TERM 1				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
SPACE AND SHAPE	**3.1** **Properties of** **2-D shapes**		2. When looking at the group of shapes with straight sides, learners group them according to the number of sides. Closed shapes with straight sides are called polygons. **Polygons** A regular polygon is a straight-sided closed shape of which all sides are equal and all angles the same size. Learners do not have to know the terms “regular” and “irregular”. Learners should be able to identify polygons according to their number of sides. They need to be able to identify any hexagon or pentagon. **Examples** of hexagons  **Examples of** pentagons  Learners need to know that all closed shapes with 4 straight sides are called **quadrilaterals.** **Examples** of quadrilaterals.  In Grade 4 learners need to identify and name **squares** and **rectangles**. For other quadrilaterals they use the group name, quadrilateral. Learners should be exposed to a range of different triangles, but are not expected to name types of triangles in Grade 4.	

GRADE 4 TERM 1				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
SPACE AND SHAPE	**3.1** **Properties of 2-D shapes**		**Activities to focus learners on** characteristics **of shapes** Most commercially available sets of 2-D shapes do not show irregular shapes. They are however easy to cut out of cardboard. Learners can draw irregular shapes on grid paper, or if they have geoboards, they can create irregular shapes on geoboards. Learners can also put cut-out card or plastic shapes together to make composite irregular shapes. Some examples are given below. This is further described under transformations.  **Written exercises and recording** Learners should do practical work with concrete apparatus, but they should also do written exercises. In Term 1 learners should be introduced to all the 2-D shapes they need to know. They should learn about the characteristics that they need to use to identify shapes. They should draw 2-D shapes and if they have apparatus create composite shapes or create shapes on geoboards. They should do written exercises involving 2-D shapes.	**5 hours**

GRADE 4 TERM 1				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Multiplication and division	**Number range for calculations** • Multiplication of at least whole 2-digit by 2-digit numbers • Division of at least whole 3-digit by 1-digit numbers **Calculation techniques** Use a range of techniques to perform and check written and mental calculations of whole numbers including • estimation • building up and breaking down numbers • rounding off and compensating • doubling and halving • using a number line • using addition and subtraction as inverse operations • using multiplication and division as inverse operations **Number range for multiples and factors** Multiples of 1-digit numbers to at least 100 **Properties of whole numbers** Recognize and use the commutative; associative; and distributive properties of whole numbers **Solving problems** • Solve problems in contexts involving whole numbers, including - financial contexts - measurement contexts	This is the second time that learners do multiplication and division in Term 1. Learners should already be familiar with the multiplication tables to 10 x 10 and be able to use these in multiplying and dividing 2-digit numbers In Term 1, learners should revise and consolidate work done in Grade 3 .i.e. • learners multiply at least 2-digit by 2-digit numbers • learners divide at least whole 2-digit by 1-digit numbers **What is different to Grade 3?** Rounding off to the nearest 10, to estimate answers. **Learners should do context free calculations and solve problems in contexts** Remember, that it helps learners to become more confident in and more independent at Mathematics, if they have techniques • to check their solutions themselves • to judge the reasonableness of their solutions **Judging reasonableness of solutions** Learners should estimate their answers before calculating. They can round off the numbers involved in the calculations. Learners can round off to the nearest 10 when multiplying or dividing with 2-digit numbers **Checking solutions** • Learners should know that they can check a division calculation by multiplying **Example:** If 69 ÷ 3 = 23; then 23 x 3 = 69 • When learners need to check a division calculation with a remainder, they will need to be taught to first multiply and then add the remainder **Example:** If 70 ÷ 3 = 23 remainder 1; then 23 x 3 = 69 therefore 69 + 1=70 • Using the inverse operation to check solutions is one reason for teaching multiplication and division together. Another reason for looking at multiplication and division together is that we almost always use multiplication to solve division. In Grade 4 learners break up numbers to multiply. There are different ways of doing this. Sometimes the numbers involved in the calculation make different methods easier or more difficult. Learners have already seen how to use the associative and commutative properties to make multiplication easier.	**5 hours**

GRADE 4 TERM 1				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Multiplication and division	• Solve problems involving whole numbers, including - comparing two or more quantities of the same kind (ratio) - comparing two quantities of different kinds (rate) - grouping and equal sharing with remainders	**Multiplication and the distributive property of multiplication over addition/ subtraction** One way for learners to understand how and why the distributive property works, is to break up arrays and write number sentences to describe the arrays. **Example**  9 x 6 = 5 x 6 + 4 x 6 The distributive law allows you to split the number and then multiply each part separately. **Using factors to multiply** **Example**: Calculate 47 x 6 47 x 6 = 47 x 2 x 3 = 94 x 3 = (90 + 4) x 3 = 90 x 3 + 4 x 3 = 270 + 12 = 282 **Using the distributive property to multiply** Example: 47 x 5 = 40 x 5 + 7 x 5 ⟶ (using the distributive property) = 4 x 10 x 5 + 35 = 4 x 5 x 10 + 35 = 200 + 35 = 235	

<table>
<tr><th colspan="5">GRADE 4 TERM 1</th></tr>
<tr><th>CONTENT AREA</th><th>TOPICS</th><th>CONCEPTS AND SKILLS</th><th>SOME CLARIFICATION NOTES OR TEACHING GUIDELINES</th><th>DURATION (in hours)</th></tr>
<tr>
<td>NUMBERS, OPERATIONS AND RELATIONSHIPS</td>
<td>1.1
Whole numbers
Multiplication
and
division</td>
<td></td>
<td>
or
47 x 5 = (50 – 3) x 5 --------► (using the distributive property)
= 50 x 5 – (3 x 5)
= 5 x 5 x 10 – 15
= 250 – 15
= 235
Dividing
Learners use what they know about multiplication to do division.
In the past learners have sometimes been taught to write out the whole times table, which they were encouraged to work out by repeated addition. It is better not to limit learners' division ability to repeated addition. Rather let them work with useful and easily remembered multiplication facts, especially multiples of , and then doubling and halving.
Example
75 ÷ 4
Learners can write out a "clue board" of what they know about multiplying by 4
Example:
<table>
<tr><td>4 x 10 = 40
4 x 20 = 80 (doubling the first statement)
4 x 5 = 20 (halving the first statement)
4 x 4 = 16
4 x 3 = 12</td></tr>
</table>
Learners multiply and then subtract to calculate
<table>
<tr><td>Multiply</td><td>Subtract</td></tr>
<tr><td>4 x 10 = 40</td><td>75 – 40 = 35</td></tr>
<tr><td>4 x 5 = 20</td><td>35 – 20 = 15</td></tr>
<tr><td>4 x 3 = 12</td><td>15 – 12 = 3</td></tr>
</table>
75 ÷ 4 = 10 + 5 + 3 + remainder 3 = 18 remainder 3
</td>
<td></td>
</tr>
</table>

GRADE 4 TERM 1				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Multiplication and division		Learners should check their calculations by multiplying: 18 x 4 = 72 therefore 72 + 3 = 75. **Kinds of problems** Sharing, grouping, treating groups as units, rate, See the description of problem types at the end of the grade notes	
ASSESSMENT: At this stage learners should have been assessed on: • data handling • 2-D shapes • multiplication and division of 2-digit numbers by 1-digit numbers				
REVISION				**5 hours**

GRADE 4 TERM 2				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
NUMBERS, OPERATIONS AND RELATIONSHIPS	**Mental Mathematics**	**Mental calculations involving** • Addition and subtraction facts for: - units - multiples of 10 - multiples of 100 - multiples of 1 000 • Multiplication of whole numbers to at least 10 x 10 • Multiplication facts for: - units by multiples of 10 - units by multiples of 100 **Number range for counting, ordering, comparing and representing and place value of digits** • Count forwards and backwards in 2s, 3s, 5s, 10s, 25s, 50s, 100s between 0 and at least 10 000. • Order, compare and represent numbers to at least 4-digit numbers • Represent odd and even numbers to at least 1 000 • Recognize the place value of digits in whole numbers to at least 4-digit numbers • Round off to the nearest and 10, 100, 1 000	The mental Mathematics programme should be developed systematically over the year. Learners should not simply be asked to do random calculations each day. As learners cover topics and develop calculating techniques in the main part of the lesson, so aspects of these can be incorporated into the mental Mathematics programme: concepts and skills are developed through the main lesson, and then practised, sometimes with smaller number ranges in the mental Mathematics programme. From Term 2 onwards the number range should be increased towards towards that required by the end of the year. The mental Mathematics should systematically develop three aspects of learners number knowledge • Number facts - number bonds: addition and subtraction facts for ◊ units ◊ multiples of 10 ◊ multiples of 100 ◊ multiples of 1000 - times tables: multiplication of whole numbers to at least 10 x 10 • Calculation techniques - doubling and halving. - using multiplication to do division. - multiplying by and - multiplying by 10, 100 and 1 000. - multiplying by multiples of 10, 100 and 1 000. - dividing by 10, 100 and 1 000. - building up and breaking down numbers. - rounding off and compensating: rounding off to 10, 100 and 1 000. - adding and subtracting of units, multiples of 10 and multiples of 100 to/from any 4-digit number.	**10 minutes every day**

GRADE 4 TERM 2				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
NUMBERS, OPERATIONS AND RELATIONSHIPS	**Mental Mathematics**	**Calculation techniques** Use a range of techniques to perform and check written and mental calculations with whole numbers including • estimation • building up and breaking down numbers • rounding off and compensating • doubling and halving • using a number line • using addition and subtraction as inverse operations • using multiplication and division as inverse operations **Number range for multiples and factors** Multiples of 1-digit numbers to at least 100 **Properties of whole numbers** Recognize and use the commutative, associative, and distributive properties of whole numbers	• **Number concept** - counting forwards and backwards (in 2s, 3s, 5s, 10s, 25s, 50s, 100s) between 0 and at least 10 000 - ordering and comparing up to 4-digit numbers - place value up to 4-digit numbers - building up and breaking down numbers - odd and even numbers - multiples **Recommend techniques** • building up and breaking down numbers • rounding off and compensating • doubling and halving • reciprocal relationship between multiplication and division • inverse relationship between addition and subtraction Some mental Mathematics can be done without apparatus, but it is often useful to do mental Mathematics with apparatus **Recommended apparatus** • numbered or un-numbered numberline • a number grid • place value cards • counting beads	

GRADE 4 TERM 2				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Counting, ordering, comparing, representing and place value of digits	**Number range for counting, ordering, comparing and representing, and place value of digits** • Count forwards and backwards (in 2s, 3s, 5s, 10s, 25s, 50s, 100s) between 0 and at least 10 000 • Order, compare and represent numbers to at least 4-digit numbers • Represent odd and even numbers to at least 1 000 • Recognize the place value of digits in whole numbers to at least 4-digit numbers • Round off to the nearest 10, 100 and 1 000	**What is different to Term 1?** • Counting number range increased to 10 000 • Rounding off to the nearest 10 and 100 • Number range for place value, ordering, comparing and representing numbers increased to 4 digits. **See notes for Term 1** All work developed here can be practised throughout the year in the mental Mathematics programme.	**1 hour**

GRADE 4 TERM 2				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Addition and Subtraction	**Number range for calculating** Addition and subtraction of whole numbers of at least 4-digits. **Calculation techniques** Use a range of techniques to perform and check written and mental calculations with whole numbers including • estimation • building up and breaking down numbers • rounding off and compensating • doubling and halving • using a number line • using addition and subtraction as inverse operations **Properties of whole numbers** Recognize and use the commutative and associative properties of whole numbers **Solving problems** Solve problems in contexts involving whole numbers, including financial contexts	**What is different to Term 1?** • In Term 2, learners add and subtract numbers up to 4 digits. • Rounding-off includes rounding off to the nearest 1 000 as a way of estimating answers. **Learners should solve problems in contexts and do context free calculations** Learners continue to • check their solutions themselves by using the inverse operation • judge the reasonableness of their solutions by rounding off numbers and estimating answers. The calculation techniques continue to mostly involve breaking down numbers. As the numbers learners work with get larger, learners may begin to lose track of some numbers when they break up numbers to do calculations. Using brackets is helpful to show grouping of numbers and so helps learners keep track of what they are doing. Since the operations in brackets have to be done first, it removes any confusion about the order of operations. Learners thus do not have to learn rules such as BODMAS if brackets are used routinely to indicate which operations have to be done first. • **Breaking down all numbers according to place value parts to add** **Example** Calculate 5 362 + 2 486 5 362 + 2 486 = 5 000 + 300 + 60 + 2 + 2 000 + 400 + 80 + 6 2 + 6 = 8 =5 000 + 2 000 + 300 + 400 + 60 + 80 + 2 + 6 **OR** and 60 + 80 = 140 =7 000 + 700 + 140 + 8 and 300 + 400 = 700 =7 848 and 5 000 + 2 000 = 7 000 means 5 362 + 2 486 = 7 848 • **Adding on by breaking down the number to be added** **Example** Calculate 5 362 + 2 486 5 362 + 2 000 → 7 362 + 400 → 7 762 + 80 →7 6 842 + 6 → 7 848	**4 hours**

GRADE 4 TERM 2				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Addition and Subtraction		• **Filling up tens by breaking down the number to be added.** This can also be called rounding off and compensating. Here, compensating means that whatever is added, must be subtracted again so that the statements remain equivalent. **Example** Calculate 2 486 + 48 2 486 + 48 = (2 486 + 14) – 14 + 48 = 2 500 + (48 –1 4) = 2 500 + 34 = 2 534 • **Breaking down both numbers to subtract** **Example** Calculate 4 687 – 2 143 4 687 – 2 143 = 4 000 + 600 + 80 + 7 – 2 000 - 100 – 40 – 3 **OR** 7 – 3 = 4 = (4 000 – 2 000) + (600 – 100) + (80 – 40) + (7 – 3) and 80 – 40 = 40 = 2 000 + 500 + 40 + 4 and 600 – 100 = 500 **= 2 544** and 4 000 – 2 000 = 2 000 This means that: 4 687 – 2 143 = 2 000 + 500 + 40 + 4 **= 2 544** • **Breaking down all the numbers to add using compensation (counterbalance)** Learners cannot subtract 4 from 3 or 80 from 40. Instead of breaking down 743 into 700 + 40 + 3 they will break down 743 into 600 + 130 + 13. Then they can subtract 4 from 13 and 80 from 130. Calculate: 8 743 – 5 684 8 743 – 5 684 = (8 000 + 700 + 40 + 3) – 5 000 – 600 – 80 – 4 = (8 000 + 600 + 130 + 13) – 5 000 – 600 – 80 – 4 (breaking up 743 into 600 + 130 + 13) = (8 000 – 5 000) + (600 – 600) + (130 – 80) + (13 – 4) = 3 000 + 0 + 50 + 9 = 3 059	

GRADE 4 TERM 2				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Addition and Subtraction		• **Subtracting by breaking down the number to be subtracted** Calculate 4 687 – 2 143 4 687 – 2 000 → 2 687 – 100 → 2 587 – 40 → 2 547 – 3 → 2 544 **Kinds of problems** Summation, Increase and decrease, comparison by difference; comparison by ratio See the description of problem types at the end of the grade notes	
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.2** **Common fractions**	**Concepts, skills and number range for Term 1** **Solving problems** Solve problems in contexts involving fractions, including grouping and equal sharing **Describing and ordering fractions** • Compare and order common fractions of different denominators (halves, thirds, quarters, fifths, sixths, sevenths, eighths) • Describe and compare common fractions in diagram form **Calculations with fractions:** • Recognize, describe and use the equivalence of division and fractions • Addition of common fractions with same denominators **Equivalent forms:** Recognize and use equivalent forms of common fractions (denominators which are multiples of each other)	**What is different to Grade 3?** Sevenths are new. There are different ways to understand fractions. This means that learners should develop the concept of fractions in a variety of ways. Problem-solving contexts can help learners to understand many ways of thinking about fractions. A variety of problems should be given to learners. See the types of fractions problems stated at the end of the Grade notes. The concept of a fraction should first be developed before learners focus on equivalence and calculating. Learners can also work with apparatus and diagrams. Different diagrams or apparatus develop different ways of thinking about fractions: • Region or area models develop the concept of fractions as part of a whole. If used in particular ways they can also develop the concept of a fraction as a measure. **Examples** of area models include circles cut into fraction pieces or diagrams of pies, rectangles or other geometric shapes divided into fraction pieces (paper folding), fractions using square or dotty grid paper, geoboards • Length or measurement models can be used to develop the concept of fractions as part of a whole and if used in particular ways also fraction as a measure **Examples** of length models include fraction strips, Cuisenaire rods, number lines • Set models develop the concept of a fraction of a collection of objects and can lay the basis for thinking about a fraction of a number e.g. $\frac{1}{3}$ of 12 **Examples** of set models include counters of any kind in different arrangements	

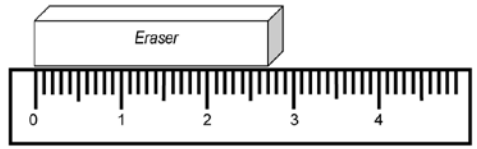
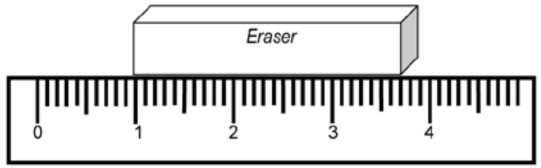
GRADE 4 TERM 2				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.2** **Common fractions**		Learners should not only work with one kind of model, because this can limit their understanding of fractions. For example, fractions in diagram forms should include region models (circles and other geometric shapes divided into fraction parts), length models (including number lines) and set models (which show collections of objects). In Term 1 learners should revise and consolidate what they learned about fractions in Grade 3. Learners should solve problems as well as work with apparatus and diagrams involving area, length and set models to ensure that they • understand the relationship between fractions and division i.e. if you share amongst 3 learners you will be making thirds • are able to name fractions.Terminology like “3 over 4” should be avoided as it tends to encourage learners to think about each fraction as two different numbers, rather than $\frac{3}{4}$ being a number which is greater $\frac{1}{2}$ than but less than 1. When naming fraction parts it is useful for learners to rather use the form “3 quarters”. Learners should, through work with apparatus, diagrams and solving problems, learn the new fractions that they will deal with in Grade 4.	**6 hours**

ASSESSMENT:

At this stage learners should have been assessed on:

- 4-digit numbers
- adding and subtracting with 4-digit numbers
- fractions

GRADE 4 TERM 2				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
MEASUREMENT	**4.1** **Length**	**Practical measuring of 2-D shapes and 3-D objects by** • estimating • measuring • recording • comparing and ordering **Measuring instruments** rulers, metre sticks, tape measures, trundle wheels **Units** millimetres (mm), centimetres (cm), metres (m), kilometres (km) **Calculations and problem-solving related to length** Solve problems in contexts related to length Conversions include converting between • millimetres (mm), and centimetres (cm) • centimetres (cm) and metres (m) • metres (m) and kilometres (km) Conversions are imited to whole numbers and fractions	**What is different to Grade 3?** In Grade 3 learners work with non-standard or informal units when measuring. They are introduced to metres and centimetres. They use rulers to measure in centimetres only. In Grade 3 learners use metre sticks or lengths of string to measure in metres. They do not learn that there are 100 cm in 1 m. They do not do conversions between units. In Grade 4 learners work with new measuring instruments. Millimetres and kilometres are introduced and learners do conversions between units. Grade 4 learners need to understand and learn the relationship between metres and centimetres, centimetres and millimetres, metres and kilometres. **Reading instruments for measuring lengths** Learners should measure lengths using • rulers (mm, cm) • metre sticks (m) • tape measures (m, cm, mm) • trundle wheels (m) Learners find rulers easy to use for measuring because: • centimetres are always numbered • there are always 10mm divisions in a centimetre In Grade 4 learners normally record their measurements with rulers as millimetres or centimetres or millimetres and centimetres e.g. the pencil is 11 centimetres and 3 millimetres long. Learners can sometimes record their measurements in centimetres and fractions of centimetres e.g. the eraser is $2\frac{1}{2}\ cm$ long. This is easy to do because on a ruler, the 5th millimetre gradation line is normally longer. Once learners have learned, from reading commercial mass and capacity packaging, that is the same as 2,5, they will also be able to use the decimal 5 in their recording i.e. 2,5cm long. Check that learners know to start measuring from zero, or to subtract the initial measurement from the final measurement.	

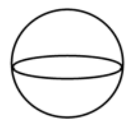
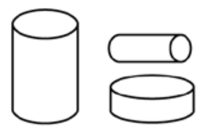
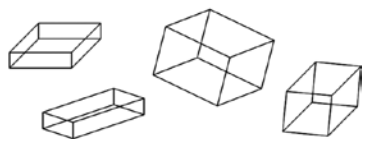
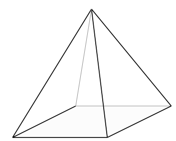
GRADE 4 TERM 2				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
MEASUREMENT	**4.1** **Length**		This is illustrated below. **Example:**  The eraser is $2cm$ + $7mm$ or $20mm$ + $7mm$ or $27mm$ long  The eraser is ($3cm$ –$1cm$) + $7mm$ = $2cm$ + $7mm$ or $20mm$ + $7mm$ or $27mm$ long Once learners have some experience of measuring in each unit, they should estimate before every measurement. It is useful to have everyday referents as comparisons e.g. the width of a door and height of a window are often 1 m, the width of a match is often 1 mm. Tape measures that are longer than 1 m and 2 m should also be used e.g. builder tapes or surveyor tapes can be more than 10 metres. The longer measuring tapes are more difficult to use. Learners cannot only read off the number corresponding with the final measurement. They also need to know for how many metres they have unrolled the tape, e.g, the distance may be 4 m and 78 cm, but the tape may only show the number 78. When using the longer measuring tapes, estimation becomes even more important. **Compare and order lengths** up to 4 digits in mm, cm, m, km In Grades R to 2 learners place objects next to each other and discuss which is longer or shorter. In the Intermediate Phase learners need to compare lengths and heights when given drawings of objects with specified lengths, or written descriptions of objects with specified lengths. At first learners can compare length given in the same units, but once they know how to convert between units, they can compare lengths and heights of objects which are specified in different units. **Calculations (including conversions) and problem-solving** Measurement provides a context in which to practise skills acquired in *Numbers, Operations and Relationships*. The skills, operations and number ranges that learners have worked with so far in the year, are given below.	**7 Hours**

GRADE 4 TERM 2				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
MEASUREMENT	**4.1** **Length**		**Estimate and calculate using mm, cm, m, km** • rounding numbers up or down to the appropriate unit of length • rounding off to 10, 100, 1 000 • addition and subtraction of up to 4-digit numbers • multiplication of 2-digit by 1-digit numbers • division of 2-digit by 1-digit numbers • add fractions in measurement contexts (using only halves, thirds, quarters, fifths, sixths, sevenths and eighths) By the end of the year the number ranges and operations can be increased to include everything that is covered under *Numbers, Operations and Relationships.* **Solve problems relating to distance and length** Include rate and ratio problems **Conversions between units** $mm \leftrightarrow cm$ $cm \leftrightarrow m$ $m \leftrightarrow km$ Converting between the units of measurement above provides a context for practising multiplying and dividing by 10; 100 and 1 000. Conversions should be limited to whole numbers and fractions given only as halves, thirds, quarters, fifths, sixths, sevenths, eighths. In Grade 4 learners do not calculate using decimals. When doing division they sometimes have a remainder e.g. 37 ÷ 4 = 9 remainder 1. Similarly when converting between units, they may give their answers in a combination of units e.g. • $35mm = 3cm$ and $5mm$ or $3\frac{1}{2}\ cm$ • $526cm = 5m$ and $26cm$ • $2\ 500m = 2m$ and $500cm$ • $4\frac{1}{2}\ km = 4\ 500m$	

GRADE 4 TERM 2

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Multiplication	**Number range for calculations** • Multiplication of at least whole 2-digit by 2-digit numbers **Calculation techniques** Use a range of techniques to perform and check written and mental calculations with whole numbers including • estimation • building up and breaking down numbers • rounding off and compensating • doubling and halving **Number range for multiples and factors** Multiples of 1-digit numbers to at least 100 **Properties of whole numbers** Recognize and use the commutative; associative; and distributive properties of whole numbers	**What is different to Term 1?** • In Term 2, learners multiply 2-digit by 2-digit numbers. • Rounding includes rounding off to the nearest 1 000 as a way of estimating answers. **Learners should do context free calculations and solve problems in contexts and do context free calculations** Learners should continue to judge the reasonableness of their solutions e.g. by estimating before calculating, using rounding off to the nearest 10 As the numbers learners work with get larger, learners may begin to lose track of some numbers when they break up numbers to do calculations. Using brackets is helpful to show grouping of numbers and so helps learners keep track of what they are doing. Since the operations in brackets have to be done first, it removes any confusion about the order of operations. Learners thus do not have to learn rules such as BODMAS if brackets are used routinely to indicate which operations have to be done first. **Using the distributive property to multiply** **Example:** Calculate 47 x 45 47 x 45 = 47 x (40 + 5) --------▶ (breaking up one number) =47 x 40 + (47 x 5) --------▶ (using the distributive property) =1 880 + 235 =2 115 **Or** 47 x 45 = 47 x (50 – 5) --------▶ (rounding up and compensating) =47 x 50 – (47 x 5) --------▶ (using the distributive property) =2 350 – 235 =2 115 Checking the reasonableness by rounding off **Example:** 47x45≈47x50≈2 350 (by approximating the multiplicand). 47x45≈50x45≈2 250 (by approximating the multiplier).	

GRADE 4 TERM 2				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Multiplication		**Breaking down numbers into factors to multiply** **Examples**: Calculate a) 47 x 12 = 47 x 2 x 6 = 47 x 2 x 2 x 3 = 94 x 2 x 3 = 188 x 3 = (100 + 80 + 8) x 3 = 300 + 240 + 24 = 564 b) 53 x 45 = 53 x 9 x 5 = 53 x 3 x 3 x 5 = 159 x 3 x 5 = 477 x 5 = (400 + 70 + 7) x 5 = 2 000 + 350 + 35 = 2 385	**6 hours**
		Solving problems • Solve problems in contexts involving whole numbers, including financial contexts • Solve problems involving whole numbers, including - comparing two or more quantities of the same kind (ratio) - comparing two quantities of different kinds (rate)	**Kinds of problems** Treating groups as units, rate (see the description of problem types at the end of the Grade 4 notes)	

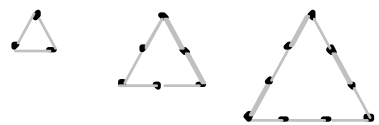
<table>
<tr><th colspan="5">GRADE 4 TERM 2</th></tr>
<tr><th>CONTENT AREA</th><th>TOPICS</th><th>CONCEPTS AND SKILLS</th><th>SOME CLARIFICATION NOTES OR TEACHING GUIDELINES</th><th>DURATION (in hours)</th></tr>
<tr>
<td>SHAPE AND SPACE</td>
<td>3.2
Properties of 3-D objects</td>
<td>Objects learners need to know and name
• rectangular prisms
• spheres
• cylinders
• cones
• square-based pyramids
characteristics which learners use to distinguish, describe, sort and compare objects
• shapes of faces
• flat and curved surfaces
Further activities to focus learners on characteristics of objects
Create 3-D models using cut-out polygons</td>
<td>What is different to Grade 3?
Learners focus on the same 3-D geometrical objects, but in Grade 3 they spoke of
• boxes, and in Grade 4 they call these rectangular prisms
• ball shapes and in Grade 4 they call these spheres
Objects and their distinguishing characteristics
There are two ways in which learners distinguish 3-D objects in Grade 4.
1. Check whether they have flat or curved surfaces. Three dimensional objects can be grouped as follows:
• <u>Objects with a curved surface only:</u>
Example: a sphere

• <u>Objects with flat and curved surfaces</u>
Cones Cylinders
 
• <u>Objects with only flat surfaces.</u> In Grade 4 learners only identify and name them.
Examples
rectangular prisms. pyramids: square- base pyramid
 
2. When looking at the group of objects with flat surfaces, learners should know that the flat surfaces of a 3-D object are called faces. They describe these objects according to the kinds of 2-D shapes that make up the flat surfaces e.g. the faces of a rectangular prism can all be rectangles or some can be squares. Square-based pyramids have one square face and the other faces are triangles.</td>
<td>5 hours</td>
</tr>
</table>

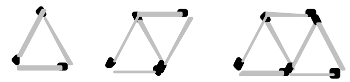
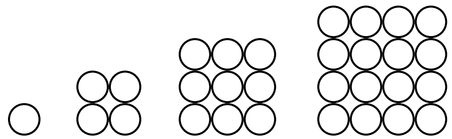
GRADE 4 TERM 2				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
SHAPE AND SPACE	**3.2** **Properties of 3-D objects**		**Making models of 3-D objects** Making 3-D objects by putting together cut-out polygons, helps to focus attention on the shapes of the faces of the 3-D objects. **Interpreting drawings of 3-D objects and written exercises** Learners need to work with real objects. However, they also need to do written exercises on 3-D objects. Interpreting pictures of 3-D objects is more difficult than working with the real objects. Learners should practise interpreting drawings of 3-D objects. They should identify and name 3-D objects in drawings; compare 3-D objects from drawings; identify everyday objects that look like geometric objects e.g. a milk carton looks like a rectangular prism; describe the surfaces of objects when shown drawings of 3-D objects; match the 2-D shapes that have the same shape as the face of 3-D objects.	

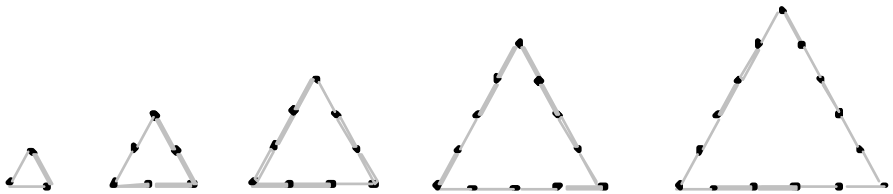
ASSESSMENT:

At this stage learners should have been assessed on:

- length
- multiplying 2-digit numbers by 2-digit numbers
- 3-D objects

GRADE 4 TERM 2				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
PATTERNS, FUNCTIONS AND ALGEBRA	**2.2** **Geometric patterns**	**Investigate and extend patterns** • Investigate and extend geometric patterns looking for relationships or rules of patterns - represented in physical or diagram form - sequences involving a constant difference - of learner's own creation • Describe observed relationships or rules in learner's own words **Input and output values** • Determine input values, output values and rules for the patterns and relationships using flow diagrams **Equivalent forms** • Determine equivalence of different descriptions of the same relationship or rule presented • verbally • in a flow diagram • by a number sentence	**What is different to Grade 3?** In Grade 3 learners copy, extend and describe patterns made with numbers, objects or drawings The descriptions are only verbal. They also createtheir own patterns. The kinds of patterns become more complex in Grade 4. In Grade 4 learners are introduced to a new way to represent patterns: the input-output flow diagram (some learners may have used this in Foundation Phase, but it is not a specification). Learners show the same patterns in different ways: in a diagram, as a verbal description, as a flow diagram and in a number sentence. Sometimes learners are able to see different aspects of a pattern when they change the form in which the pattern is presented. Learners work with patterns that are made from 2-D shapes and 3-D objects or from drawings/diagrams of these shapes and objects. In Patterns, Functions and Algebra we choose geometric patterns that can be re-described using a number pattern (this does not mean that it can't be described in words, in fact the description in words is usually the starting point). In Shape and Space learners also work with visual patterns that are geometric. However, in Shape and Space they are only required to describe the patterns using the language of geometry and to copy the patterns. While many of these patterns can be described using algebraic expressions, this is beyond the scope of Intermediate Phase learners. What kinds of geometric patterns should learners work with? • Simple repeating patterns – but this is really more of a focus in the Foundation Phase **Example:** Complete the pattern  • Patterns in which the shapes grow or decrease in different ways. We can describe these patterns by the way they look. - patterns in which the shape keeps its form, but gets larger (or smaller) in each stage. 	**4 hours**

GRADE 4 TERM 2				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
PATTERNS, FUNCTIONS AND ALGEBRA	**2.2** **Geometric patterns**		- patterns in which a shape or part of a shape is added at each stage  In each of the examples above the patterns are made by adding on the same number of matches in each successive shape. In the top pattern 3 matches are added each time. In the second pattern two matches are added each time. Both patterns show number **patterns with a constant difference.** Most geometric patterns learners see in Grade 4, will be patterns with a constant difference. They are more likely to get patterns with a constant ratio when working only with number sequences. • Patterns with neither a constant difference nor a constant ratio... **Example**  What should learners do? • Copy and extend the pattern. This helps them to understand how the pattern is formed. • Describe the pattern in words - Different learners will describe different aspects of the pattern - You want learners to describe the relationship between shapes in the sequence or rules in their in own words. To do this, learners need to discuss how they made the pattern or to answer the question "How do I get from one stage in the pattern to the next?" Learners need to have opportunities to see that sometimes changing the form of representation (geometric to verbal or to a flow diagram or to a table) can help them to understand the pattern in different ways. Learners should "translate" these geometric sequences into other forms of expression or representation, namely • verbally describe the pattern • number sequences which can also be recorded in a table form.	

<table>
<tr><th colspan="5">GRADE 4 TERM 2</th></tr>
<tr><th>CONTENT AREA</th><th>TOPICS</th><th>CONCEPTS AND SKILLS</th><th>SOME CLARIFICATION NOTES OR TEACHING GUIDELINES</th><th>DURATION
(in hours)</th></tr>
<tr><td>PATTERNS, FUNCTIONS AND ALGEBRA</td><td>2.2
Geometric patterns</td><td></td><td>Example:
Extending the pattern:

Describing the pattern in own words
“It is a pattern of triangles”
“ Each triangle is bigger than the one before”
Describing how they made the pattern or answering the question “how to I get from one stage to the next?”
“I added one more matchstick to each side of each triangle”
“Each triangle has one more matchstick in each side than the triangle on its left”
Recording the number pattern in a table.
When learners fill in the table like the one shown below, they will see that the number of matchsticks used for each triangle is 3 times the position of the triangle in the sequence. They will see that the rule is triangle number times 3. Learners can then be asked to predict how many matches they will use for triangles they have not built, e.g. 10th, 100th etc.
<table>
<tr><td>Triangle number</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>5</td><td>10</td></tr>
<tr><td>Number of matchsticks</td><td>3</td><td>6</td><td>9</td><td></td><td></td><td></td><td></td></tr>
</table></td><td></td></tr>
<tr><td>SHAPE AND SPACE</td><td>3.3
Symmetry</td><td>Recognize, draw and describe line of symmetry in 2-D shapes</td><td>This should include shapes in which there are more than one line of symmetry.
Drawings of 2-D shapes should include those where the line of symmetry is not necessarily vertical.</td><td>2 hours</td></tr>
</table>

GRADE 4 TERM 2				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Addition and subtraction	**Number range for calculating** Addition and subtraction of whole numbers of at least 4 digits. **Calculation techniques** Use a range of techniques to perform and check written and mental calculations with whole numbers including • estimation • building up and breaking down numbers • rounding off and compensating • doubling and halving • using a number line • using addition and subtraction as inverse operations **Number range for multiples and factors** Multiples of 1-digit numbers to at least 100 **Properties of whole numbers** Recognize and use the commutative and associative properties with whole numbers **Solving problems** Solve problems in contexts involving whole numbers, including financial contexts	This is the second time that learners work with addition and subtraction with up to 4-digit numbers in Term 2. Learners revise and consolidate what they have done earlier in the term. See previous notes.	**4 hours**

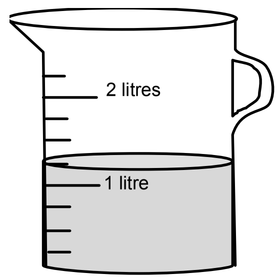
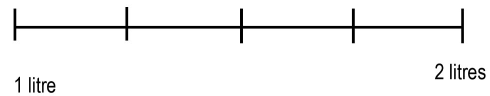
GRADE 4 TERM 2				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Division	**Number range for calculations** • Division of at least whole 3-digit by 1-digit numbers. **Calculation techniques** • Use a range of techniques to perform and check written and mental calculations of whole numbers including - estimation - building up and breaking down numbers - rounding off and compensating - doubling and halving - using multiplication and division as inverse operations **Number range for multiples and factors** • Multiples of 1-digit numbers to at least 100 **Properties of whole numbers** • Recognize and use the commutative; associative; and distributive properties of whole numbers **Solving problems** • Solve problems in contexts involving whole numbers - financial contexts - measurement contexts • Solve problems involving whole numbers, including - grouping and equal sharing with remainders	**What is different to Term 1?** In Term 1, learners revise and consolidate work done in Grade 3.i.e. learners divide at least whole 2-digit by 1-digit numbers. In term 2, learners divide 3-digit numbers by 1-digit numbers **Learners should solve problems in contexts and do context free calculations** The following problem types remain important: • sharing, grouping, rate See the description of problem types at the end of theGrade notes Learners continue • to check their solutions themselves, by using multiplication • to judge the reasonableness of their solutions, by estimating before calculating **Dividing** Learners continue to use what they know about multiplication to do division. With all calculations in Grade 4, learners are not encouraged to treat the digits separately, but rather to consider the number as a whole and to keep in mind the value of the parts of the number. In the past Grade 4 learners were taught to write out the whole times table, which they were encouraged to work out by repeated addition. At other times in the past , Grade 4 learners were encouraged to divide by doing repeated subtraction of the divisor. Most Grade 4 learners got lost in the extensive repeated subtraction of the divisor when dividing 3-digit by 1-digit numbers. When dividing 3-digit by 1-digit numbers, it is preferable for learners to work with the easily remembered multiplication facts of multiples of 10 and then doubling and halving. These large groups of numbers can then be subtracted from the number being divided into. In this way learners do fewer subtractions and are more likely to arrive at the correct answer **Example** 375 ÷ 8 Learners can write out a “clue board” of what they know about multiplying by 8. This generally includes multiplying by 10 and multiples of 10. Multiply by 5 (halve the multiplying by 10 value). Multiply by 2, 4, 8 (through doubling).	**4 Hours**

GRADE 4 TERM 2				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Division	- comparing two or more quantities of the same kind (ratio) - comparing two quantities of different kinds (rate)	Filling in other multiples as they need to use them. **<u>CLUE BOARD</u>** 10 x 8 = 80 20 x 8 = 160 30 x 8 = 240 40 x 8 = 320 5 x 8 = 40 6 x 8 = 48 3 x 8 = 24 Learners multiply and then subtract to calculate. **Multiply** / **Subtract** **40** x 8 = 320 / 375 – 320 = 55 **6** x 8 = 48 / 55 – 48 = **7** 375 ÷ 8 = **40** + **6** + remainder **7** = **46** remainder **7** Learners should check their calculations by multiplying: 46 x 8 = 368, and 368 + 7 = 375. Example of checking reasonableness by rounding off With division it makes more sense for learners to round off the dividend to a multiple of the divisor e.g. 400 ÷ 8 = 50 and 320 ÷ 8 = 40. Therefore, the answer should lie between 40 and 50.	
ASSESSMENT: At this stage learners should have been assessed on: • dividing 3-digit numbers by 1-digit numbers • adding and subtracting 4-digit numbers • geometric patterns				
REVISION				**4 hours**
Assessment (Half-yearly)				**6 hours**

GRADE 4 TERM 3				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
NUMBERS, OPERATIONS AND RELATIONSHIPS	**Mental Mathematics**	**Mental calculations involving**: • Addition and subtraction of: - units - multiples of 10 - multiples of 100 - multiples of 1 000 • Multiplication of whole numbers to at least 10 x 10 • Multiplication facts of: - units by multiples of 10 - units by multiples of 100 • **Number range for counting, ordering, representing and place value of digits** count forwards and backwards in 2s, 3s, 5s, 10s, 25s, 50s, 100s) between 0 and at least 10 000 • order, compare and represent numbers to at least 4-digit numbers • represent odd and even numbers to at least 1 000 • recognize the place value of digits in whole numbers to at least 4-digit numbers • round off to the nearest 10, 100 or 1 000. **Calculation techniques** Use a range of techniques to perform and check written and mental calculations of whole numbers including • estimation • building up and breaking down numbers	The mental Mathematics programme should be developed systematically over the year. Learners should not simply be asked to do random calculations each day. As learners cover topics and develop calculating techniques in the main part of the lesson, so aspects of these can be incorporated into the mental Mathematics programme: concepts and skills are developed through the main lesson, and then practised, sometimes with smaller number ranges in the mental Mathematics programme. See further notes in Term 1 and Term 2	**10 minutes every day**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**Mental Mathematics**	• rounding off and compensating • doubling and halving • using a number line • using addition and subtraction as inverse operations • using multiplication and division as inverse operations **Number range for multiples and factors** Multiples of 1-digit numbers to at least 100 **Properties of whole numbers** Recognize and use the commutative; associative; and distributive properties of whole numbers		

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
MEASUREMENT	**4.3** **Capacity/ volume**	**Practical measuring of 3-D objects by** • estimating • measuring • recording • comparing and ordering **Measuring instruments** measuring spoon, measuring cups, measuring jugs **Units** millilitre (ml) , litres (l) **Calculations and problem-solving related to capacity/volume include:** • Solve problems in contexts using capacity • Convert between litres and millilitres, limited to examples of whole numbers and fractions	**What is different to Grade 3?** In Grade 3 learners work with non-standard or informal units when measuring capacity. They also work with litres and millilitres. They do not learn that there are 1 000 millilitres in 1 litre. They do not do conversions between units. They work with measuring cups and measuring spoons. They begin to work with measuring jugs, but only read off measurements where the calibration line is numbered. Grade 4 learners work with new measuring instruments, and convert between units. Grade 4 learners need to • consolidate their sense of how much 1 litre is; • further develop a sense of how much 1 millilitre is; • understand and know the relationship between the two units of capacity; and • read any measurement on a measuring jug i.e. at both numbered and unnumbered calibration lines. **What is capacity? What is volume?** **Capacity** is the amount of substance that an object can hold or the amount of space inside the object. **Volume** is the amount of space that an object occupies. So a bottle can have a 1 litre capacity, but it may not be filled to its full capacity. It could for example, only contain a volume of 250 ml. **Measuring capacity/ volume and reading capacity/ volume measuring instruments** Learners find it easy to measure with measuring spoons or measuring cups, because this requires filling them and pouring the contents out. Measuring with calibrated measuring jugs or other instruments with numbered and un-numbered gradation lines is more difficult. Learners need to be taught the skills involved. These include • knowing where to stand to read the measuring jug correctly • knowing how to read the numbered gradation lines and to calculate what the unnumbered gradation lines mean. **Learners need to read** • different kinds of measuring jugs • measuring jugs on which the numbered intervals/gradation lines/calibration represent different intervals /amounts • measuring jugs on which there are a different number of un-numbered intervals within each numbered interval.	**6 Hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
MEASUREMENT	**4.3** **Capacity/ volume**		Learners need practice with examples in which the numbered intervals are divided into: - 2 un-numbered intervals - 4 un-numbered intervals - 5 un-numbered intervals - 10 un-numbered intervals An example is given below. Here the numbered gradation lines on the jugs show 1-litre amounts.  Let's think about the gradations as a number line. There are 4 spaces between each litre.  This means that each small space shows 1 000ml ÷ 4 = 250ml The liquid is filled to 1 space above 1 litre i.e. 1 000ml + 250ml = 1 250ml It is sometimes easier and cheaper to get a range of syringes with calibrated gradation lines, than it is to get a range of measuring jugs. Learners will learn the same measurement reading skills if they work with syringes than with jugs. **Compare capacities** up to 4 digits in ml, l Learners should sequence containers marked in millilitres and / or litres. Here learners need to be able to translate the decimal numbers on some packaging into fractions e.g. 1,5 litres of cool drink is the same as $1\frac{1}{2}$ litres of cool drink. One should also choose examples that allow learners to realize that the height of a container is **not** directly proportional to the capacity and that learners need to take into account the diameter of the container.	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
MEASUREMENT	**4.3** **Capacity/ volume**		**Recording capacities** Because learners work only with decimal fractions in Grade 6, they should record capacities as • litres only e.g. 5 litres • millilitres only e.g. 250ml • litres and millilitres together e.g. 2 litres and 80 millilitres • litres and fractional parts of litres e.g. $2\frac{3}{4}$ litres • since learners will be reading half litres in decimal-form on some packaging they can also write half litres in decimal-form. However but this is not a requirement in this grade. **Calculations (including conversions) and problem-solving** Measurement provides a context in which to practise skills acquired in **Numbers, Operations and Relationships.** The skills, operations and number ranges required are given below. **Estimate and calculate** using ml, l • rounding numbers up or down to the most appropriate unit of measurement • rounding off to 10, 100, 1 000 • addition and subtraction of up to 4-digit numbers • multiplication 2-digit by 2-digit numbers • division: 3-digit by 1-digit numbers • counting in fractions e.g. $\frac{1}{4}$ litre, $\frac{3}{4}$ litres, 1 litre as they measure with measuring cups hold $\frac{1}{4}$ litre • add fractions in contexts (using only halves, thirds, quarters, fifths, sixths, sevenths and eighths) **Solve problems** relating to capacity Include rate and ratio problems **Convert** between units $ml \leftrightarrow l$ Converting between the units of measurement provides a context for practising multiplying and dividing by 1 000. Conversions should be limited to whole numbers and fractions given only as halves, thirds, quarters, fifths, sixths, sevenths, eighths. Conversions can also include converting the decimal half to the common fraction form of a half. Remember learners can also state their answers in a combination of units, e.g. 3l and 4ml or 5l and 26ml	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.2** **Common fractions**	**Solving problems** • Solve problems in contexts involving fractions, including grouping and equal sharing **Describing and ordering fractions** • Compare and order common fractions with different denominators (halves; thirds, quarters; fifths; sixths; sevenths; eighths) • Describe and compare common fractions in diagram form **Calculations with fractions** • Addition of common fractions with same denominators • Recognize, describe and use the equivalence of division and fractions **Equivalent forms:** • Recognize and use equivalent forms of common fractions (denominators which are multiples of each other)	Learners should develop the concept of fractions in a variety of ways, including • a range of problem-solving contexts (see the types of fractions problems stated at the end of the Grade 4 notes). • a range of apparatus and diagrams (see notes Term 1) **Equivalent forms** A focus of Term 2 can be on equivalence (which should be developed through problem-solving and working with diagrams and apparatus). The fractions that learners will be assessed on in Grade 4 were stated in Term 1. Learners are not expected to be able to give equivalent fractions in symbolic (number) form without having diagrams which they can refer or without a problem context in which to make sense of the equivalence. It is recommended that fraction strips or fraction walls are provided when learners are formally assessed on equivalence. **Comparing and ordering fractions:** Learners should also compare and order fractions either with the aid of diagrams (fractions as shapes or number lines) or through problem contexts or using the two together. **Calculations with fractions:** Calculations with fractions are limited to • making fractions through grouping or sharing which is linked with understanding the relationship between division and fractions e.g. If 5 children share sweets equally, they will each get $\frac{1}{5}$ of the sweets • adding fractions with the same denominators Calculations as with other aspects of fractions should be developed either through problem contexts or with the use of apparatus or diagrams. Learners should be given problem contexts in which they need to add fraction parts. Learners should also be given either fraction pieces to count e.g. $\frac{3}{8} + \frac{4}{8}$ can be done by counting out and counting on in eighths with apparatus or by colouring in diagrams or by “hopping” in eighths on a number line. Measurement is an important context through which to develop and consolidate the notion of fractions. If the suggested sequencing in this document is followed then learners will have covered length and capacity already. Length and capacity can be used to develop the concepts of fractions, equivalence, and adding with fractions.	**5 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Counting, ordering, comparing, representing and place value of digits	• **Number range for counting, ordering, comparing, representing and place value of digits** • Count forwards and backwards in 2s, 3s, 5s, 10s, 25s, 50s, 100s between 0 and at least 10 000 • Order, compare and represent numbers to at least 4-digit numbers • Represent odd and even numbers to at least 1 000 • recognize the place value of digits in whole numbers to at least 4-digit numbers • round off to the nearest 10, 100 or 1 000	See notes in Term 2 All work developed here can be practised throughout the year in the mental Mathematics programme.	**1 hour**

GRADE 4 TERM 3

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Addition and subtraction	**Number range for calculating** Addition and subtraction of whole numbers of at least 4 digits. **Calculation techniques** Use a range of techniques to perform and check written and mental calculations of whole numbers including • estimation • building up and breaking down numbers • rounding off and compensating • doubling and halving • using a number line • using addition and subtraction as inverse operations **Properties of whole numbers** Recognize and use the commutative and associative properties with whole numbers **Solving problems** Solve problems in contexts involving whole numbers, including financial contexts	This is further practice of addition and subtraction done in Term 2. Refer to those notes.	**4 hours**

ASSESSMENT:

At this stage learners should have been assessed on:

- 4-digit numbers
- adding and subtracting with 4-digit numbers
- fractions
- capacity

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
SHAPE AND SPACE	**3.5** **Viewing objects**	**Position and views** Match different views of everyday objects Identify everyday objects from different views	This links with the work done in Geography in Map Skills. Learners work with side views, plan views and top views of simple single objects such as a cup, hat, shoe, box, apple. They also work with side views and plan views of a classroom, simple buildings, school fields. The skills of identifying everyday objects and collections of objects can be developed in the Geography lessons and practised in the Mathematics lessons.	**2 hours**
SHAPE AND SPACE	**3.1** **Properties of 2-D shapes**	**Shapes learners need to know and name** • Regular and irregular polygons: - triangles - squares, rectangles, other quadrilaterals - pentagons - hexagons • Circles **Characteristics which learners use to distinguish, describe, sort and compare shapes** • straight and curved sides • number of sides **Further activities to focus on characteristics of shapes** Draw 2-D shapes on grid paper	This is revision and consolidation of work done in Term 1. See notes in Term 1 Learners should do both written exercises and some practical work with apparatus	**4 hours**

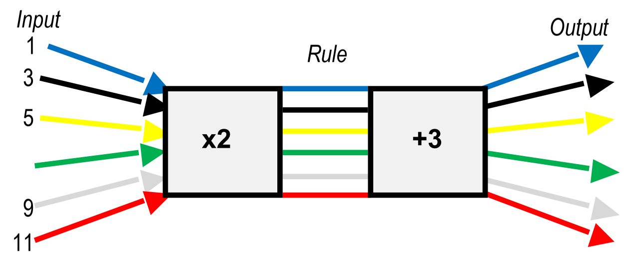
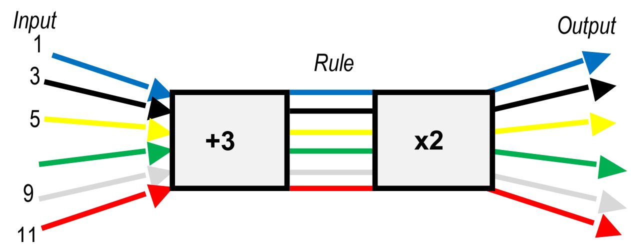
CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
DATA HANDLING	**5.1** **Collecting** and **organising data**	Collect data using tally marks and tables for recording	Teachers in this phase should ensure that different topics are chosen for data collection in each of the grades. The following are new in Term 3 of Grade 4 • learners read, interpret, analyse and summarise pie charts, where the information is presented in fractions only • learners read, analyse data represented in words i.e. short paragraphs - the data presented in words should be represented in other forms and then analysed **Analysing graphs** Analyse graphs on environmental or socio-economic contexts and answer questions on graphs. Both graphs and questions to be provided by teacher or textbook. Learners should work with at least • 1 pie graph where the information is given in common fractions and not percentages • 1 bar graph Suitable topics include: • quantities of materials recycled in the town, province, country • quantities of recycling materials collected by schools around the country • sources of lighting and heating in SA • kinds of toilets in SA homes • kinds of homes in SA	**7 hours**
	5.2 **Representing data**	Draw a variety of graphs to display and interpret data including: • pictographs (one-to-one representation) • bar graphs		
	5.3 **Analysing, interpreting and reporting data**	Critically read and interpret data represented in • words • pictographs • bar graphs • pie charts Analyse data by answering questions related to data categories Summarise data verbally and in short written paragraphs		

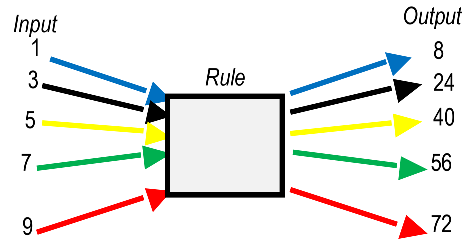
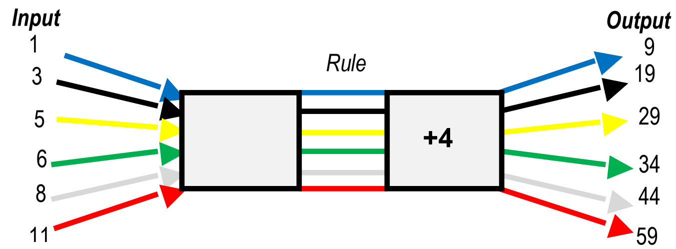
CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
			Data represented in words The data presented in words should be represented in other forms such as tally marks, tables or pictographs and then analysed. **Complete data cycle including drawing pictograph: context personal data** This is can be used as a Maths project for the year. Learners work through whole data cycle to create an individual pictograph using contexts that relate to themselves, their class, their school or their family. Suitable topics include favourite sports / favourite movies / favourite music / favourite TV programmes / foods or cool drinks/ favourite colours etc. **Developing critical analysis skills** Learners compare graphs on the same topic but where data has been collected from different groups of people, at different times, in different places or in different ways. Here learners will be able to discuss the differences between the graphs. The aim is for learners to become aware of factors that can impact on the data. Learners should do at least 1 example. Learners can summarize the findings of their comparison in a paragraph. Examples could include: • comparing data about cars that pass the school at different times or comparing data about cars that pass different venues (busy and quiet areas, poorer and richer areas, etc.) • comparing data collected at your school to national data from *Census At School* e.g. favourite sports; favourite subjects; transport to school; type of dwelling; access to goods and services at home • comparing data collected from girls and boys e.g. favourite sports, favourite movies, favourite school subjects	

ASSESSMENT

At this stage learners should have been assessed on:

- views
- 2-D shapes
- data handling (recommended form of assessment: **project**)

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
PATTERNS, FUNCTIONS AND ALGEBRA	**2.1** **Numeric patterns**	**Investigate and extend patterns** • Investigate and extend numeric patterns looking for relationships or rules of patterns: - sequences involving a constant difference or ratio - of learner's own creation • Describe observed relationships or rules in learner's own words **Input and output values** Determine input values, output values and rules for patterns and relationships using flow diagrams **Equivalent forms** Determine equivalence of different descriptions of the same relationship or rule presented • verbally • in a flow diagram • by a number sentence	In Term 1 learners worked with flow diagrams in order to learn about • Inverse operation between multiplication and division • Multiplication of units by multiples of ten • The associative property with whole numbers and how we can use this property when we multiply **Flow diagrams** are further developed in this term. Learners also work with number sequences. It is useful for learners to be given examples which continue to focus on the properties of operations. For example learners have seen that they can multiply in any order, and that they can add in any order. They can compare flow diagrams to see whether order makes a difference when they add and multiply in any order. **Example**   Learners should discuss whether the order of the operations made a difference Once learners have had practice in finding inputs and outputs when the rule is stated, they can be given examples where inputs and outputs are provided but no rule is given. At first these can be flow diagrams in which there is a "one stage rule" i.e. add; or subtract or multiply or divide.	**4 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
PATTERNS, FUNCTIONS AND ALGEBRA	**2.1** **Numeric patterns**		**Example** Find the rule  Then they can work with examples which have a two stage rule e.g. multiply and then add, where one stage is left out **Example** Determine the rule  **Sequences of numbers:** In the Intermediate Phase learners extend sequences of numbers. In Grade 4 they work with two kinds of sequences. 1. Sequences involving a constant difference **Examples** a) 2; 4; 6; 8… b) 18; 16; 14; 12… In the examples above learners are adding 2 or subtracting 2 to make the pattern. Learners may describe it as a pattern of counting on or counting back in twos. Learners should also be given examples which do not start on a multiple of the number they are adding or subtracting.	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
PATTERNS, FUNCTIONS AND ALGEBRA	**2.1** **Numeric patterns**		**Examples** a) 1; 4; 7; 10……. b) 87; 66; 45; …….. 2. Sequences involving a constant ratio **Example** 1 600; 800; 400; ... In the above example learners are dividing by 2. All the numbers in the sequence are multiples of 2. Learners should also be given examples in which the numbers in the sequence are not multiples of the number they are multiplying or dividing by. **Examples** a) 3; 6; 12; 24; ... b) 10; 30; 90; 270; ...	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Addition and subtraction	**Number range for calculating** Addition and subtraction of whole numbers of at least 4 digits. **Calculation techniques** Use a range of techniques to perform and check written and mental calculations of whole numbers including • estimation • building up and breaking down numbers • rounding off and compensating • doubling and halving • using a number line • using addition and subtraction as inverse operations Number range for multiples and factors Multiples of 1-digit numbers to at least 100 **Properties of whole numbers** Recognize and use the commutative and associative properties of whole numbers **Solving problems** Solve problems in contexts involving whole numbers, including financial contexts	This is further practice of Addition and Subtraction done in Term 2. Refer to those notes	**4 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Multiplication	**Number range for calculations** Multiplication of at least whole 2-digit by 2-digit numbers **Calculation techniques** Use a range of techniques to perform and check written and mental calculations of whole numbers including • estimation • building up and breaking down numbers • rounding off and compensating • doubling and halving **Number range for multiples and factors** Multiples of 1-digit numbers to at least 100 **Properties of whole numbers** Recognize and use the commutative; associative; and distributive properties of whole numbers **Solving problems** Solve problems in contexts involving whole numbers, including • financial contexts • measurement contexts Solve problems involving whole numbers, including • comparing two or more quantities of the same kind (ratio) • comparing two quantities of different kinds (rate)	This is further practice of Multiplication done in Term 2. Refer to those notes	**5 hours**

<table>
<tr><th>CONTENT AREA</th><th>TOPICS</th><th>CONCEPTS AND SKILLS</th><th>SOME CLARIFICATION NOTES OR TEACHING GUIDELINES</th><th>DURATION (in hours)</th></tr>
<tr>
<td>PATTERNS, FUNCTIONS AND ALGEBRA</td>
<td>2.3
Number sentences
(introduction to algebraic expressions)</td>
<td>Number sentences
• Write number sentences to describe problem situations
• Solve and complete number sentences
- by:
- inspection
- trial and improvement
• Check the solution by substitution</td>
<td>This is a continuation of the work done on number sentences in Term 1.

In this term learners are given practice in writing number sentences to describe problem situations. Learners have the opportunity to practise a mixture of all problem types (see the notes on problem types at the end of Grade 4) that they have encountered so far during the year. At some point, they are asked to write a number sentence to describe the problem.

As before, number sentences are used to develop the concept of equivalence. But they can also relate to all aspects of number work covered during the year. During the second part of the year you can give learners practice in answering multiple choice questions, which is a common format in national systemic tests.

Example using place value
2 000 + □ + 30 + 9 = 2 739
Choose the correct answer
a)7
b) 739
c) 700
d) 2 739

Number sentences can also consolidate the idea of expressing a rule:
For which pairs of numbers can you use the rule ‘multiply the first number by 6 to get the second number’
<table>
<tr><th>First number</th><th>Second number</th></tr>
<tr><td>a) 3</td><td>18</td></tr>
<tr><td>b) 5</td><td>66</td></tr>
<tr><td>c) 2</td><td>12</td></tr>
<tr><td>d) 11</td><td>30</td></tr>
</table>
This is done to especially focus learners’ attention on the properties of operations. The examples can focus more on the concept of equivalence.

Example:
Which of the following statements are TRUE?
8 x □ = □ + 8
8 x □ = □ – 8
8 x □ = □ x 8
8 x □ = 7 + □</td>
<td>3 hours</td>
</tr>
</table>

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
PATTERNS, FUNCTIONS AND ALGEBRA	**2.3** **Number sentences** (introduction to algebraic expressions)		**Example:** How much is 14 x 18 less than 15 x 18? a)1 b)18 c)14 d)15	
SPACE AND SHAPE	**3.4** **Transforma-tions**	**Build composite shapes** Put 2-D shapes together to create different composite 2-D shapes including some shapes with line symmetry. **Tessellations** Pack out 2-D shapes to create tessellating patterns including some patterns with line symmetry. **Describe patterns** Refer to lines, 2-D shapes, 3-D objects and lines of symmetry when describing patterns • in nature • from modern everyday life • our cultural heritage	In this suggested sequencing of Grade 4 Mathematics, transformations are done again inTerm 4. For Term 3 learners can focus on building composite shapes. In Term 4 learners can focus on tessellations and describing patterns in the world. **Build composite shapes** Learners put together 2-D shapes to make composite 2-D shapes. Tangram puzzles are an example of this. Sometimes learners should be instructed to put together 2-D shapes to make composite shapes with a line of symmetry.	**3 hours**
	REVISION			**4 hours**

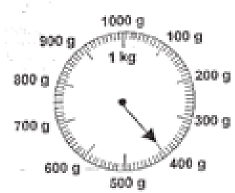
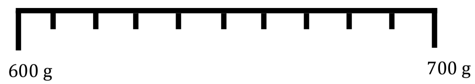
GRADE 4 TERM 4				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
NUMBERS, OPERATIONS AND RELATIONSHIPS	**Mental Mathematics**	**Mental calculations involving**: • Addition and subtraction facts for: - units - multiples of 10 - multiples of 100 - multiples of 1 000 • Multiplication of whole numbers to at least 10 x 10 • Multiplication facts for: - units by multiples of 10 - units by multiples of 100 **Number range for counting, ordering, comparing and representing and place value of digits** • Count forwards and backwards in 2s, 3s, 5s, 10s, 25s, 50s, 100s between 0 and at least 10 000 • Order, compare and represent numbers to at least 4-digit numbers • Represent odd and even numbers to at least 1 000 • Recognize the place value of digits in whole numbers to at least 4-digit numbers • Round off to the nearest 10, 100 or 1 000	The mental Mathematics programme should be developed systematically over the year. Learners should not simply be asked to do random calculations each day. As learners cover topics and develop calculating techniques in the main part of the lesson, so aspects of these can be incorporated into the mental Mathematics programme: concepts and skills are developed through the main lesson, and then practised, sometimes with smaller number ranges in the mental Mathematics programme. See further notes in Term 1 and Term 2	**10 minutes every day**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**Mental Mathematics**	**Calculation techniques** Use a range of techniques to perform and check written and mental calculations with whole numbers including • estimation • building up and breaking down numbers • rounding off and compensating • doubling and halving • using a number line • using addition and subtraction as inverse operations • using multiplication and division as inverse operations **Number range for multiples and factors** Multiples of 1-digit numbers to at least 100 **Properties of whole numbers** Recognize and use the commutative, associative and distributive properties of whole numbers		

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers:** Counting; Ordering, comparing, representing and place value of digits	**Number range for counting, ordering, comparing and representing, and place value of digits** • Count forwards and backwards in 2s, 3s, 5s, 10s, 25s, 50s, 100s between 0 and at least 10 000 • Order, compare and represent numbers to at least 4-digit numbers • Represent odd and even numbers to at least 1 000 • Recognize the place value of digits in whole numbers to at least 4-digit numbers • Round off to the nearest 10, 100 or 1 000.	**See Term 2 notes** All work developed here can be practiced in the Mental Mathematics Programme for the rest of the year	**1 hour**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Addition and subtraction	**Number range for calculating** Addition and subtraction of whole numbers with at least 4 digits. **Calculation techniques** Use a range of techniques to perform and check written and mental calculations of whole numbers including • estimation • building up and breaking down numbers • rounding off and compensating • doubling and halving • using a number line • using addition and subtraction as inverse operations **Properties of whole numbers** Recognize and use the commutative and associative properties of whole numbers **Solving problems** Solve problems in contexts involving whole numbers, including financial contexts	This is further practice of addition and subtraction done in Term 2: Refer to those notes	**4 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
MEASUREMENT	**4.2** **Mass**	**Practical measuring of 3-D objects by** • estimating • measuring, recording • comparing and ordering • 3-D objects using mass **Measuring instruments** bathroom scales, kitchen scales and balances **Units** grams (g) and kilograms (kg)	**What is different to Grade 3?** In Grade 3 learners work with non-standard or informal units when measuring mass. They also work with kilograms and grams. They read bathroom scales but only read the mass at the numbered calibration lines. They do not learn that there are 1 000g in 1kg. They do not convert between units. The Grade 4 learners must learn the relationship between the two units. Grade 4 learners need to • consolidate their sense of how much 1kg is • further develop a sense of how much 1g is • understand and know the relationship between grams and kilogram • convert between grams and kilograms • read measurements on scales indicated on both numbered and unnumbered calibration lines. **Reading instruments and measuring mass** Learners need to • estimate mass in grams and kilograms • read the masses stipulated on packaging • read the mass on pictures of kitchen scales (in g & kg) and bathroom scales (in kg) and balance scales (in g & kg) • read the mass on real kitchen scales in (g & kg) and bathroom scales (in kg) and balance scales (in g & kg). Reading the mass on kitchen and bathroom scales involves - knowing where to stand to read the scale correctly - knowing how to read the numbered gradation lines and to calculate what the unnumbered gradation lines mean Learners need to read ◊ different kinds of mass meters ◊ mass meters on which the numbered intervals/ gradation lines / calibration represent different intervals /masses ◊ apparatus which have different numbers of un-numbered intervals within each numbered interval.	**6 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
MEASUREMENT	**4.2** **Mass**		Learners need to practice with examples in which the numbered intervals are divided into: ◊ 2 un-numbered intervals ◊ 4 un-numbered intervals ◊ 5 un-numbered intervals ◊ 10 un-numbered intervals **Example:** Here the numbered lines show 100g intervals: 100g, 200g, 300g, 400g, 500g, 600g, 700g, 800g, 900g, 1 000g 	
		Calculations and problem-solving with mass include problems in contexts with mass converting between grams and kilograms limited to examples with whole numbers and fractions	It is sometimes useful to convert the circular dial into a number line for learners  There are 10 spaces between each 100g. Each 100g interval has been divided into 10 smaller spaces. This means that each un-numbered interval shows 100g ÷ 10 = 10g **Compare masses** with up to 4 digits in grams and kilograms Learners should sequence containers marked in grams and/kilograms. Here learners need to be able to translate the decimal numbers on some packaging into fractions e.g. 2,5kg of flour is the same as $2\frac{1}{2}$ kg of flour. One should also choose examples that allow learners to realize that the size of a container or the volume it contains is not directly proportional to the mass: some substances have a greater density than others. **Calculations (including conversions) and problem-solving** Measurement provides a context in which to practice skills acquired in Numbers, Operations and Relationships. The skills, operations and number ranges required are given below.	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
MEASUREMENT	**4.2** **Mass**		**Calculate and estimate (**using grams and kilograms) • round numbers up or down to the appropriate unit of mass • rounding to 10, 100, 1 000 • addition and subtraction of up to 4-digit numbers • multiplication 2-digit by 2-digit numbers • division: 3-digit by 1-digit numbers • add fractions in context (using only halves, thirds, quarters, fifths, sixths, sevenths and eighths) **Solve problems** relating to mass • include rate especially rands per kilograms and ratio problems e.g. increasing or decreasing the mass of ingredients in a recipe by a set ratio • write number sentences to describe problems **Convert** between units: $g \leftrightarrow kg$ Converting between the units of measurement above provides a context for practising multiplying and dividing by 1 000. Conversions should be limited to whole numbers and fractions given only as halves / thirds / quarters / fifths / sixths / sevenths / eighths. Conversions can also include converting the decimal half to the common fraction form of half. When learners do division in Grade 4 the answers may have remainders e.g. 115 ÷ 25 = 4 remainder 15. Similarly when converting grams to kilograms, learners may get part of the answer in kilograms and state the remaining part in grams e.g. 4 250g = 4kg and 250g **Recording masses** Because learners will only work with decimal fractions in Grade 6, they should record masses in • kilograms only e.g. 5kg • grams only e.g. 250g Since learners will be reading half kilograms in decimal form on some packaging, they can also write half kilograms in the decimal form. However this is not a requirement in this grade.	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
SHAPE AND SPACE	**3.2** **Properties of 3-D objects**	**Objects which learners need to know and name** • rectangular prisms • spheres • cylinders • cones • square-based pyramids **The characteristics which learners use to distinguish, describe, sort and compare objects** • shapes of faces • flat and curved surfaces **Further activities to focus learners on charactersistics of objects** Make 3-D models using cut out polygons	This is revision and consolidation of work done in Term 2. See notes in Term 2. Learners should do both written exercises and practical work with apparatus	**4 Hours**

ASSESSMENT:

At this stage learners should have been assessed on:

- 4-digit numbers
- adding and subtracting with 4-digit numbers
- mass
- 3-D objects

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.2** **Common fractions**	**Solving problems** Solve problems in contexts involving fractions, including grouping and equal sharing **Describing and ordering fractions** • Compare and order common fractions with different denominators (halves; thirds, quarters; fifths; sixths; sevenths; eighths) • Describe and compare common fractions in diagram form **Calculations with fractions** • addition of common fractions with the same denominators • recognize, describe and use the equivalence of division and fractions **Equivalent forms** Recognize and use equivalent forms of common fractions with denominators which are multiples of each other	This is revision and consolidation of the concepts developed in Term 3. See Term 3 notes In Term 4 length, capacity and mass can be used as contexts for fractions.	**5 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Division	**Number range for calculations** Division of at least whole 3-digit by 1-digit numbers **Calculation techniques** Use a range of techniques to perform and check written and mental calculations of whole numbers including • estimation • building up and breaking down numbers • rounding off and compensating • doubling and halving • using multiplication and division as inverse operations **Properties of whole numbers** Recognize and use the commutative, associative, and distributive properties with whole numbers **Solving problems** • Solve problems in contexts involving whole numbers, including - financial contexts - measurement contexts • Solve problems involving whole numbers, including - grouping and equal sharing with remainders - comparing two or more quantities of the same kind (ratio) - comparing two quantities of different kinds (rate)	This is further practice of division of 3-digit numbers by 1-digit numbers done in Term 2. Refer to those notes.	**3 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
MEASUREMENT	**4.6** **Perimeter, area and volume**	**Perimeter** Measure perimeter using rulers or measuring tapes **Measurement of area** Find areas of regular and irregular shapes by counting squares on grids in order to develop an understanding of square units **Measurement of volume** Find volume/capacity of objects (by packing or filling them in order to develop an understanding of cubic units	**What is different to Grade 3?** • Area and volume are only measured informally in the Intermediate Phase. Learners are not required to know or apply formulae for the perimeter, area or volume of any shape or objects. • In Grade 3 learners only measured perimeter informally by finding the distance around two-dimensional shapes using string. Learners in Grade 3 are not required to state or write how long a perimeter is. They only show the string length or compare different perimeters by comparing string lengths. • In Grade 4 learners measure the perimeters of shapes and spaces with rulers and measuring tapes. They are required to state and record this measurement in standard units: mm, cm, m. They are also required to work from drawings in which side lengths are specified in mm, cm, m, km. Here they add the lengths. In Grade 4 they will also count the lengths of the perimeters by counting the number of sides of square grids on which shapes are drawn. Here learners need to know that the diagonal distances between corners of a grid square are longer than the vertical or horizontal distances between corners of a grid square. • In Grade 3 learners only investigate areas using tiling. In Grade 4 area measurements continue to be informal, but now learners use both tiling and square grids. Learners count how many grid squares the shape covers. The area is stated in number of grid squares. Shapes should include - regular shapes with straight sides where the sides are all the same length. - irregular shapes length with straight sides where the sides are not all the same - shapes with curved sides • Learners do not work with volume in Grade 3. In Grade 4 learners - count how many cubes or rectangular prisms are used to fill a container - The volume of the container is stated in number of cubes or rectangular prisms such as boxes or blocks - make stacks with cubes or rectangular prisms The volume of the stack is stated in number of cubes or rectangular prisms such as boxes or blocks	**7 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
			- interpret pictures of ◊ stacks made of cubes or rectangular prisms in order to state the volume in terms of the number of cubes or rectangular prisms ◊ containers filled with cubes or rectangular prisms in order to state the volume in terms of the number of cubes or rectangular prisms **What is capacity? What is volume?** **Capacity** is the amount of substance that an object can hold or the amount of space inside the object. **Volume** is the amount of space that an object occupies. A bottle can have a 1 litre capacity, but it may not be filled to its full capacity, it could for example, only contain a volume of 250ml.	
ASSESSMENT: At this stage learners should have been assessed on: • fractions • division of 3-digit numbers by 1-digit numbers • perimeter, area and volume				
SHAPE AND SPACE	**3.6** **Position and movement**	**Location and directions** Locate position of objects, drawings or symbols on grid using alpha-numeric grid references Locate positions of objects on a map using alpha-numeric grid references	• Cells in a grid are often labelled with a letter and a number e.g. D4; A3; E7. This is called alpha-numeric referencing. This links with the work done in Geography in Map Skills. The skills described below can be developed in the Geography lesson and practised in the Mathematics lesson. • Learners work with alpha-numeric grid references on grids and maps. Locate objects using the grid references. When learners work with grid references they need to learn - to find the cell i.e. to answer questions like “What is in cell B3?” - in which cell an object is i.e. to answer questions like “Where is the cow?”	**2 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
SHAPE AND SPACE	**3.4** **Transforma-tions**	**Build composite shapes** Put 2-D shapes together to make different composite 2-D shapes including some shapes with line symmetry **Tessellations** Pack out 2-D shapes to create tessellating patterns including some patterns with line symmetry **Describe patterns** Refer to lines, 2-D shapes, 3-D objects and lines of symmetry when describing patterns • in nature • from modern everyday life • our cultural heritage	In the suggested sequencing of Grade 4 Mathematics, transformations were done in Term 3. In that term learners focused on building composite shapes including some shapes with line symmetry. In Term 4 learners focus on tessellations and describing patterns in real life. **Tessellations** Learners use 2-D shapes to create tessellation patterns. In Grade 4 these tiling patterns can be made by packing out the tiles. Learners need to identify and describe tessellation patterns. Grade 4 learners are not required to create the patterns by rotating, translating or reflecting a single shape. **Describe patterns** Learners describe patterns by talking about the shapes they see in the pattern e.g. • the pattern I see on the crane is made of straight lines • the pattern we see on the honeycomb looks like a tessellation pattern of hexagons • the pattern I see on the bead bracelet looks like a tessellation pattern of triangles Learners describe patterns by discussing the symmetry of shapes e.g. the butterfly's wings make a symmetrical pattern Learners often find patterns easier to describe, once they have copied or made the patterns. It is useful to link the process of making or copying patterns with the descriptions of patterns from nature, modern everyday life and our cultural heritage. Often the geometrical process you use to make a copy of the pattern is not the same as the original process used to make the pattern. Bees do not tessellate with hexagons to make a honeycomb, but if learners tessellate with a hexagon, they can make a pattern that looks similar to the pattern they see in the honeycomb.	**3 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
PATTERNS, FUNCTIONS AND ALGEBRA	**2.2** **Geometric patterns**	**Investigate and extend patterns** • Investigate and extend geometric patterns looking for relationships or rules of patterns - represented in physical or diagram form - sequences involving a constant difference or ratio - of learner's own creation • Describe observed relationships or rules in learner's own words **Input and output values** Determine input values, output values and rules for the patterns and relationships using flow diagrams **Equivalent forms** Determine equivalence of different descriptions of the same relationship or rule presented • verbally • in a flow diagram • by a number sentence	This is consolidation of what was done in Term 2. See notes in Term 2. In Term 4 learners should just do more examples.	**2 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1. Whole numbers** Addition and subtraction	Addition and subtraction of whole numbers with at least 4 digits. **Calculation techniques** Use a range of techniques to perform and check written and mental calculations of whole numbers including: • estimation • building up and breaking down numbers • rounding off and compensating • doubling and halving • using a number line • using addition and subtraction as inverse operations **Number range for multiples and factors** Multiples of 1-digit numbers to at least 100 **Properties of whole numbers** Recognize and use the commutative and associative properties with whole numbers **Solving problems** in contexts involving whole numbers, including financial contexts	This is further practice of Addition and Subtraction done in Term 2. Refer to those notes	**3 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
DATA HANDLING	**5.1.** **Probability**	Perform simple repeated events and list possible outcomes for events such as: • tossing a coin • rolling a die	**What is different from Grade 3?** Learners do not work with probability in Grade 3. Everything about probability is new in Grade 4. **Performing simple repeated events** Learners need to perform experiments by tossing a coin or rolling a die. Doing experiments with a coin is easier than with a die because the coin can only have two outcomes (heads or tails), while rolling the die can have 6 outcomes (numbers1-6). Learners should first list the possible outcomes before doing the experiments. They should learn how to record the results of their experiments in a table using tally marks.	**2 hours**
ASSESSMENT: At this stage leaners should have been assessed on: • addition and subtraction with 4-digit numbers • transformations • location • probability				
REVISION				**5 hours**
ASSESSMENT				**6 hours**

Problem type	Additional notes	Examples
Summation	A sum	A man buys cell phones for all his stores. He buys 6 789 black phones, 1 567 brown cell phones and 4 532 red cell phones. How many cell phones did he buy altogether?
	Missing part of a given sum	Farm workers picked 2 345 oranges during the morning. After lunch they picked some more. By the end of the day, they had 6 589 oranges. How many oranges did they pick after lunch?
Increase and decrease	Calculate the result	The price for a container of barley is R8 231. Since some of the barley is ruined, the price is decreased by R3 789. What price does a shop owner pay for the container of barley?
	Calculate the change	A salesman earned R4 328 during November. During December, the amount increased to R7 435. How much more money did he earn during December than in November?
	Calculate the initial value	A farmer struggles to sell some of his sheep. He decreases the original price of one sheep by R1 456. He sells the sheep for R 4 787 each. What was the original price that the farmer wanted for his sheep?
Multiplication as repeated addition		Learners sell sweets during market day. They put 25 sweets in a packet. How many sweets will they need to fill 15 packets?
Grouping	Grouping problems which are solved with division and/or repeated subtraction Answers to problems which have or do not have remainders	A rich company gives boxes of toys to a school. Each box contains 8 toys. How many boxes are needed to pack 375 toys?
	Grouping problems which are solved with multiplication and/or repeated addition. Answers to problems which have or do not have remainders	A school gives 15 bags of soccer balls to a poor school. Each bag contains 45 soccer balls. How many soccer balls does the school give away?
	Grouping problems in an array form Problems solved by division (or repeated subtraction) or multiplication (repeated addition)	A farmer plants 34 rows of apple trees. There are 56 apple trees in each row. How many apple trees are there in total? or A farmer wants to plant 1 904 apple trees. He wants to plant the same number of trees in each of 34 rows. How many apple trees must he plant in each row?
Sharing	Sharing problems solved by division/ repeated subtraction Smaller groups of equal size formed from a given amount. Answers to calculations which have remainders lead to the concept of fractions (common or decimal fractions)	The school shares 174 chocolate cakes equally between 9 hospitals. How many cakes does each hospital get?
Comparison by difference		Zwi collected 6 231 bottles for recycling during the year. She collected 2 879 fewer bottles than a class mate. How many bottles did the classmate collect?
Treating groups as units		You can buy 15 candles for R56. What will you pay for 195 of the same candles?

Problem type	Additional notes	Examples
Rate	Learners calculate the total if given rate per object	One box of chocolates costs R28. How much will 45 boxes of these boxes of chocolate cost?
	Learners calculate the rate per object	The mass of 6 containers of equal size of flour is 234 kg. What is the mass of one of these containers of flour?
	Learners first calculate the rate and then apply it to generate more information	If 9 bowls cost R135, how much will 56 of these bowls cost?
Comparison by ratio		Zwi collected 65 bottles for recycling. Her friend collected twelve times as many bottles as Zwi. How many bottles did the friend collect?
Proportional sharing		Feroza works for 3 hours and Daniel works for 1 hour cleaning homes. Together they are paid R520. How should the money be fairly shared between the two?

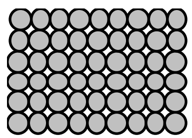
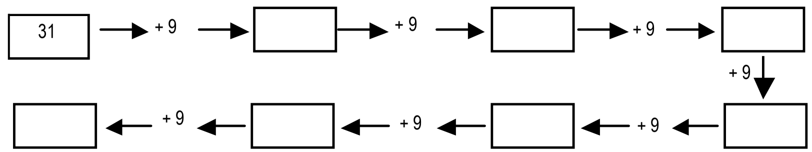
Meaning of a fraction	Examples of problems
Part of a whole where the whole is a single object	Susan eats two eighths of a chocolate bar. What fraction of the chocolate bar is left? Show your answer in a drawing.
Part of a whole where the whole is a collection of objects	Five friends share 21 chocolates equally. How many chocolates does each person get?
Relationship	Barry earns a third of what his father earns per hour. If his father earns R267 per hour, how much does Barry earn per hour?
Ratio	$\frac{2}{5}$ of a cup of milk is needed to make one batch of biscuits. How many cups of milk are needed to make 5 batches of these biscuits?
Comparator	Which is the longest? $\frac{2}{3}$ of a metre or $\frac{1}{4}$ of a metre?
Unit of measurement	I need $1\frac{2}{5}$ m material to make a shirt, and I have $\frac{4}{5}$ m. How much material do I still need to buy?
Number	Name two numbers between $4\frac{1}{2}$ and 5
Fractional parts put together to make a whole (iterative)	After a game, 55 athletes get $\frac{1}{2}$ of an orange each. How many oranges are needed for the 55 athletes?

TIME ALLOCATION PER TOPIC: GRADE 5							
Term 1		**Term 2**		**Term 3**		**Term 4**	
Topic	**Time**	**Topic**	**Time**	**Topic**	**Time**	**Topic**	**Time**
Mental Mathematics (10 minutes daily)	**8 hours**	Mental Mathematics (10 minutes daily)	**7 hours**	Mental Mathematics (10 minutes daily)	**8 hours**	Mental Mathematics (10 minutes daily)	**7 hours**
Whole numbers: counting, ordering, comparing, representing and place value (4-digit numbers)	**2 hours**	Whole numbers: counting, ordering, comparing, representing and place value (6-digit numbers)	**1 hour**	Common fractions	**5 hours**	Whole numbers: counting, ordering, comparing, representing and place value (6-digit numbers)	**1 hour**
Number sentences	**3 hours**	Whole numbers: addition and subtraction (5-digit numbers)	**5 hours**	Mass	**5 hours**	Whole numbers: addition and subtraction (5-digit numbers)	**5 hours**
Whole numbers: addition and subtraction (5-digit numbers)	**5 hours**	Common fractions	**5 hours**	Whole numbers: counting, ordering, comparing, representing and place value (6-digit numbers)	**1 hour**	Properties of 3-D objects	**5 hours**
Numeric patterns	**4 hours**	Length	**6 hours**	Whole numbers: addition and subtraction	**5 hours**	Common fractions	**5 hours**
Whole numbers: multiplication (2-digit by 2-digit) and division (3-digit by 1-digit)	**6 hours**	Whole numbers: multiplication (3-digit by 2- digit)	**7 hours**	Viewing objects	**3 hours**	Whole numbers: division (3-digit by 2-digit)	**7 hours**
Time	**6 hours**	Properties of 3-D objects	**6 hours**	Properties of 2-D objects	**4 hours**	Area, perimeter & volume	**7 hours**
Data handling	**10 hours**	Geometric patterns	**4 hours**	Transformations	**3 hours**	Position and movement	**2 hours**
Properties of 2-D shapes	**7 hours**	Symmetry	**2 hours**	Temperature	**2 hours**	Transformations	**4 hours**
Capacity/volume	**5 hours**	Whole numbers: division (4-digit by 2 digit)	**8 hours**	Data handling	**9 hours**	Geometric patterns	**2 hours**
				Numeric patterns	**5 hours**	Number sentences	**3 hours**
				Whole numbers: multiplication (3-digit by 2- digit)	**7 hours**	Probability	**2 hours**
Revision	**4 hours**	Revision	**3 hours**	Revision	**3 hours**	Revision	**4 hours**
		Assessment (all subjects)	**6 hours**			Assessment (all subjects)	**6 hours**
TOTAL: 60 HOURS		**TOTAL: 60 HOURS**		**TOTAL: 60 HOURS**		**TOTAL: 60 HOURS**	

3.3.2 Clarification of content for Grade 5

GRADE 5 TERM 1				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
NUMBERS, OPERATIONS AND RELATIONSHIPS	**Mental Mathematics**	**Mental calculations involving**: • Addition and subtraction facts of: - units - multiples of 10 - multiples of 100 - multiples of 1 000 • Multiplication of whole numbers to at least 10 x 10 • Multiplication facts for: - units by multiples of 10 - units by multiples of 100 - units by multiples of 1 000 - units by multiples of 10 000 **Number range for counting, ordering, comparing, and representing numbers and for the place value of digits** • Count forwards and backwards in whole number intervals up to at least 10 000 • Order, compare and represent numbers to at least 4-digit numbers • Represent odd and even numbers to at least 1 000 • Recognize the place value of digits in whole numbers to at least 4-digit numbers • Round off to the nearest 5, 10, 100 and 1 000	The mental Mathematics programme should be developed systematically over the year. Learners should not be asked to do random calculations each day. As learners cover topics and develop calculating techniques in the main part of the lesson, so aspects of these can be incorporated into the mental Mathematics programme. Concepts and skills are developed through the main lesson, and then practised, sometimes with smaller number ranges in the mental Mathematics programme. You can keep the number range lower in Term 1 and increase it during the year. At the start of the year, number ranges and calculations techniques can be based on those developed in Grade 4. The mental Mathematics should systematically develop three aspects of learners' number knowledge • number facts - number bonds: addition and subtraction facts for: ◊ units ◊ multiples of 10 - times tables involving multiplication of whole numbers to at least 10x10 • calculation techniques - doubling and halving - using multiplication to do division - multiplying by 10, 100 and 1 000 - multiplying by multiples or 10, 100 and 1 000, - dividing by 10, 100 and 1 000, - building up and breaking down numbers - rounding off to the nearest 10, 100 and 1 000 and compensating - adding and subtracting of units, multiples of 10, 100, 1 000 to/from any 4-digit number	**10 minutes every day**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**Mental Mathematics**	**Calculation techniques** Using a range of techniques to perform and check written and mental calculations of whole numbers including: • estimation • adding and subtracting in columns • building up and breaking down numbers • using a number line • rounding off and compensating • doubling and halving • using addition and subtraction as inverse operations • using multiplication and division as inverse operations **Number range for multiples and factors** • Multiples of 2-digit whole numbers to at least 100 • Factors of 2-digit whole numbers to at least 100 **Properties of whole numbers** • Recognize and use the commutative associative, distributive properties of whole numbers • 0 in terms of its additive property • 1 in terms of its multiplicative property	• number concept - counting ◊ count forwards and backwards in 2s, 3s, 5s, 10s, 25s, 50s, between 0 and at least 1 000 ◊ count forwards and backwards in 100s between 0 and at least 10 000. - ordering and comparing up to 4-digit numbers - place value for numbers of up to 4-digits - building up and breaking down numbers - odd and even numbers - multiples Some mental Mathematics can be done without apparatus, but it is often useful to do mental Mathematics with apparatus **Recommended apparatus** - a number line - a number grid - place value cards - counting beads	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Counting, ordering, comparing, representing and place value of digits	**Number range for counting, ordering, comparing and representing and place value of digits** • Count forwards and backwards in whole number intervals up to at least 10 000 • Order, compare and represent numbers to at least 4-digit numbers • Represent odd and even numbers to at least 1 000 • Recognize the place value of digits in whole numbers to at least 6-digit numbers • Rounding off to the nearest 5, 10, 100 and 1 000	In Term 1, learners should revise and consolidate work done in Grade 4 • Count forwards and backwards in 2s, 3s, 5s, 10s, 25s, 50s, 100s between 0 and at least 1 000 • Count forwards and backwards in 100s between 0 and at least 10 000. • Order, compare and represent numbers to at least 4-digit numbers. • Recognize the place value of digits in whole numbers to at least 4-digit numbers. • Round off to the nearest 10 and 100 **Counting** Counting should not only be thought of as verbal counting. Learners should count using apparatus such as • counters • counting beads • number grids • structured, semi-structured and empty number lines • pictures of objects, especially pictures of large numbers of objects that are presented in a grouped or structured way. An example of a picture of objects suitable for counting is provided at the end of the Grade 5 section on Numbers, Operations and relationships. • arrays or diagrams of arrays e.g.  • other diagrams for counting e.g.  Counting should not always start on the first multiple. Nor should it always start on any other multiple e.g. counting in 2s can start from 5 or 27 or 348.	**2 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Counting, ordering, comparing, representing and place value of digits		**Place value** (number range 0 to 999) Learners should be able to break up numbers into hundreds, tens and units using • the number names (number words) • place value or flash cards • expanded notation, Recommended apparatus: place value/flash cards, Dienes blocks **Compare and order** (number range 0 to 999) Here learners should be given a range of exercises, e.g. • Arrange the given numbers below from the smallest to the biggest, or biggest to smallest • Fill in missing numbers in - a sequence - on a number grid • Show a given number on a numbered or un-numbered number line e.g. on a number show line which number is halfway between 1 340 and 1 350. • Indicate which of two numbers is greater or smaller e.g. 5 431 or 5 413. • Replace * with <, = or > e.g. 7 889 * 7 898, 41 09 * 5 190 All work developed here can be practised throughout the year in the mental Mathematics programme.	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
PATTERNS, FUNCTIONS AND ALGEBRA	**2.1** **Number sentences** (introduction to algebraic expressions)	**Number sentences** • Write number sentences to describe problem situations • Solve and complete number sentences by - inspection - trial and improvement • Check the solution by substitution	Writing number sentences can be seen as a way of preparing learners to write algebraic equations. Number sentences can be used to describe problem situations. Number sentences can also be used as an equivalent form of expression to sections of flow diagrams or tables. Sometimes in the Intermediate Phase learners work with number sentences in isolation. However, it is more common for learners to work with number sentences and other forms of representation e.g. problems specified in words, numbers and calculations represented in diagrams (including flow diagrams). Examples of the above should be included at appropriate times throughout the year. Number sentences are also a way of showing equivalence. It seems obvious that what is written on the one side of the equal sign is equal to what is written on the other side. However learners need to be taught that these are equivalent expressions on either side of the equal sign. In the Intermediate Phase it is useful to use number sentences, and patterns made up of number sentences to assist learners to make sense of and learn the following: • The inverse relationship between addition and subtraction • The commutative, associative, and distributive properties with whole numbers and how we can use these properties together with building up and breaking down numbers when we add and subtract • Addition and subtraction facts for: - units - multiples of 10 - multiples of 100 - multiples of 1 000 Exploring, understanding and learning the logic of equivalent statements, by working through patterns made up of number sentences, helps learners to learn calculation techniques. At the start of the year number sentences can be used to help learners understand and use the commutative and associative properties when calculating with whole numbers. This will prepare them for the calculations that they will do early in the first term	**3 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
PATTERNS, FUNCTIONS AND ALGEBRA	**2.1** **Number sentences** (introduction to algebraic expressions)		**Using number sentences to consolidate learners' understanding of the additive properties of** **Examples:** 63 – 63 = ☐ 742 – 742 = ☐ 7 654 – ☐ = 7 654 After completing a number of similar examples, learners should explain in their own words what they notice. **Further examples:** a) 79 – 4 + 4 = ☐ b) 237 + 6 – 6 = ☐ c) 6 997 + 6 – 6 = ☐ d) 54 + 6 – ☐ = 54 After completing a number of similar examples, learners should explain what they notice in their own words. **Further examples** a) 62 + 5= ☐+ 4 (learners can use the fact that 5 = 4 + 1, so 62 + 1 + 4 = 63+ 4 b) 23 + 7 – ☐ = 22 c) 20 – 12 = ☐+ 12 – 12 **Using number sentences to focus attention on addition and subtraction as inverse operations and to encourage learners to use them in calculations** Subtraction can undo what addition does and addition can undo what subtraction does if you keep the numbers the same. Learners are not expected to use the expression "inverse operations". They are expected to know that • addition can be used to check subtraction calculations • subtraction can be used to check addition calculations **Examples:** 54 – 12 = ☐ therefore 42 + 12 = ☐ 387 – 142 = ☐ therefore 245 + 142 = ☐ 482+ 200 = ☐ therefore 682 – 200 = ☐ 262 + 237 = ☐ therefore 499 – 237 = ☐	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
PATTERNS, FUNCTIONS AND ALGEBRA	**2.1** **Number sentences** (introduction to algebraic expressions)		After completing a number of similar examples, learners should explain in their own words what they notice **Using number sentences to focus attention on multiplication and division as inverse operations and to encourage learners to use them in calculations** **Examples:** 8 x 9 = □ therefore 72 ÷ 9 = □ 6 x 7 = □ therefore 42 ÷ 7 = □ 32 x 3 = □ therefore 6 ÷ 3 = □ 4 x 1 000 = □ therefore 4 000 ÷ 1 000 = □ **Using number sentences to consolidate learners understanding of the multiplicative properties of 1** a) 45 x 1 = □ b) 8 ÷ 8 = □ c) 74 ÷ 74 = □ d) 7 654 ÷ 7 654 = □ e) □÷ 9 = 1 After completing a number of similar examples, learners should explain what they notice in their own words. They are expected to be able to say: “When you divide a number by itself, you get 1”; “When you multiply or divide a number by 1 it remains unchanged”. **Further examples:** a) 63 ÷ 7 x7 = □ b) 54 ÷ 6 x 6 = □ c) 6 997 ÷ 6x 6 = □ After completing a number of similar examples, learners should explain what they notice in their own words. They are expected to conclude: “When you multiply and divide by the same number, you get back to the number you started with”.	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
PATTERNS, FUNCTIONS AND ALGEBRA	**2.1** **Number sentences** (introduction to algebraic expressions)		**Using number sentences to help learners consolidate the commutative and associative properties** **Commutative property** Numbers can be added in any order. **Example:** 26 + 19 = 19 + 26 **Examples:** 16 + 47 = ☐ or 47 + 16 = ☐ 35 + 468 = ☐ or 468 + 35 = ☐ 627 + 67 = ☐ or 67 + 627 = ☐ After completing a number of similar examples, learners should explain in their own words what they notice. Learners are not expected to know the names of the properties of operations e.g. commutative property. They only need to know how to use this property to make their calculations easier or use equivalent statements. **Associative property** The associative property allows numbers to be grouped in different ways when adding more than two numbers without it affecting the answer. **Examples:** (42 + 33) + 18 = ☐ has the same aswer as 42 + (33 + 18) = ☐ 251 + (27 + 49) = ☐ has the same aswer as (251 + 27) + 49 = ☐ After completing a number of similar examples, learners should explain in their own words what they notice. Learners are not expected to know the names of the properties of operations e.g. associative property. They only need to know how to use them to make their calculations easier or to use equivalent statements. In most calculations where learners break up numbers before adding, learners should change the way numbers are grouped. **Example:** • when learners write 349 + 273 = 300 + 200 + 40 + 70 + 9 + 3 they are in effect changing the way the numbers are grouped. • when learners calculate by rounding off and compensating or filling up to tens or hundreds, learners should change the way the numbers are grouped. **Example:** 489 + 27 = 489 + (11 + 16) = (489 + 11) + 16 = 500 + 16 = 516.	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
PATTERNS, FUNCTIONS AND ALGEBRA	**2.1** **Number sentences** (introduction to algebraic expressions)		**Order of subtraction** When you change the order in which you subtract numbers, the answers will NOT be the same. The commutative property does NOT hold for subtraction. **Example:** 26 – 19 ≠ 19 – 26. Learners do not work with negative numbers yet. It is best to ask whether the number are True and False. **Examples:** True or false? 49 – 13 = 13 – 49 True or false? 297 – 36 = 36 – 297 Similar examples can be given to consolidate learners' understanding of the commutative property of multiplication and also the associative property of multiplication.This can be done using number patterns and flow diagrams. **Addition and subtraction facts for 10** **Example:** a) 10 = 5 + ….. b) 10 – 5 = c) 10 = 9 + ….. d) 10 – 9 = e) 10 = 4 + ….. f) 10 – 4 = **Addition and subtraction facts for 100** **Example:** a) 100 = 50 + ….. b) 100 – 50 = c) 100 = 90 + ….. d) 100 – 90 = e) 100 = 40 + ….. f) 100 – 40 = After learners have completed sets of number sentences like those above, learners should be asked what they notice, how this can help them with calculating and how this can help them to check their answers. Once learners can work easily with pairs of multiples of ten that make up 100, the examples can be extended. **More addition and subtraction facts for 100** **Example:** a) 100 = 54 + ….. b) 100 – 54 = c) 100 = 91 + ….. d) 100 – 91 = e) 100 = 47 + ….. f) 100 – 47 = **Addition and subtraction facts for 1 000** Similar exercises can be set for pairs of numbers that make up	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Addition and subtraction	**Number range for calculations** Addition and subtraction of whole numbers with at least 5-digit numbers **Calculation techniques** Using a range of techniques to perform and check written and mental calculations with whole numbers including • estimation • adding and subtracting in columns • building up and breaking down numbers • using a number line • rounding off and compensating • doubling and halving • using addition and subtraction as inverse operations **Properties of whole numbers** • Recognize and use the commutative, associative and distributive properties with whole numbers • O in terms of its additive property • 1 in terms of its multiplicative property **Solving problems** • Solve problems involving whole numbers, including • financial contexts • measurement contexts	Numbers, operations and relationships make up about half the Mathematics that learners do in the Intermediate Phase. Rather than focus on addition and subtraction once in the year, it is recommended that learners revisit addition and subtraction each term in Grade 5. In Term 1, learners should revise and consolidate work done in Grade 4. Learners add and subtract numbers with up to digits. Learners round off numbers to the nearest 10, 100 where appropriate **Learners should do context free calculations and solve problems in contexts** It helps learners to become more confident in and more independent at Mathematics, if they have techniques • to check their solutions themselves • to judge the reasonableness of their solutions **Judging reasonableness of solutions** Learners should be trained to judge the reasonableness of solutions. One way to do this is to estimate their answers before calculating. They can round off the number involved in the calculations. When adding or subtracting -digit numbers, learners can round off to the nearest When adding two numbers that are close to each other e.g. 3 345 and 3 340 learners can use doubling as a way of estimating their answers. **Checking solutions** Learners should know that they can • check an addition calculation by subtraction. **Example:** If 5 362 + 2 488 = 7 848 then 7 848 – 2 488 = 5 362 • check a subtraction calculation by addion **Example**: If 4 687 – 2 134 = 2 544 then 2 544 + 2 134 = 4 687 Using the inverse operation to check solutions is one reason for teaching addition and subtraction simultaneously. Another reason for doing the two operations at the same time is that when learners solve problems, it is sometimes possible to solve the same problem by doing either addition or subtraction **Example**: Veli's shopping costs R163. He pays with a R200 note. How much change does he get"? Some learners may add on from R163 to get R200 e.g. R163 + R7 = R170 and R170 + R30 = R200. This means Veli gets R37 change.	**5 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Addition and subtraction		For the first part of Grade 5 addition and subtraction techniques are still based on breaking down numbers. As the numbers learners work with get larger, learners may begin to lose track of some numbers when they break up numbers to do calculations. Using brackets is helpful to show grouping of numbers and so helps learners keep track of what they are doing. Since the operations in brackets have to be done first, it removes any confusion about the order of operations. Learners thus do not have to learn rules such as BODMAS if brackets are used routinely to indicate which operations have to be done first. • **Breaking down all numbers according to place value parts to add** **Example:** Calculate 5 362 + 2 486 = 5 000 + 300 + 60 + 2 + 2 000 + 400 + 80 + 6 = 5 000 + 2 000 + 300 + 400 + 60 + 80 + 2 + 6 = 7 000 + 700 + 140 + 8 = 7 848 **OR** 2 + 6 = 8 and 60 + 80 = 140 and 300 + 400 = 700 and 5 000 + 2 000 = 7 000 and 7 000 + 700 + 140 + 8 = 7 848 means 5 362 + 2 486 = 7 848 • **Adding on (by breaking down the number to be added)** **Example:** Calculate 5 362 + 2 486 5 362 + 2 000 → 7 362 + 400 → 7 762 + 80 → 7 6 842 + 6 → 7 848 This may get unwieldy if more than numbers are added • **Filling up tens or hundreds by breaking down the number to be added** This can also be called rounding off and compensating.	

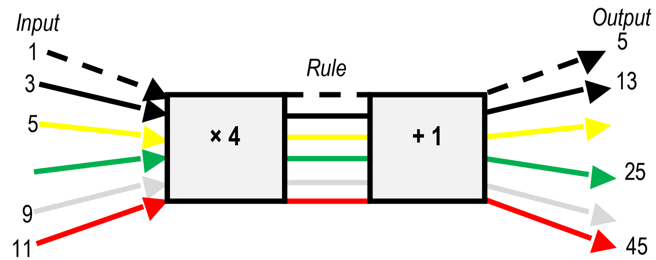
CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Addition and subtraction		**Example:** Calculate 2 486 + 148 2 486 + 148 = 2 486 + 14 – 14 + 148 = 2 500 + 134 = 2 500 + 100 + 34 = 2 634 This may get unwieldy if more than 2 numbers are added. • **Breaking down both numbers to subtract** **Example:** Calculate 4 687 – 2 143 4 687 – 2 143 = 4 000 + 600 + 80 + 7– 2 000 – 100 – 40 – 3 = (4 000 – 2 000) + (600 – 100) + (80 – 40) + (7 – 3) = 2 000 + 500 + 40 + 4 = 2 544 **OR** 7 – 3 = 4 and 80 – 40 = 40 and 600 – 100 = 500 and 4 000 – 2 000 = 2 000 means 4 687 – 2 143 = 2 544 • **Breaking down all numbers to add using compensation (counterbalance)** Learners cannot subtract 4 from 3 or 80 from 40. Instead of breaking down 743 into 700 + 40 + 3 they will break down 743 into 600 + 130 + 13. Then they can subtract 4 from 13 and 80 from 130. Calculate: 8 743 – 5 684 8 743–5 684=8000+700+40+3–5 000–600–80–4 (**compensate by breaking up 743 into 600 + 130 + 13**) =8000+600+130+13 – 5 000 – 600 – 80 – 4 = 8 000 – 5 000 + 600 – 600 + 130 – 80 + 13 – 4 = 3 000 + 0 + 50 + 9 = 3 059	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Addition and subtraction		• **Subtracting by breaking down the number to be subtracted** Calculate 4 687 – 2 143 4 687 – 2 000 → 2 687 – 100 → 2 587 – 40 → 2 547 – 3 = 2544 This may get unwieldy if more than 2 numbers are subtracted. • **Using the additive property of zero by compensation to calculate** Calculate 2 696 + 2 387: 2 296+ 2 387=2 296 + 4 – 4+ 2387 =2 300 + 2387 – 4 =2 300 +2 683 = 4 983 This may get unwieldy if more than 2 numbers are added. This method may work better if smaller numbers are added e.g. 2-digit or 3-digit numbers. **Kinds of problems** Summation, Iincrease and decrease, comparison by difference comparison by ratio See the description of problem types at the end of the Grade 5 notes	

ASSESSMENT:

At this stage learners should have been assessed on:

- 4-digit numbers
- adding and subtracting with 4-digit numbers
- working with number sentences

<table>
<tr><th>CONTENT AREA</th><th>TOPICS</th><th>CONCEPTS AND SKILLS</th><th>SOME CLARIFICATION NOTES OR TEACHING GUIDELINES</th><th>DURATION (in hours)</th></tr>
<tr>
<td>PATTERNS, FUNCTIONS AND ALGEBRA</td>
<td>2.1
Numeric patterns</td>
<td>Investigate and extend patterns
• Investigate and extend numeric patterns looking for relationships or rules of patterns
- sequences involving a constant difference or ratio
- of learner's own creation
• Describe observed relationships or rules in learner's own words
Input and output values
Determine input values, output values and rules for patterns and relationships using flow diagrams
Equivalent forms
Determine equivalence of different descriptions of the same relationship or rule presented
• verbally
• in a flow diagram
• by a number sentence</td>
<td>Sequences of numbers:
Examples of the above are illustrated in Term 3.
Patterns given in input-output diagrams
Input-output diagrams are sometimes called function diagrams or function machines because they are a way of introducing learners to functional relationships diagrammatically. Functional relationships become very important in the Senior Phase and FET Mathematics.
The forms of input-output diagrams that learners in the Intermediate Phase work with most often are Flow diagrams or spidergrams. When using flow diagrams, the correspondence between input and output values should be clear in its representational form i.e. the first input produces the first output values, the second input values produces the second output values, etc.
Example.


Any input-output diagram can allow learners to see or work out:
• the inputs, if the rule is given as well as corresponding output values
• the outputs, if the rule is given as well as corresponding input values
• the rule, if the rule works for every given input value and its corresponding output value.
Tables are a useful way to record patterns in Grades 4 and 5. In Grade 5 it is useful to sometimes include the rule on the table, e.g.
<table>
<tr><th></th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th><th>8</th><th>9</th><th>10</th></tr>
<tr><td>x 6</td><td>6</td><td>12</td><td>18</td><td></td><td>30</td><td></td><td></td><td></td><td></td><td>60</td></tr>
</table>
In Term 1 it is recommended that number patterns are used to develop concepts and skills that will be used in multiplication and division. The focus can be on input-output flow diagrams that help learners to understand and learn about</td>
<td>4 hours</td>
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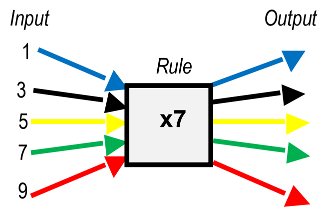
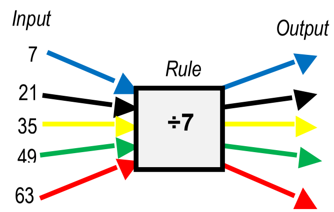
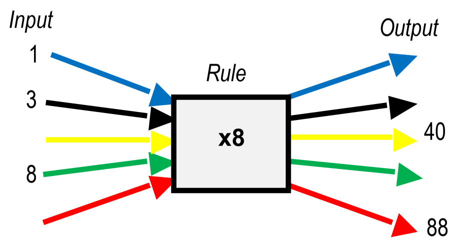
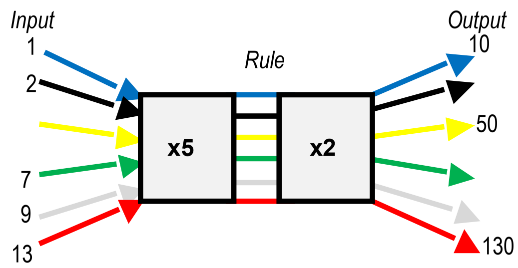
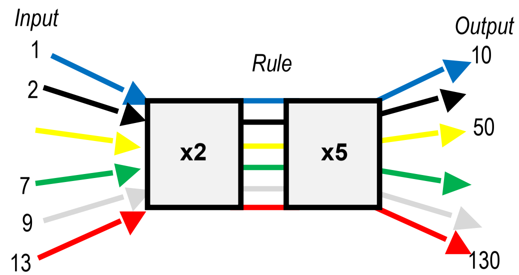
CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
PATTERNS, FUNCTIONS AND ALGEBRA	**2.1** **Numeric patterns**		• inverse operation between multiplication and division • multiplication of units by multiples of 10, 100 and 1 000 • the associative property with whole numbers and how we can use this property when we multiply e.g. multiplying by multiples of 10 **Using flow diagrams to focus attention on multiplication and division as inverse operations** Learners are not expected to use the expression “inverse operations”. They are expected to know that • multiplication can be used to do division calculations • multiplication can be used to check division calculations Provide learners with appropriate flow diagrams which they complete and discuss. **Examples:**  After completing a number of similar examples, learners should explain in their own words what they notice. If learners then write pairs of matching number sentences based on the flow diagrams, they can discuss using multiplication to check division and using multiplication to check division. **Further examples** Learners can use the above knowledge to indicate how they could complete the missing input numbers in a flow diagram: 	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
PATTERNS, FUNCTIONS AND ALGEBRA	**2.1** **Numeric patterns**		Once learners have completed the flow diagram, they can discuss how they found the missing input numbers from the corresponding output number and rule. This can be consolidated by giving learners pairs of number sentences in which the same numbers are multiplied and divided. **Using flow diagram to help learners develop multiplication and division techniques** **Associative property** Numbers can be multiplied in any order. **Example**:(13 x 5) x 2 = 13 x (5 x 2)   Learners discuss what they notice when they compare the examples. Learners are not required to know the name of the associative property. They are only expected to be able to use it to make calculations easier or use equivalent statements. **Using flow diagrams to help learners think about and use techniques for multiplying by multiples of 10** Learners complete a flow diagram like the one below. They then explain using their own words what they notice when they compare the flow diagrams. They then diiscuss a short way to multiply by	

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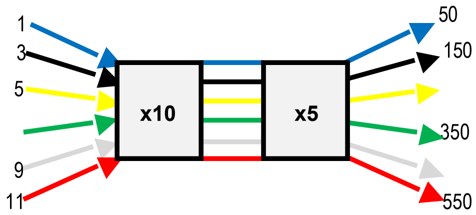
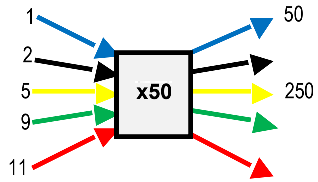
<tr><td>PATTERNS, FUNCTIONS AND ALGEBRA</td><td>2.1
Numeric patterns</td><td></td><td>

Input ***Output*** ***Input*** ***Output***





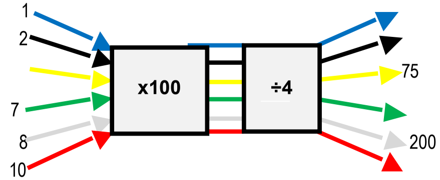
This can be consolidated by multiplying by other multiples of 10.

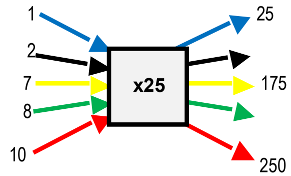
Similar pairs of flow diagrams can be used, to help learners develop techniques for multiplying by multiples of

Other quick multiplication techniques can be developed in this way

Examples

Input ***Output*** ***Input*** ***Output***





Learners can develop fast mental and written techniques based on this. Once learners understand these techniques for multiplying and dividing, further practice can be given in the mental mathematics programme.

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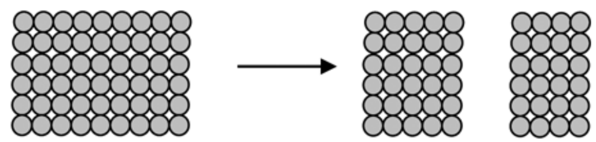
CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Multiplication and division	**Number range for calculations** • multiplication of at least whole -3-digit by 2-digit numbers • division of at least whole 3-digit by 1-digit numbers **Calculation techniques** Using a range of techniques to perform and check written and mental calculations of whole numbers including: • estimation • building up and breaking down numbers • using a number line • rounding off and compensating • doubling and halving • using addition and subtraction as inverse operations • using multiplication and division as inverse operations **Number range for multiples and factors** • Multiples of 2-digit whole numbers to at least 100 • Factors of 2-digit whole numbers to at least 100 **Properties of whole numbers** • Recognize and use the commutative; associative; distributive properties of whole numbers • 0 in terms of its additive property • 1 in terms of its multiplicative property	Rather than do all the multiplication and division in one block, it is recommended that learners revisit calculations regularly. In this suggested sequencing of work, learners do multiplication and division in 3 of the 4 terms in Grade 4. Nine hours are allocated to multiplication and division for Term 1. **What is different to Grade 4?** In Term 1, learners revise and consolidate work done in Grade 4 .i.e. • learners multiply at least 2-digit numbers by 2-digit numbers • learners divide at least whole 3-digit by1-digit numbers Learners can recap the properties of multiplication and division and brush up on their skills **Learners should do context free calculations and solve problems in contexts** The following problem types remain important: sharing, grouping, treating groups as units, rate, ratio(see the description of problem types at the end of the Grade 5 notes) Remember, that it helps learners to become more confident in and more independent in Mathematics, if they have techniques • to check their solutions themselves • to judge the reasonableness of their solutions **Judging reasonableness of solutions** Learners should estimate their answers before calculating. They can round off the numbers involved in the calculations. Learners can round off to the nearest when multiplying or dividing with 2-digit numbers **Checking solutions** Learners should know that they can check a division calculation by doing multiplication. **Example:** If 69 ÷ 3 = 23; then 23 x 3 = 69 When learners check a division calculation involving a remainder, they must be taught to first multiply the quotient by the divisor and then to add the remainder **Example:** If 70 ÷ 3 = 23 remainder 1; then 23 x 3 = 69 and 69 + 1 = 70 Using the inverse operation to check solutions is one reason for teaching multiplication and division simulteneously. Another reason for combining multiplication and division is that we almost always use multiplication to solve division problems.	**6 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Multiplication and division	**Solving problems** • Solve problems involving whole numbers, including - financial contexts - measurement contexts • Solve problems involving whole numbers, including: - comparing two or more quantities of the same kind (ratio) - comparing two quantities of different kinds (rate) - grouping and equal sharing with remainders	In Grade 5 learners continue to break up numbers to multiply. There are different ways of doing this. Sometime the numbers involved in the calculation make different methods easier or more difficult. Learners are already able to use the associative and commutative properties to multiply two or more numbers. **Multiplication and the distributive law** One way for learners to understand how and why the distributive property works, is to split arrays and write number sentences to describe the arrays. **Example**  9 x 6 = 5 x 6 + 4 x 6 The distributive law allows you to break down the number and then multiply each part separately. As the numbers learners work with get larger, learners may begin to lose track of some numbers when they break up numbers to do calculations. Using brackets is helpful to show grouping of numbers and so helps learners keep track of what they are doing. Since the operations in brackets have to be done first, it removes any confusion about the order of operations. Learners thus do not have to learn rules such as BODMAS if brackets are used routinely to indicate which operations have to be done first. **Using the distributive property to multiply** 47x 45 47 x (40 + 5) ⇢ (breaking up one number) = 47 x40 + 47 x 5 ⇢ (using the distributive property) = 1880 + 235 = 2 115 or 47x 50 – 5= 47 x 50– 47 x 5 ⇢ (using the distributive property) = 2 350–235 = 2 115	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Multiplication and division		**Example** of checking reasonableness by rounding off 47 x 45 ≈ 47 x 50 ≈ 2 350 by approximating the multiplicand. **or** 54 x 26 ≈ 50 x 45 ≈ 2 250 by approximating the multiplier. **Breaking down numbers into suitable factors to multiply** **Example**: a) Calculate 47 x 12 47 x 12 = 47 x 2 x 6 ------▶ (breaking down 12 into its factors) =(47 x 2) x 2 x 3 ------▶ (breaking down 6 into its factors) =(94 x 2) x 3 = 188 x 3 =(100 + 80 + 8)x 3 = 300 + 240 + 24 = 564 b) Calculate 53 x 45 53 x 45 = 53 x 9 x 5 ------▶ (breaking down 45 into its factors) =(53 x 3) x 3x 5 ------▶ (breaking down 9 into its factors) =(159 x 3) x 5 =477 x 5 =(400 + 70 + 7) x 5 = 2 000 + 350 + 35 = 2 385 **Dividing** **Problems** There are two kinds of problems that result in division. It is important that learners experience both of these: • sharing problems: e.g. 6 learners share 32 sweets equally. How many sweets does each learner get.? • grouping: e.g. Samkele has a large packet with 32 sweets. How many smaller packets can she make with 6 sweets each?	

<table>
<tr><th>CONTENT AREA</th><th>TOPICS</th><th>CONCEPTS AND SKILLS</th><th>SOME CLARIFICATION NOTES OR TEACHING GUIDELINES</th><th>DURATION (in hours)</th></tr>
<tr><td>NUMBERS, OPERATIONS AND RELATIONSHIPS</td><td>1.1
Whole numbers
Multiplication
and
division</td><td></td><td>
Some problems and calculations should have a remainder, and some should not.
See the description of problem types at the end of the Grade 5 notes
Learners continue to use what they know about multiplication to do division.
As with Grade 4, learners are not encouraged to treat the digits separately, but rather to consider the number as a whole and to keep the value of the parts of the number in mind. Sometimes in the past, learners were taught to write out the whole times table, which they were encouraged to work out by repeated addition. At other times in the past learners were encouraged to divide by doing repeated subtraction of the divisor. Many learners got lost in the extensive repeated subtraction of the divisor when dividing 3-digit by 1-digit numbers. When dividing 3-digit by 1-digit numbers, it is preferable for learners to work with the easily remembered multiplication facts of multiples of 10 and then doubling and halving. These large groups of numbers can then be subtracted from the number being divided into. In this way learners do fewer subtractions and are more likely to arrive at the correct answer
Example
Claculate 375 ÷ 8
Learners can write out a “clue board” of what they know about multiplying by 8.

This generally includes multiplying by 10 and multiples of 10
Multiplying by 5 (halve the multiplying by 10 value).
Multiplying by 2, 4, 8 (learners get this through doubling).
Filling in other multiples as they need to use them.

Clue board
10x8 = 80
20x8 = 160
30x8 = 240
40x8 = 320
5x8 = 40
6x8 = 48
3x8 = 24
Learners use multiplication and then subtraction to calculate.
<table>
<tr><th>Multiply to get an approximate answer</th><th>Subtract to find the difference</th></tr>
<tr><td>40 x 8 = 320</td><td>375 – 320 = 55</td></tr>
<tr><td>6 x 8 = 48</td><td>55 – 48 = 7</td></tr>
</table>
375 ÷ 8 = 40 + 6 + remainder 7 = 46 remainder 7
Learners should check their calculations by multiplying 46 by 8 and the adding 7.
Example of checking reasonableness by rounding off
With division it makes more sense for learners to round off the dividend to a multiple of the divisor e.g. 400 ÷ 8 = 50 and 320 ÷ 8 = 40. So the answer should lie between 40 and 50.
</td><td></td></tr>
</table>

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
MEASUREMENT	**4.4** **Time**	**Reading time and time instruments** Read, tell and write time in 12-hour and 24-hour formats on both analogue and digital instruments in • hours • minutes • seconds Instruments include clocks, watches and stopwatches **Reading calendars** **Calculations and problem solving related to time include** Calculation of time intervals where time is given in • seconds and/or minutes • minutes and/or hours • hours and/or days • days and/or weeks and/or months • months and/or years • years and/or decades **History of time** Know how time was measured and expressed in ancient times.	**What is different to Grade 4?** Stopwatches are introduced. Learners can either use stopwatches that occur as single instruments, or stopwatches on cell phones or wrist watches. Learners continue to read, record and calculate time in -hour and -hour formats and to work with analogue and digital instruments. This is practised regularly. Once learners have been taught to tell the time, it can be practised during the mental Mathematics section of the lesson, and frequently at other times during the day. Learners continue to read calendars **Calculations and problem-solving related to time** Decades are introduced. Calculations should be limited to whole numbers and fractions.	**6 hours**

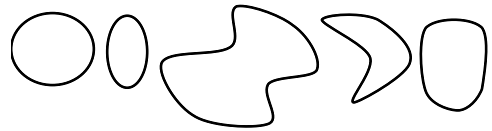
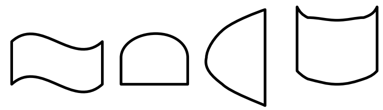
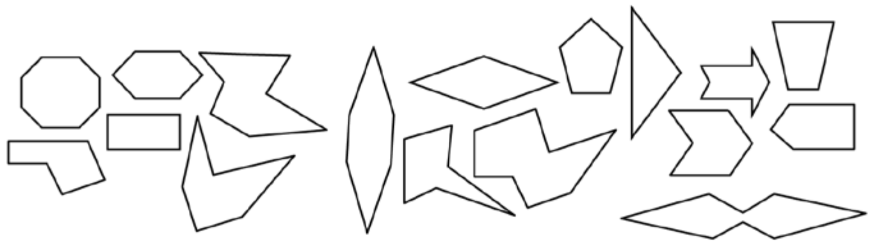
ASSESSMENT:

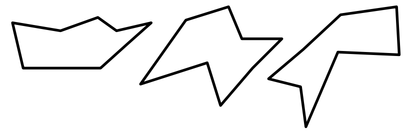
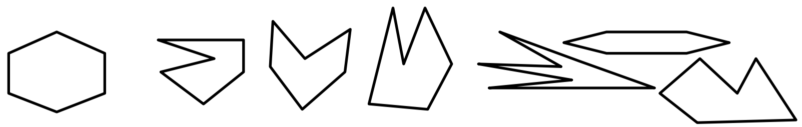
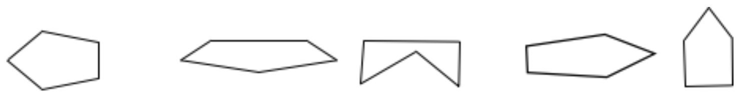
At this stage learners should have been assessed on:

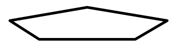
- multiplication (2-digit by 2-digit numbers) and division (3-digit by 1-digit numbers)
- time
- 2-D shapes including identifying right angles

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
DATA HANDLING	**5.1 Collecting and organising data**	• Collect data using tally marks and tables for recording • Order data from smallest group to largest group	**What is different to Grade 4?** The following are new in Grade 5 • ordering data sets • analyzing data not only according to categories, but also taking into account contexts and sources of data • analyzing ungrouped numerical data sets to find the mode • pictographs which show a many-to-one correspondence • conclusions and predictions when analysing and summarising data Teachers in this phase should ensure that different topics are chosen for data collection and analysis in each of the grades. **Complete data cycle including drawing bar graph: context personal data** The complete data cycle includes asking a question, collecting, organising, representing, analyzing,interpreting data and reporting on the data. Work through whole data cycle to make individual bar graph using contexts that relate to themselves, their class, their school or their family. Suitable topics include: • favourite sports / favourite movies / favourite music / favourite TV programmes / foods or cool drinks/ favourite colours, etc. • models/makes of cars passing the school grounds **Analysing graphs** Analysing graphs on environmental or socio-economic contexts by answering questions on graphs. Both graphs and questions to be provided by teacher or textbook. Learners should work with at least • 2 pie graphs where the information is given in fractions and not percentages • 1 pictograph with a many-to-one representation • 1 bar graph • Suitable topics include • quantities of materials recycled in the town, province, country • quantities of recycling materials collected by schools around the country • sources of lighting and heating in SA • kinds of toilets in SA homes • kinds of homes in SA	**10 hours**
	5.2 Representing data	Draw a variety of graphs to display and interpret data including • pictographs (many-to-one correspondence) • bar graphs		
	5.3 Analysing, interpreting and reporting data	Critically read and interpret data represented in • words • pictographs • bar graphs • pie charts Analyse data by answering questions related to • data categories • data sources and contexts Summarise data verbally and in short written paragraphs that include • drawing conclusions about the data • making predictions based on the data Examine ungrouped numerical data to determine the most frequently occurring score in the data set (mode)		

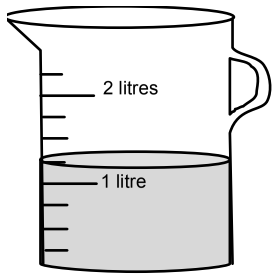
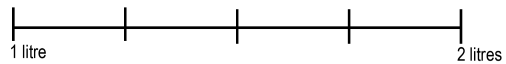
CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
			Drawing pictographs: context socio-economic data **This is recommended as the Maths project for Grade 5** Learners should be given socio-economic data, preferably national or regional, so that the numbers are large. This can be provided as unstructured data, in a paragraph, in a list or in a table or tally. Learners sort and order the data and draw a pictograph with many-to-one representation. They then complete the rest of the data cycle. Suitable topics include: • Facilities at schools in SA • Sources of water for families in SA e.g. piped to house, piped to yard, piped to communal source outside the property, borehole, spring, etc. • what source/sources of lighting for families in SA, e.g. electricity, candles, paraffin, etc. • kinds of homes in SA	
Assessment point Recommended form of assessment: **Project**				

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
SPACE AND SHAPE	**3.1** **2-D shapes**	**Shapes learners need to know and name** • Regular and irregular polygons - triangles, squares, rectangles, other quadrilaterals, pentagons, hexagons, heptagons, • Circles • Similarities and differences between squares and rectangles **Characteristics learners use to distinguish, describe, sort and compare shapes** • Straight and / curved sides • Number of sides • Length of sides • Angles: limited to - right angles - angles smaller than right angles - angles greater than right angles **Further activities to focus learners on charatceristics of shapes** Draw 2-D shapes on grid paper **Angles** limited to • right angles • angles smaller than right angles • Angles greater than right angles	**What is different to Grade 4?** • Heptagons are a new shape. • Learners also examine the length of the sides of shapes; so that they can describe the differences between squares and rectangles. • Learners start to focus on angle. In Grade 5 the focus is on right angles. **Shapes and their distinguishing** characteristics There are **four ways** in which learners distinguish shapes in Grade 5. 1. By checking whether they have straight or curved sides. Two dimensional shapes can be grouped as follows: • *<u>Closed shapes with curved sides only</u>*: <u>Examples</u>  The only 2-D shape that has curved sides that learners are expected to name is the circle. They should, however, be exposed to other shapes with curved sides which they are not expected to name • *<u>Closed shapes with curved and straight sides</u>*: <u>Examples</u>  Learners are not expected to name any of these shapes. • *<u>Closed shapes with straight sides only</u>*: <u>Examples</u>  2. When looking at the group of shapes with straight sides, learners group them according to the number of sides. A polygon is a closed shape with only straight sides. Learners are not expected to know the name polygon.	**7 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
SPACE AND SHAPE	**3.1** **2-D shapes**		**Polygons** A regular polygon is a straight sided closed shape that has all its sides the same length and all its angles the same size. Learners do not have to know the terms “regular” and “irregular”. Learners should be able to identify polygons according to their number of sides. They need to be able to identify any heptagon, hexagon or pentagon. Examples of heptagons/septagons  Examples of hexagons  **Examples of** pentagons  Learners need to know that all closed shapes with straight sides are called quadrilaterals. They need to be able to identify and name, squares and rectangles, for other quadrilaterals they use the group name, quadrilateral in Grade 5 Examples of quadrilaterals.  Learners should be exposed to a range of different triangles, but are not expected to name types of triangles in Grade 5	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
SPACE AND SHAPE	**3.1** **2-D shapes**		3. Learners distinguish shapes by looking at the length of the sides. Learners differentiate between squares and rectangles by looking at the lengths of the sides. However, learners can also discuss the lengths of sides of other shapes e.g. a learner may say that the following shape is a pentagon whose sides are not all the same length  4. Learners distinguish shapes by looking at the size of their angles. Here learners need to know how to identify a right angle (see notes below). They check whether shapes are rectangles or squares by checking whether all their angles are right angles. **Angles** In the Intermediate Phase learners measure angles informally. They do not use protractors or discuss angles in terms of degrees. In Grade 5 learners only need to know what a right angle looks like. All other angles are described as either bigger or smaller than right angles. Learners can be introduced to angles as a **'how much turning has taken place between the arms or sides of the angle'**. Here a right angle is equivalent to a quarter turn or revolution. Learners use informal angle measurers such as the corner of a sheet of paper or a page folded to make a right angle, to check whether shapes or objects have right angles. Learners should first learn characteristics of each shape, before discussing comparisons between shapes. **Activities to focus learners on characteristics of shapes** Most commercially available sets of 2-D shapes do not show irregular shapes. They are however easy to cut out of cardboard. Learners can draw irregular shapes on grid paper or if they have geoboards, they can create irregular shapes on geoboards. Learners can also combine cut-out or plastic shape to create composite irregular shapes Examples  **Written exercises and recording** Learners should do practical work with concrete apparatus but they should also do written exercises.	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
MEASUREMENT	**4.3** **Capacity/ Volume**	**Practical measuring of 3-D objects by** estimating measuring recording comparing and ordering **Measuring instruments** measuring spoons, measuring cups, measuring jugs **Units** millilitre (ml) litre (l) **Calculations and problem-solving related to capacity / volume include** solving problems in contexts using capacity/volume converting between litres and millilitres limited to examples with whole numbers and fractions	**What is capacity? What is volume?** **Capacity** is the amount of a substance that an object can hold or the amount of space inside the object. **Volume** is the amount of space that an object occupies. A bottle can have a 1 litre capacity, but it may not be filled to its full capacity. It could for example, only contain a volume of 250ml. In Grade 5 learners work with the same units of capacity that they worked with in Grade 4. They also work with the same measuring instruments. Learners need to: • consolidate their sense of how much 1 litre is • consolidate their sense of how much 1 millilitre is • understand and know the relationship between litres and millilitres. Check whether learners have a sense of which units and instruments are appropriate for measuring which various capacities. For example learners need to know which units to use to state the capacity of • a kettle • a petrol tank • a baby's milk bottle Learners should have a sense of which instruments are appropriate for measuring various capacities. For example they need to know what instruments to use to measure • liquid medicine to give to a baby • milk for a pudding recipe • water to dilute a packet of powdered cool drink **Measuring capacity and reading capacity measuring instruments** Learners find it easy to measure with measuring spoons or measuring cups, because this just requires filling them and pouring out the contents. Measuring with calibrated measuring jugs or other instruments with numbered and un-numbered gradation lines is more difficult. Learners need to be taught the skills of • where to stand to read a measuring jug correctly • how to read the numbered gradation lines and to calculate what the un-numbered gradation lines mean.	**5 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
MEASUREMENT	**4.3** **Capacity/ Volume**		Learners need to read • different kinds of measuring jugs • measuring jugs on which the numbered intervals, gradation lines or calibration represent different levels of the content. • measuring jugs on which there are a different number of un-numbered intervals within each numbered interval. Learners need practice with examples in which the numbered intervals are divided into - 2 un-numbered intervals - 4 un-numbered intervals - 5 un-numbered intervals - 10 un-numbered intervals **Example:** Here the numbered gradation lines on the jug shows 1 litre measurement readings. Think of the gradations as a number line.  There are 4 spaces between each litre.  This means that each small space shows 1 000ml ÷ 4 = 250ml The liquid is filled to space above litre i.e. 1 000ml + 250ml = 1 250ml It is sometimes easier and cheaper to get a range of syringes with calibrated gradation lines, than it is to get a range of measuring jugs. Learners will learn the same measurement reading skills if they work with syringes rather than jugs.	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
MEASUREMENT	**4.3** **Capacity/ Volume**		**Compare capacities in millilitres and litres** Learners should sequence containers marked in millilitres and litres. Here learners need to translate the decimal numbers on some packaging into fractions e.g. 1,5 litres of cool drink is the same as $1\frac{1}{2}$ litres of cool drink. One should also choose examples that allow learners to realize that the height of a container is not directly proportional to the capacity and that learners need to take into account the diameter of the container. **Recording capacities** Because learners will only work with decimal fractions in Grade 6, they should record capacities as • litres only e.g. 5 litres • millilitres only e.g. 250ml • litres and millilitres together e.g. 2 litres and 80 millilitres • litres and fractional parts of litres e.g. $2\frac{3}{4}$ litres • since learners will be reading half litres in decimal form off some packaging they can also write half litres in the decimal form, but this is not a requirement in this grade. **Calculations (including conversions) and problem-solving** Measurement provides a context in which to practise skills acquired in Numbers, Operations and Relationships. The skills, operations and number ranges required are appropriate for Term 1. By the end of the year the number ranges and operations can be increased to include everything that is covered under *Numbers, Operations and Relationships.* **Estimate and calculate** using millilitres and litres • rounding numbers up or down to the most appropriate unit of capacity • rounding off to10, 100, 1 000 (Doing rounding off when reading measuring instruments can help learners to understand the reasons for rounding up or down) • addition and subtraction of up to 4-digit numbers • multiplication up to 2-digit by 2-digit numbers • division up to 3-digit by 1-digit numbers • add fractions in measurement contexts (using only halves, thirds, quarters, fifths, sixths, sevenths and eighths)	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
MEASUREMENT	**4.3** **Capacity/ Volume**		**Solve problems** relating to capacity including • rate problems (especially price per litre) • ratio problems (e.g. increasing ingredients in a recipe by fixed ratios, or calculations where ingredients are mixed in a fixed ratio e.g. 1 part to 4 parts) **Convert** between units: $ml \leftrightarrow l$ Converting between litres and millilitres provides a context for practising multiplication and dividision by 1 000 . Conversions should be limited to whole numbers and fractions (given only as halves, thirds, quarters, fifths, sixths, sevenths, eighths). Conversions can also include converting the decimal half to the common fraction form of half. In Grade 5 learners do not calculate with decimals. When doing division they sometimes have a remainder e.g. 37 ÷ 4 = 9 remainder 1. Similarly when converting between units they may state their answers in a combination of units e.g. • 3 750 ml = 2 litres and 750millilitres • $4\frac{1}{2}$ litres = 4 500millilitres	
ASSESSMENT: At this stage learners should have been assessed on: • data handling • capacity				
			REVISION	**5 hours**

GRADE 5 TERM 2				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
NUMBERS, OPERATIONS AND RELATIONSHIPS	**Mental Mathematics**	**Mental calculations involving**: • Addition and subtraction facts of: - units - multiples of 10 - multiples of 100 - multiples of 1 000 • Multiplication of whole numbers to at least 10 x 10 • Multiplication facts of: - units by multiples of 10 - units by multiples of 100 - units by multiples of 1 000 - units by multiples of 10 000 **Number range for counting, ordering, comparing and representing, and place value of digits** • Count forwards and backwards in whole number intervals up to at least 10 000 • Order, compare and represent numbers to at least 6-digit numbers • Represent odd and even numbers to at least 1 000 • Recognize the place value of digits in whole numbers to at least 6-digit numbers. • Round off to the nearest 5, 10, 100, 1 000	The mental Mathematics programme should be developed systematically over the year. Learners should not simply be asked to do random calculations each day. As learners cover topics and develop calculating techniques in the main part of the lesson, so aspects of these can be incorporated into the mental Mathematics programme: concepts and skills are developed through the main lesson, and then practised with smaller number ranges in the mental Mathematics programme. The mental Mathematics should systematically develop three aspects of learners' number knowledge • number facts - number bonds: addition and subtraction facts of ◊ units ◊ multiples of 10 ◊ multiples of 100 ◊ multiples of 1 000 - times tables up to 10 x 10 • calculation techniques - doubling and halving - using multiplication to do division - multiplying by 10, 100 and 1 000 - multiplying by multiples or 10, 100 and 1 000 - dividing by 10, 100 and 1 000 - building up and breaking down numbers - rounding off and compensating: rounding off to 5, 10, 100 and 1 000 - Adding and subtracting of units, multiples of 10, 100 and 1 000 to/from any 5-digit number • number concept - counting forwards and backwards in 2s, 3s, 5s, 10s, 25s, 50s, 100s between 0 and at least 10 000. - ordering and comparing up to 6-digit numbers - place value for up to 6-digit numbers - building up and breaking down numbers - odd and even numbers - multiples - factors	**10 minutes every day**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**Mental Mathematics**	**Calculation techniques** Using a range of techniques to perform and check written and mental calculations of whole numbers including: • estimation • adding and subtracting in columns • building up and breaking down numbers • using a number line • rounding off and compensating • doubling and halving • using addition and subtraction as inverse operations • using multiplication and division as inverse operations **Number range for multiples and factors** • Multiples of 2-digits whole numbers to at least 100 • Factors of 2-digit whole numbers to at least 100 **Properties of whole numbers** • Recognize and use the commutative; associative; distributive properties with whole numbers • 0 in terms of its additive property • 1 in terms of its multiplicative property	Some mental Mathematics can be done without apparatus, but it is often useful to do mental Mathematics with apparatus **Recommended apparatus** • number lines including structured and unstructured number lines • a number grid • place value cards • counting beads	

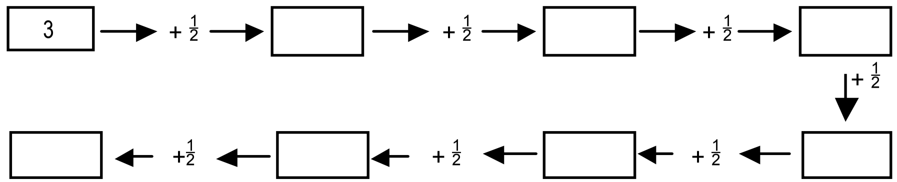
CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Counting, ordering, comparing, representing and place value of digits	Number range for counting, ordering, representing and place value of digits • Count forwards and backwards in whole number intervals up to at least 10 000 • Order, compare and represent numbers to at least 6-digit numbers • Represent odd and even numbers to at least1 000 • Recognize the place value of digits in whole numbers to at least 6-digit numbers. • Rounding off to the nearest 5, 10, 100 or 1000	What is different to Term 1 • counting number range increased – learners count forwards and backwards in 2s, 3s, 5s, 10s, 25s, 50s, 100s between 0 and at least 10 000. • learners also count in fractions (after the topic of fractions has been covered in the main lesson – see comment in that section about counting in fractions) • Rounding off to the nearest 10, 100, 1 000 • number range for place value, ordering, comparing and representing numbers increased to 6 digits See further notes in Term 1, but be aware that number ranges have increased in Term 2. The increased number ranges are shown in the column on the left. All work learnt here can be practiced throughout the year in the mental Mathematics programme.	**1 Hour**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Addition and subtraction	**Number range for calculations** Addition and subtraction of whole numbers with at least 5-digit numbers **Calculation techniques** Using a range of techniques to perform and check written and mental calculations of whole numbers including: • estimation • adding and subtracting in columns • building up and breaking down numbers • using a number line • rounding off and compensating • doubling and halving • using addition and subtraction as inverse operations **Properties of whole numbers** • Recognize and use the commutative; associative; distributive properties of whole numbers • 0 in terms of its additive property • 1 in terms of its multiplicative property **Solving problems** Solve problems involving whole numbers, including the following: • financial contexts • measurement contexts	What is different to Term 1? • In Term 2, learners add and subtract numbers with up to 5 digits. • Rounding off as a way of estimating answers to include rounding off to the nearest 1 000 as well as rounding off to the nearest 10, 100 Learners should solve problems in contexts and do context free calculations As number ranges get larger many learners tend to lose the parts of the number that they break up, when they try to combine again. This is especially the case when more than two 5-digit numbers are being added. It is for this reason that column addition and column subtraction are introduced in Grade 5. In Term 2 one can still encourage learners to expand the numbers as they write them in columns. In Term 1, an option of a column method was provided, but it consisted of putting different place values into different rows. Learners continue to: • check their solutions themselves e.g. by using the inverse operation • judge the reasonableness of their solutions e.g. by rounding off numbers and estimating answers **Example:** Calculate: 56 423 +7 581 +21 479 • Breaking down all the numbers to add Adding in a row (horizontally) 50 000+6 000+400+20+3+7 000+500+80+1+20 000+1 000+400 +70+9 = 50 000+20 000+ 6 000+7 000+1 000+400+500 +4 00+20+ 80 +70+ 3+1+9 = 70 000 + 14 000 + 1 300 + 170 + 14 = 70 000 + 10 000 + 4 000 + 1 000 + 300 + 100 + 70 + 10 + 4 = 80 000 + 5 000 + 400 + 80+ 4 = 85484 The horizontal method may get unwieldy when more than two 5-digit numbers are added. The alternative is to use the expanded vertical method.	**5 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Addition and subtraction		• Expanded vertical method 56 423 = 50 000 + 6 000 + 400 + 20 + + 7 581 = 7 000 + 500 + 80 + 1 + 21 479 = 20 000+ 1 000 + 400 + 70 + 9 70 000+ 14 000 + 1300 + 170 + 10 = 70 000 + 10 000 + 5 000 + 400 + 80+ 4 = 85484 • Adding on (by breaking down the number to be added) Calculate: 56 423 + 7 581 56 423 + 7 000 → 63 423 + 500 → 63 923 + 80 → 64 003 + 1 → 64 004 This tends to work better if only two numbers are added. If a third or fourth number is added, they can be broken up and added one at a time, but the expanded column method is more efficient. • Breaking down all the numbers cording to place value parts to subtract using compensation (counterbalance) **Example**: Calculate: 8 743 – 5 684 8 743 – 5 684 = 8 000 + 700 + 40 + 3 – 5 000 – 600 – 80 – 4 = 8 000 + 600 + 130 + 13 – 5 000 – 600 – 80 – 4 (by breaking up 743 into 600 + 130 + 13) = 8 000 – 5 000 + 600 – 600 + 130 – 80 + 13 – 4 = 3 000 + 0 + 50 = 3 059 • Breaking down numbers and using the expanded column method Calculate: 98 743 – 45 684 Learners cannot subtract 4 from 3 or 80 from 40. Instead of breaking down 743 into 700 + 40 + 3 they will break down 743 into 600 + 130 + 13. Then they can subtract 4 from 13 and 80 from 130.	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Addition and subtraction		600 130 13 9 8 7 4 3 = 90 000+ 8 000 + 700 + 40 + 3 – 4 5 6 8 4 40 000+ 5 000 + 600 + 80 + 4 50 000+ 3 000 + 0 + 50 + 9 = 53 059 • Subtracting by breaking down number to be subtracted Calculate 74 687 – 52 143 74 687 – 50 000→24 687 – 2 000 → 22 687 – 100 → 22 587 – 40 → 22 547 – 3 = 22544 **or** 25 746 – 10 000 – 4 000 – 500 – 30 – 2 = (15 746 – 4 000) – 500 – 30 – 2 = (11 746 – 500) – 30 – 2 = (11 246 – 30) – 2 = 11 216 – 2 = 11 214 This tends to work better if only one number is subtracted from another. If a second or third number is subtracted, they can be broken up and subtracted one at a time, but the expanded column method is more efficient. Problems Summation, increase and decrease, comparison by difference; comparison by ratio See the description of problem types at the end of the grade notes	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.2** **Common fractions**	**Concepts, skills and number range** • Describing and ordering fractions • Count forwards and backwards in fractions • Compare and order common fractions to at least twelfths **Calculations with fractions** • Addition of common fractions with the same denominator • Recognize, describe and use the equivalence of division and fractions **Solving problems** Solve problems in contexts involving common fractions, including grouping and sharing **Equivalent forms:** Recognize and use equivalent forms of common fractions with denominators which are multiples of each other.	What is different to Grade 4? • Ninths, tenths, elevenths and twelfths • Learners count in fractions • Subtraction of fractions with the same denominators • Addition and subtraction of mixed numbers • Fractions of whole numbers that result in whole numbers Most of the new work mentioned above can be developed in Terms 3 and 4. However, learners can begin to count in fractions Learners should develop the concept of fractions in a variety of ways. Problem solving contexts can help learners to understand many ways of thinking about fractions. A variety of problems should be given to learners. See the types of fractions problems stated at the end of the grade notes. Learners can also work with apparatus and diagrams. Different diagrams or apparatus develop different ways of thinking about fractions. • Region or area models develop the concept of fractions as part of a whole. If used in particular ways they can also develop the concept of fraction as a measure. Examples of area models include circles cut into fraction pieces (or diagrams of pies), rectangles or other geometric shapes divided into fraction pieces (paper folding), fractions using square or dotty grid paper, geoboards. • Length or measurement models can be used to develop the concept of fractions as part of a whole and if used in particular ways also fraction as a measure. Examples of length models include fraction strips, Cuisenaire rods, number lines. • Set models develop the concept of fraction of a collection of objects (and can lay the basis for thinking about a fraction of a number e.g. $\frac{1}{3}$ of 12) Examples of set models include counters of any kind in different arrangements. Learners should not only work with one kind of model, because this can limit their understanding of fractions. For example fractions in diagram forms should include region model (circles and other geometric shapes divided into fraction parts), length models (including number lines) and set models (which show collections of objects). In Term 2 learners should revise and consolidate what they learned about fractions in Grade 4. This is described below, but learners can also count in fractions.	**5 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.2** **Common fractions**		Counting in fractions can happen • as learners place down fraction pieces • on the number line • or in number chains like the one shown below.  Learners should solve problems as well as work with apparatus and diagrams (area, length and set models) to ensure that they • understand the relationship between fractions and division i.e. if you share equally amongst 3 learners you will be making thirds • are able to name fractions (terminology like “3 over 4” should be avoided as it tends to encourage learners to think about each fraction as two different numbers, rather than $\frac{3}{4}$ being a number which is greater than $\frac{1}{2}$ but less than 1). Learners should, through work with apparatus, diagrams and solving problems, deal with at least the list of fractions required in Grade 4. This should be extended to include the full range of fractions required in Grade 5. The initial focus on fractions should deal with understanding the concept of a fraction. Once learners have consolidated this they can move on to working with equivalence, then comparing and then calculating with fractions. **Equivalence, comparing and ordering** Equivalence should be approached using apparatus, diagrams or problem contexts. Learners are not expected to be able to give equivalent fractions in symbolic (number) form without having diagrams to which they can refer or a problem context in which to make sense of the equivalence. Once learners are comfortable with equivalence, it is easy for them to compare and order fractions. **Calculations with fractions:** Calculations with fractions in the first term can focus on • making fractions through grouping or sharing which is linked with understanding the relationship between division and fractions e.g. If children share sweets equally, they will each get $\frac{1}{5}$ of the sweets • adding fractions with the same denominators	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.2** **Common fractions**		Calculations as with other aspects of fractions should be developed either through problem contexts or with the use of apparatus or diagrams. Learners should be given problem contexts in which they need to add fraction parts. Learners should also be given either fraction pieces to count e.g. $\frac{3}{8}+\frac{4}{8}$ can be done by counting out and counting on in eighths with apparatus or by colouring in diagrams or by "hopping" in eighths on a number line.	

ASSESSMENT:

At this stage learners should have been assessed on:

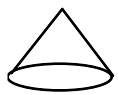
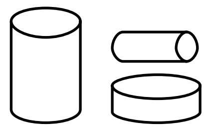
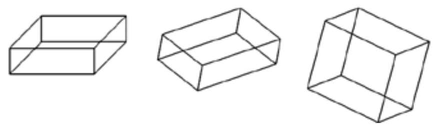
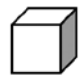
- 6-digit numbers
- adding and subtracting up to 5-digit numbers
- fractions

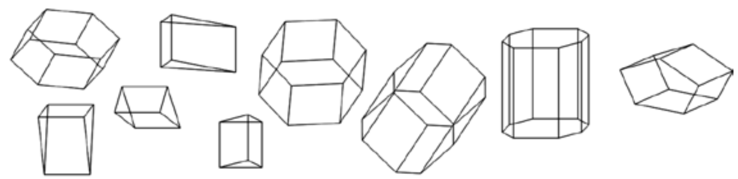
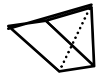
CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
MEASUREMENT	**4.1** **Length**	**Practical measuring of 2-D shapes and 3-D objects by:** estimating measuring recording comparing and ordering **Measuring instruments** rulers, metre sticks, tape measures, trundle wheels **Units:** millimetres (mm), centimetres (cm), metres (m), kilometres (km) Calculations and problem-solving related to length Solve problems in context related to length Conversions include converting between any of the following units: millimetres (mm), centimetres (cm), metres (m) and kilometres (km) Conversions limited to whole numbers and fractions	In Grade 5 learners work with the same units of length that they worked with in Grade 4. They also work with the same measuring instruments. Check whether learners have a sense of which units and instruments are appropriate for measuring various lengths, heights and distances Learners should have a sense of which units are appropriate for measuring different lengths. For example, they need to know which units to use to state • the length and width of a desk • the distance to the next town • the length of a nail Learners should have a sense of which instruments are appropriate for measuring different lengths. For example,they need to know which instruments to use to measure: • the length and width of a desk • the length of the classroom • the length of a rugby field Reading instruments for measuring lengths Learners should measure lengths using • rulers (mm, cm) • metre sticks (m) • tape measures (m, cm, mm) • trundle wheels (m) Learners find rulers easy to use for measuring. This is because • centimetres are always numbered • there are always 10mm divisions in a centimetre. Stating and recording length measurements In Grade 5 learners continue to record their measurements using rulers, as millimetres or centimetres or millimetres and centimetres e.g. the pencil is 11 centimetres and 3 millimetres long. They can sometimes record their measurements in centimetres and fractions of centimetres e.g. the eraser is $2\frac{1}{2}\ cm$ long. This is easy to do because on a ruler, the 5th millimetre gradation line is normally longer. Once learners have learned, from reading commercial mass and capacity packaging, that $2\frac{1}{2}$ is the same as 2,5 , they will also be able to use the decimal ',5' in their recording i.e. 2,5cm long.	**7 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
MEASUREMENT	**4.1** **Length**		Tape measures that are longer than 1m and 2m should also be used e.g. builder tapes or surveyor tapes can be more than 10 metres. The longer measuring tapes are more difficult to use. Learners cannot only read off the number corresponding with the final measurement. They also need to know for how many metres they have unrolled the tape, e.g, the distance may be 4m and 78cm, but the tape may only show the number 78. When using the longer longer measuring tapes, estimation becomes even more important. **Compare and order lengths up to 6 digits in mm, cm, m, km** In the Intermediate Phase learners need to work with drawings of objects with specified lengths, or written descriptions of objects with specified lengths. At first learners can compare length given in the same units, but once they know how to convert between units, they can compare lengths and heights of objects which are specified in different units **Calculations (including conversions) and problem-solving** Measurement provides a context in which to practise skills acquired in Numbers, Operations and Relationships. The skills, operations and number ranges required are given below. **Estimate and calculate using** • Round numbers up or down to the appropriate unit of length • Rounding off to 5, 10, 100 and1 000 • Addition and subtraction up to 5-digit numbers • Multiplication: 3-digit number by 2-digit number • Division: 3-digit number by 2-digit number • Add common fractions in the context of measurement (using only halves, thirds, quarters, fifths, sixths, sevenths and eighths) By the end of the year the number ranges and operations can be increased to include everything that is covered under *Numbers, Operations and Relationships.* Solve problems relating to distance and length including rate and ratio problems. Conversions between units $mm \leftrightarrow cm$ $cm \leftrightarrow m$ $m \leftrightarrow km$ Converting between the units of measurement above provides a context for practising multiplication and division by 10, 100, 1 000 Conversions should be limited to whole numbers and fractions given only as halves / thirds / quarters / fifths / sixths / sevenths / eighths.	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
MEASUREMENT	**4.1** **Length**		In Grade 5 learners do not calculate using decimals. When doing division there will sometimes be a remainder in the answer, e.g. 37 ÷ 4 = 9 remainder 1. Similarly when converting between units, answers may be stated in a combination of units e.g. • 35cm = 3cm and 5mm or $3\frac{1}{2}cm$ • 526cm = 5m and 26cm • 2 500m = 2m and 500cm • $4\frac{1}{2}\,km$ = 4 500m	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1 Whole numbers** Multiplication	**Number range for calculations** Multiplication of at least whole 3-digit by 2-digit numbers **Calculation techniques** Using a range of techniques to perform and check written and mental calculations of whole numbers including: • estimation • building up and breaking down numbers • using a number line • rounding off and compensating • doubling and halving **Number range for multiples and factors** • Multiples of 2-digits whole numbers to at least 100 • Factors of 2-digit whole numbers to at least 100 **Properties of whole numbers** • Recognize and use the commutative; associative and distributive properties with whole numbers • 0 in terms of its additive property • 1 in terms of its multiplicative property **Solving problems** • Solve problems involving whole numbers, including - financial contexts - measurement contexts • Solve problems involving whole numbers, including comparing two or more quantities of the same kind (ratio)	What is different to Term 1? In Term 1, learners multiply 2-digit by 2-digit numbers. In Term 2, learners multiply 3-digit by 2-digit numbers Learners should do context free calculations and solve problems in contexts Focus on multiples and factors, so that learners' knowledge of multiples and factors can be used in multiplication. Learners should continue to judge the reasonableness of their solutions e.g. by estimating before calculating using rounding off to the nearest 10, 100, 1 000 **Using the distributive property to multiply** 547 x (40 + 5) = 547 x40 + 547 x 5 $\dashrightarrow$ (using the distributive property) = 21 880 + 2 735 = 24 615 **or** 547x (50 – 5) = 547 x 50 – 547 x5 $\dashrightarrow$ (using the distributive property) = 27 350 – 2 735 = 24 615 Using rounding-off to estimate and judge reasonableness of answer 547 x 45 = 547 x 50 ≈ 27 350 Breaking down numbers into factors to multiply Example: Calculate 547 x 42 547 x 42 = 547 x 7 x 6 = 547 x 2 x 3 x 7 = 1 094 x 3 x 7 = 3 282 x 7 = (7 x 3 000) + (7 x 200) + (7 x 80) + (7 x 2) = 21 000 + 1 400 + 560 + 14 = 22 974 Notice that as numbers get larger, learners will tend to use more than one calculating technique at the same time e.g. in the above example the factors of the multiplier are used but the multiplicant is split into place value parts. Kinds of problems Treating groups as units/rate See the description of problem types at the end of the Grade 5 notes	**6 hours**

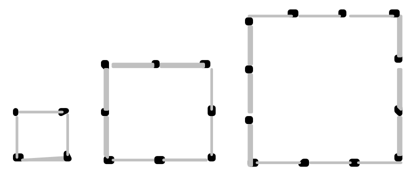
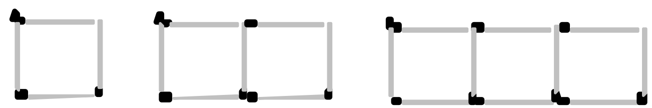
CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
SPACE AND SHAPE	**3.2** **Properties of 3-D objects**	Objects learners need to know and name • rectangular prisms and other prisms • cubes • cylinders • cones • pyramids • similarities and differences between cubes and rectangular prisms Charactersistics learners use to distinguish, describe, sort and compare shapes • shape of faces • number of faces • flat and curved surfaces • Further activities to focus learners on charactersistics of objects • make 3-D models using cut out polygons • cutting open boxes to trace and describe their nets	What is different to Grade 4? • cubes are introduced • learners work with prisms as a group for the first time • in the same way that learners distinguish between rectangles and squares, using the lengths of their sides, so they distinguish between cubes and rectangular prisms using the shapes of their faces • learners count the number of faces on 3-D objects and use this as part of their descriptions of objects Objects and their distinguishing charactersistics There are three ways in which learners distinguish 3-D objects in Grade 5 1. By checking whether they have flat or curved surfaces. Three dimensional objects can be grouped as follows: • Objects with a curved surface only: **Example: sphere**  • *Objects with flat and curved surfaces* **Examples:** **cones**  **cylinders**  • *Objects with only flat surfaces.* In Grade 5 learners only identify and name **rectangular prisms**  **cubes:** 	**6 Hours**

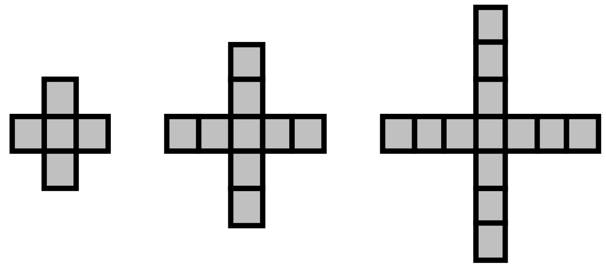
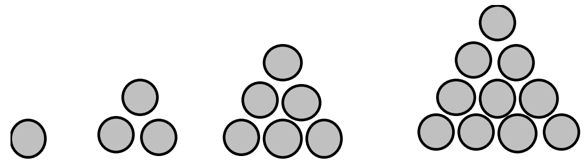
CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
SPACE AND SHAPE	**3.2** **Properties of 3-D objects**		**other prisms**  **pyramids:** square based pyramid.  2. When looking at the group of objects with flat surfaces, learners should know that the flat surfaces of a 3-D object are called **faces.** They describe these objects according to the kinds of 2-D shapes that make up the flat surfaces e.g. the faces of a rectangular prism can all be rectangles or some can be squares. Square-based pyramids have one square face and the other faces are triangles. 3. Learners can also look for right angles on the faces of objects. If the object that they are examining has faces with only right angles, then it will be either a cube or a rectangular prism. Further activities to focus learners on characteristics of objects: Learners create 3-D objects by putting together cut-out polygons, which helps to focus attention on the shapes of the faces of the 3-D objects. Learners cut open boxes to make nets. They describe the nets of the boxes. Interpreting drawings of 3-D objects and written exercises Learners need to work with real objects. However they also need to do written exercises on 3-D objects. Interpreting pictures of 3-D objects is more difficult than working with the real objects. Learners should practice interpreting drawings of 3-D objects. They should identify and name 3-D objects in drawings and identify everyday objects that look like geometric objects e.g. a milk carton looks like a rectangular prisms. Describe the surfaces of objects when shown drawing of 3-D objects, match the 2-D shapes that have the same shape as the faces of 3-D objects, match nets of rectangular prisms to the appropriate drawing of rectangular prisms and compare 3-D objects from drawings.	

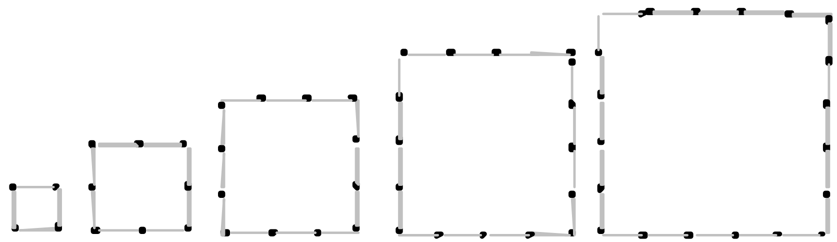
ASSESSMENT:

At this stage learnes should have been assessed on:

- length
- multiplication of up to 3-digit numbers by 2-digit numbers
- 3-D objects

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
PATTERNS, FUNCTIONS AND ALGEBRA	**2.2** **Geometric patterns**	**Investigate and extend patterns** • Investigate and extend geometric patterns looking for relationships or rules of patterns - represented in physical or diagram form - sequences involving a constant difference - of learner's own creation • Describe observed relationships or rules in learner's own words **Input and output values** Determine input values, output values and rules for the patterns and relationships using flow diagrams **Equivalent forms** Determine equivalence of different descriptions of the same relationship or rule presented • verbally • in a flow diagram • by a number sentence	In Geometric Patterns in the Intermediate Phase the aim is for learners to get more practice in working with geometric patterns each year. Learners continue to do the activities they did in Grade 4. They just learn to do them more quickly. Learners no longer work with simple repeating patterns. Learners work with patterns that are made from 2-D shapes and 3-D objects or from drawings / diagrams of these shapes and objects. In Patterns, Functions and Algebra we choose geometric patterns that can be re-described using a number pattern, this does not mean that it can't be described in words. In fact the description in words is usually the starting point. In Shape and Space learners also work with visual patterns that are geometric. However they are only required to describe the patterns using the language of geometry and to copy the patterns. While many of these patterns can be described using algebraic expressions, this is beyond the scope of Intermediate Phase learners. Learners show the same patterns in different ways: in a diagram, as a verbal description, as a flow diagram and in a number sentence. Sometimes learners are able to see different aspects of a pattern when they change the form in which the pattern is presented. What kinds of geometric patterns should learners work with? Patterns in which the shapes grow (increase) or decrease in different ways. • patterns in which the shape keeps its form, but gets larger (or smaller) at each stage e.g.  • patterns in which a shape or part of a shape is added at each stage e.g.  In each of the examples above the pattern is made by adding on the same number of matchsticks. In the top pattern four matchsticks are added each time. In the second pattern three matchsticks are added each time. Both number patterns are patterns with a constant difference. Most geometric patterns learners see in Grade 5 will be patterns with a constant difference. They are more likely to get patterns with a constant ratio when working with number sequences.	**4 Hours**

<table>
<tr><th>CONTENT AREA</th><th>TOPICS</th><th>CONCEPTS AND SKILLS</th><th>SOME CLARIFICATION NOTES OR TEACHING GUIDELINES</th><th>DURATION (in hours)</th></tr>
<tr><td>PATTERNS, FUNCTIONS AND ALGEBRA</td><td>2.2
Geometric patterns</td><td></td><td>The pattern below is also a pattern with a constant difference: four squares are added each time.

Patterns with neither a constant difference nor a constant ratio
Example:

What should learners do?
• Copy and extend the pattern
This helps them to understand how the pattern is formed
• Describe the pattern in words.
Different learners will describe different aspects of the pattern.
Learners are required to describe the relationship between shapes in the sequence or rules in own words. To do this, learners need discuss how they made the pattern or be able to answer the question “How do I get from one stage in the pattern to the next?”
• Learners need opportunities to see that changing the form of representation from geometric to verbal or to a flow diagram or to a table can sometimes help them to understand the pattern. Learners should “translate” these geometric sequences into other forms of expression or representation namely by:
- verbal description of the pattern
- flow diagrams or input –output diagrams
- number sequences which can be recorded in a table form.</td><td></td></tr>
</table>

<table>
<tr><th>CONTENT AREA</th><th>TOPICS</th><th>CONCEPTS AND SKILLS</th><th>SOME CLARIFICATION NOTES OR TEACHING GUIDELINES</th><th>DURATION (in hours)</th></tr>
<tr><td>PATTERNS, FUNCTIONS AND ALGEBRA</td><td>2.2
Geometric patterns</td><td></td><td>Example:
Extending the pattern:

Describing the pattern in own words
“It is a pattern of squares”
“ Each square is bigger than the one before”
Describing how they made the pattern or answering the question “How did you get from one stage to the next?”
“I added one more matchstick to each side of each square”
“Each square has one more matchstick in each side than the square to the left of it”
Recording the number pattern in a table
When learners fill in a table like the one below, they can see that the number of matchsticks used for each square is 4 times the position number of the square.
Learners can then be asked to predict how many matches they will use for squares they have not built e.g. 10th, 100th , etc,
<table>
<tr><td>Square’s position number</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>10</td></tr>
<tr><td>Number of match sticks</td><td>4</td><td>8</td><td>12</td><td></td><td></td><td></td><td></td></tr>
</table></td><td></td></tr>
<tr><td>SPACE AND SHAPE</td><td>3.3
Symmetry</td><td>Recognize, draw and describe lines of symmetry in 2-D shapes</td><td>This should include shapes in which there is more than one line of symmetry.
Drawings of 2-D shapes where the line of symmetry is not necessarily vertical.</td><td>2 hours</td></tr>
</table>

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Division	**Number range for calculations** Division of at least whole 3-digit by 2-digit numbers **Calculation techniques** Use a range of techniques to perform and check written and mental calculations with whole numbers including • estimation • building up and breaking down numbers • using multiplication and division as inverse operations **Number range for counting, ordering and representing, and place value of digits** • Recognize the place value of digits in whole numbers to at least 6-digit numbers. • Round off to the nearest 10, 100, 1 000 **Number range for multiples and factors** • Multiples of 2-digit numbers to at least 100 • Factors of 2-digit whole numbers to at least 100 **Multiplication facts** • Units by multiples of 10 • Units by multiples of 100 **Properties of whole numbers** • Recognize and use the commutative; associative; and distributive properties of whole numbers • 1 in terms of its multiplicative property	What is different to Term 1? In Term 1, learners revised and consolidated work done in Grade 4, i.e.learners divided at least whole 3-digit by 1-digit numbers. In term 2, learners divide 3-digit numbers by 2-digit numbers. Learners should do context free calculations and solve problems in contexts. The following problem types remain important: sharing, grouping and rate (see the description of problem types at the end of the Grade 5 notes) Learners continue to: • check their solutions themselves, by using multiplying • judge the reasonableness of their solutions, by estimating before calculating. Dividing Learners continue to use what they know about multiplication to do division. Focus on multiples and factors, so that learners' knowledge of multiples and factors can be used in division. Learners should continue to be given problems with and without remainders. Learners are still not encouraged to treat the digits separately, but rather to consider the number as a whole and to keep the value of the parts of the number in mind. Sometimes in the past learners were taught to write out a whole times table, which they were encouraged to work out by repeated addition. At other times in the past learners were encouraged to divide by doing repeated subtraction of the divisor. Many learners got lost in the extensive repeated subtraction of the divisor when dividing 3-digit by 2-digit numbers. When dividing 3-digit by 2-digit numbers, it is preferable for learners to work with the easily remembered multiplication facts of multiples of 10 and then doubling and halving. These large groups of numbers can then be subtracted from the number being divided into. In this way learners do fewer subtractions and are more likely to arrive at the correct answer.	**8 hours**

<table>
<tr><th>CONTENT AREA</th><th>TOPICS</th><th>CONCEPTS AND SKILLS</th><th>SOME CLARIFICATION NOTES OR TEACHING GUIDELINES</th><th>DURATION (in hours)</th></tr>
<tr><td>NUMBERS, OPERATIONS AND RELATIONSHIPS</td><td>1.1
Whole numbers
Division</td><td>Solving problems
Solve problems in contexts involving whole numbers, including financial contexts
Solve problems involving whole numbers, including
• comparing two or more quantities of the same kind (ratio)
• comparing two quantities of different kinds (rate)
• grouping and equal sharing with remainders</td><td>Example
442 ÷ 17
Learners can write out a “clue board” of what they know about multiplying by 17. While they do not know the 17 times table, they do know 17 x 10 and how to use this to get multiples of 17 x 10 .
Learners find 17 x 5 by halving 17 x 10
Learners use doubling to find 17 x 2; 17 x 4; 17 x 8.
Lerners fill in other multiples as they need to use them e.g.
Clue board
10 x 17 = 170
20 x 17 = 340
30 x 40 = 510
5 x 17 = 85
2 x 17 = 34
3 x 17 = 51
6 x 17 = 102
Learners usemultiply and then subtract to calculate by approximation.
<table><tr><td>Multiply to get an approximate answer</td><td>Subtract to find the difference</td></tr><tr><td>20 x 17 = 340</td><td>442 – 340 = 102</td></tr><tr><td>6 x 17 = 102</td><td>102 – 102 = 0</td></tr></table>442 ÷ 17 = 20 + 6 = 26
Learners should check their calculations by multiplying:
26 x 17 = (26 x 10) + (26 x 7)
= 260 + 182
= 422</td><td></td></tr>
<tr><td colspan="4">REVISION</td><td>3 hours</td></tr>
<tr><td colspan="4">ASSESSMENT (Half yearly)</td><td>6 hours</td></tr>
</table>

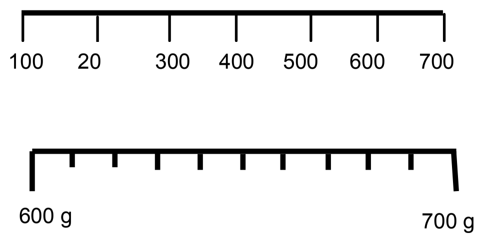
GRADE 5 TERM 3				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
NUMBERS, OPERATIONS AND RELATIONSHIPS	**Mental Mathematics**	**Mental calculations involving**: • Addition and subtraction facts of - units - multiples of 10 - multiples of 100 - multiples of 1 000 • Multiplication of whole numbers to at least 10 x10 • Multiplication facts of - units by multiples of 10 - units by multiples of 100 - units by multiples of 1 000 - units by multiples of 10 000 **Number range for counting, ordering, comparing and representing and place value of digits** • Count forwards and backwards in whole number intervals up to at least 10 000 • Order, compare and represent numbers to at least 6-digit numbers • Represent odd and even numbers to at least 1 000. • Recognize the place value of digits in whole numbers to at least 6-digit numbers. • Rounding off to the nearest 5, 10, 100 and 1 000	The mental Mathematics programme should be developed systematically over the year. Learners should not simply be asked to do random calculations each day. As learners cover topics and develop calculating techniques in the main part of the lesson, so aspects of these can be incorporated into the mental Mathematics programme. Concepts and skills are developed through the main lesson, and then practised, sometimes with smaller number ranges in the mental Mathematics programme. See further notes in Term 1 and Term 2, but be aware that number ranges have increased. The increased number ranges are shown in the column on the left.	**10 minutes every day**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**Mental Mathematics**	**Calculation techniques** Using a range of techniques to perform and check written and mental calculations of whole numbers including • estimation • adding and subtracting in columns • building up and breaking down numbers • using a number line • rounding off and compensating • doubling and halving • using addition and subtraction as inverse operations • using multiplication and division as inverse operations **Number range for multiples and factors** • Multiples of 2-digits whole numbers to at least 100 • Factors of 2-digit whole numbers to at least 100 **Properties of whole numbers** • Recognize and use the commutative; associative; distributive properties of whole numbers • 0 in terms of its additive property • 1 in terms of its multiplicative property		

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.2** **Common fractions**	**Describing and ordering fractions:** • count forwards and backwards in fractions • compare and order common fractions to at least twelfths **Calculations with fractions:** • addition and subtraction of common fractions with same denominator • addition and subtraction of mixed numbers • fractions of whole numbers which result in whole numbers • recognise, describe and use the equivalence of division and fractions **Solving problems** Solve problems in contexts involving common fractions, including grouping and sharing **Equivalent forms**: Recognize and use equivalent forms of common fractions with denominators which are multiples of each other	Learners should develop the concept of fractions in a variety of ways, including • a range of problem-solving contexts (see the types of fractions problems stated at the end of the Grade 5 notes). • a range of apparatus and diagrams (see notes in Term 1) Learners are not expected to be able to give equivalent fractions in symbolic (number) form without having diagrams to which they can refer or a problem context in which to make sense of the equivalence. It is recommended that fraction strips or fraction walls are provided when learners are formally assessed on equivalence. Once learners are comfortable with equivalence, it is easy for them to compare and order fractions. **Calculations with fractions:** Learners continue to • make fractions through grouping or sharing which is linked with understanding the relationship between division and fractions e.g. If 5 children share sweets equally, they will each get $\frac{1}{5}$ of the sweetss • add fractions with the same denominators Calculations as with other aspects of fractions should be developed either through problem contexts or with the use of apparatus or diagrams. Learners should be given problem contexts in which they need to add fraction parts. Learners should also be given either fraction pieces to count e.g. $\frac{3}{8} + \frac{4}{8}$ can be done by counting out and counting on in eighths with apparatus or by colouring in diagrams or by “hopping” in eighths on a number line. Learners are also expected to: • find fractions of whole numbers which result in whole numbers e.g. what is $\frac{1}{4}$ of 24? If learners have worked with drawings of collections of objects, and they know the relationship between division and fractions, this can be done without learning a rule or method. Learners can simply draw 24 objects and then make 4 equal groups • subtract fractions with the same denominators • add and subtract mixed numbers It is not expected that learners know rules for simplifying fractions or for converting between mixed numbers and fraction forms. Learners should	**5 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.2** **Common fractions**		know from working with equivalence, when a fraction is equal to or greater than **Examples** The examples below are illustrated without contexts, but could equally arise in a problem situation. $2\frac{3}{5} + 3\frac{4}{5} = 5\frac{7}{5} = 5 + \frac{5}{5} + \frac{2}{5} = 6\frac{2}{5}$ Similarly with subtraction, learners can first subtract the whole numbers, and then use equivalence and compensation to complete the calculation. $6\frac{3}{5} - 2\frac{4}{5} = 4 + \frac{3}{5} - \frac{4}{5} = 3 + \frac{5}{5} + \frac{3}{5} - \frac{4}{5} = 3\frac{4}{5}$ Measurement is an important context through which to develop and consolidate the concept of fractions. If the suggested sequencing in this document is followed then learners will alredy have covered length and capacity. Length and capacity can be used to develop the concepts of fractions, equivalence, and adding with fractions.	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
MEASUREMENT	**4.2** **Mass**	**Practical measuring of 3-D objects by** estimating, measuring, recording, comparing and ordering **Measuring instruments** bathroom scales, kitchen scales and balances **Units** grams (g) and kilograms (kg); **Calculations and problem-solving related to mass include** Solve problems in contexts related to mass Converting between grams and kilograms limited to examples with whole numbers and fractions	In Grade 5 learners work with the same units of mass as they did in Grade 4. They also work with the same measuring instruments. Learners need to • consolidate their sense of how much 1kg is • consolidate their sense of how much 1g is • understand and know the relationship between kilograms and grams. Learners should have a sense of which units are appropriate for measuring different masses. For example they need to know which units to use to state the mass of • a cow • a baby • flour for baking a cake Learners should understand which instruments are appropriate for measuring different masses. For example they need to know which instruments to use to measure • their own mass • the mass of flour for baking a cake **Reading instruments and measuring mass** Learners need to • estimate mass in grams and kilograms, including being able to match objects to the appropriate unit of measurement before measuring them • choose, with reasons, the most appropriate scale to use for particular objects from a range of scales provided • read kitchen scales in g and kg and bathroom scales in kg and balances in g and kg This includes reading the mass on real scales balances and pictures of scales. The skills involved include - knowing where to stand to read the scale correctly - knowing how to read the numbered gradation lines and to calculate what the un-numbered gradation lines mean. Learners need to read - different kinds of measuring apparatus - apparatus in which the numbered intervals, gradation lines or calibration represent different intervals.	**5 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
MEASUREMENT	**4.2** **Mass**		- apparatus in which there are a different numbers of un-numbered intervals within each numbered interval. Learners need practice using examples in which the numbered intervals are divided into: - 2 un-numbered intervals - 4 un-numbered intervals - 5 un-numbered intervals - 10 un-numbered intervals **Example** Here the numbered lines show 100g intervals: 100g; 200g; 300g; 400g; 500g; 600g; 700g; It is sometimes useful to convert a circular dial into a number line for learners  There are 10 spaces between each 100g. Each 100g interval has been divided into 10 smaller spaces. This means that each un-numbered interval shows 100g ÷ 10 = 10g **Compare masses** with up to 6-digits in grams and kilograms. If learners have not done this in previous grades, they should sequence containers marked in grams and kilograms. Here learners need to be able to translate the decimal numbers on some packaging into fractions e.g. 2,5kg of flour is the same as $2\frac{1}{2}\,kg$ of flour. One should also choose examples that allow learners to realize that the size of a container or the volume it contains is not directly proportional to the mass. Some substances have a greater density than others. **Calculations (including conversions) and problem-solving** Measurement provides a context in which to practise skills acquired in Numbers, Operations and Relationships.	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
MEASUREMENT	**4.2** **Mass**		**Estimate and calculate** using grams and kilograms. • Rounding up or down to the most appropriate unit of measurement addition and subtraction with up to 5-digit numbers • Rounding off to 5, 10, 100, 1 000. Doing rounding off when reading measuring instruments can help learners to understand the reasons for rounding up or down • Multiplication of 3-digit by 2-digit • Division of 3-digit by 2-digit • Add and subtract common fractions and mixed numbers with same denominator (using only halves, thirds, quarters, fifths, sixths, sevenths , eighths, ninths, tenths, elevenths and twelfths) • Determine fractions of whole numbers that result in whole numbers **Solve problems** relating to mass including rate (especially rands per kilogram) and ratio problems e.g. increasing or decreasing the mass of ingredients in a recipe by a set ratio **Convert between units:** $g \leftrightarrow kg$ Converting between the units of measurement provides a context for practising multiplying and dividing by 1 000. When learners do division in Grade 4 a remainder may result e.g. 115 ÷ 25 = 4 remainder 15. Similarly when converting grams to kilograms learners may get part of the answer in kilograms and state the remaining part in grams e.g. 4 250g = 4kg and 250g Conversions should be limited to whole numbers and fractions given only as halves / thirds / quarters / fifths / sixths / sevenths / eighths. Conversions can also include converting the decimal half to the common fraction form of half. **Recording mass** Because learners will only work with decimal fractions in Grade 6, they should record masses as • kilograms only e.g. 5kg • grams only e.g. 250g • kilograms and grams together e.g. 3 kilograms and 45 grams • kilograms and fractional parts of kilograms e.g. $2\frac{3}{4}$ kilograms • since learners will be reading half kilograms in decimal form off some packaging they can also write half kilograms in the decimal form, but this is not a requirement in this grade.	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Counting, ordering, comparing, representing and place value of digits	**Number range for counting, ordering, comparing, representing and place value of digits** • Count forwards and backwards in whole number intervals up to at least 10 000 • Order, compare and represent numbers to at least 6-digit numbers • Represent odd and even numbers to at least 1 000 • Recognize the place value of digits in whole numbers to at least 6-digit numbers • Round off to the nearest 5, 10, 100 or 1000	See further notes in Term 1, but be aware that number ranges have increased. The increased number ranges are shown in column 3 on the left and summarised in Term 2 notes, clarifications and teaching guidelines. All work developed here can be practised throughout the year in the mental Mathematics programme.	**1 hour**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Addition and subtraction	**Number range for calculations** • Addition and subtraction of whole numbers with at least 5-digit numbers **Calculation techniques** Using a range of techniques to perform and check written and mental calculations of whole numbers including: • estimation • adding and subtracting in columns • building up and breaking down numbers • using a number line • rounding off and compensating • doubling and halving • using addition and subtraction as inverse operations **Properties of whole numbers** • recognize and use the commutative, associative and distributive properties with whole numbers • 0 in terms of its additive property • 1 in terms of its multiplicative property **Solving problems** Solve problems involving whole numbers, including: • financial contexts • measurement contexts	This is further practice of Addition and Subtraction with up to 5-digit numbers done in Term 2. Refer to those notes. You can revise the expanded column method shown below. Learners can then begin to use the traditional column methods. Learners continue to: • check their solutions themselves e.g. by using the inverse operation • judge the reasonableness of their solutions e.g. by rounding off numbers and estimating answers • **Expanded vertical column method to add** 56 423 = 50 000 + 6 000 + 400 + 20 + 3 + 7 581 = 7 000 + 500 + 80 + 1 + 21 479 = 20 000 + 1 000 + 4 00 + 70 + 9 Total = 70 000 + 14 000 + 1 300 + 170 + 14 = 70 000 + 10 000 + 5 000 + 400 + 80 + 4 = 85 484 • **The vertical column method to add.** 1 1 1 5 6 4 2 3 + 7 5 8 1 6 4 0 0 4 • The **expanded column method to subtract** Calculate: 74 687 – 52 143 Learners cannot subtract 4 from 3 or 80 from 40. Instead of breaking down 743 into 700 + 40 + 3 they will break down 743 into 600 + 130 + 13. Then they can subtract 4 from 13 and 80 from 130. 600 130 13 98 743 = 90 000 + 8 000 + 700 + 40 + 3 – 45 684 = 40 000 + 5 000 + 600 + 80 + 4 Total = 50 000 + 3 000 + 0 + 50+ 9 = 53 059	**5 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Addition and subtraction		• **The vertical column method to subtract** $\begin{array}{r} 2\ 5\ 7\ 4\ 6 \\ -1\ 4\ 5\ 3\ 2 \\ \hline 1\ 1\ 2\ 1\ 4 \\ \hline \end{array}$ **Or** $\begin{array}{rrrr} {\scriptstyle 8} & {\scriptstyle 6} & {\scriptstyle 13} & {\scriptstyle 13} \\ 8 & 7 & 4 & 3 \\ -5 & 6 & 8 & 4 \\ \hline 3 & 0 & 5 & 9 \\ \hline \end{array}$	

ASSESSMENT:

At this stage learners should have been assessed on:

- fractions
- mass
- addition and subtraction of up to 5-digit numbers

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
SHAPE AND SPACE	**3.5 Viewing objects**	**Position and views** Link the position of viewer to views of single everyday objects, collections of everyday objects or scenes from everyday life	**What is different to Grade 4?** • In Grade 4 learners matched different views of single everyday objects. • In Grade 5 learners work with views of single everyday objects or collections of everyday objects. They match views of the object or objects with the position of the viewer. **Position and views** Learners are presented with multiple views of an everyday object or collection of everyday objects or scenes from everyday life, as well as positions of viewers in relation to the object or objects. They match each view with a viewer or viewpoint. Everyday objects often have more irregular surfaces than geometric objects e.g. compare a teapot to a sphere or a person to a cube. This makes it easier to identify views and viewpoints of everyday objects.	**5 hours**
SPACE AND SHAPE	**3.1 Properties of 2-D shapes**	**Shapes learners need to know and name are** • regular and irregular polygons - triangles, squares, rectangles, other quadrilaterals, pentagons, hexagons, heptagons, • circles • similarities and differences between squares and rectangles **Characteristics learners use to distinguish, describe, sort and compare shapes** • Straight and / curved sides • Number of sides • Length of sides • Angles: limited to - right angles - angles smaller than right angles - angles greater than right angles **Further activities to focus learners on characteristics of shapes** Draw 2-D shapes on grid paper **Angles** limited to • right angles • angles smaller than right angles • angles greater than right angles	This is revision and consolidation of the work done in Term 1: see Term 1 notes. Learners should continue to do practical work with concrete apparatus, but they should also continue to do written exercises.	**4 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
SHAPE AND SPACE	**3.4** **Transforma-tions**	**Use transformations to create composite shapes** Create composite 2-D shapes including shapes with line symmetry by tracing and moving a 2-D shape by • rotation • translation • reflection **Use transformations to create tessellations** Make tessellated patterns including some patterns with line symmetry by tracing and moving 2-D shapes by • rotation • translation • reflection **Describe patterns** Refer to lines, 2-D shapes, 3-D objects and /or lines of symmetry and/ or rotations and/or reflections and/or translations when describing patterns	In this suggested sequencing of Grade 5 Mathematics, transformations are done in Terms 3 and 4. For Term 3 learners can focus on building composite shapes. In Term 4 learners can focus on tessellations and describing patterns in the world. **What is different to Grade 4?** • In Grade 4 learners create composite shapes by placing 2-D shapes next to each other. In Grade 5 learners trace and move a 2-D shape using reflections, rotations and translations to draw composite shapes. • In Grade 4 learners create tessellations by packing out shapes. In Grade 5 learners trace and move a 2-D shape using reflections, rotations and translations to draw tessellations. **Use transformations to create composite shapes** Learners use a 2-D shape as a template which they trace and move by reflecting, translating and rotating to create composite shapes. Some of the new shapes drawn should have lines of symmetry. Learners describe how they moved the shape to create the pattern using the words “rotation, translation and reflection”	**3 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
MEASUREMENT	**4.5** **Temperature**	**Practical measuring of temperature by** estimating, measuring, recording, comparing and ordering **Measuring instruments** thermometers **Units** degrees Celsius (^oC) **Calculations and problem-solving related to temperature** Solve problems in contexts involving to Temperature Calculate temperature differences limited to positive whole numbers	**Measuring temperature is a new topic in Grade 5 Mathematics and Geography.** Learners need to develop a sense of how hot or cold things are when described in degrees Celsius. This can be achieved through learning common temperature referents e.g. • the freezing point of pure water is 0^oC • the boiling point of pure water is 100^oC • the average normal human body temperature is 37 0^oC • the daily environmental temperatures. **Reading temperature measurement** Learners should read temperatures on pictures of thermometers. Where possible learners should read temperatures on real thermometers. **Reading calibrated capacity measuring instruments** Reading analogue thermometers requires learners to read the temperature on numbered and un-numbered gradation lines. In thermometers designed to read the environmental temperatures the unnumbered gradation lines often refer to whole degrees. In thermometers designed to read human body temperature the unnumbered gradation lines often refer to fractions of degrees. **Recording and reporting on temperature measurements** Learners should record and report on temperature measurements they have read off thermometers in whole numbers. This may involve rounding up or down. They can also record and report temperatures by using fraction notion. **Calculations and problem-solving related to temperature** Calculations and problem-solving involvingtemperatures should be limited to positive whole numbers and fractions (although learners in Grade 5 work with halves, thirds, quarters, fifths, sixths, sevenths, eighths, ninths, tenths, elevenths and twelfths, with temperature calculations it makes sense to use tenths, quarters and halves)	**2 hours**

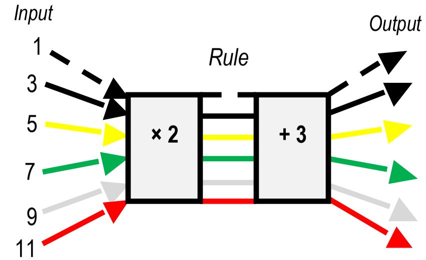
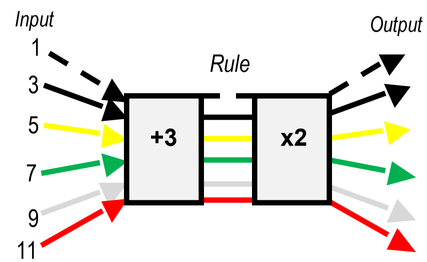
ASSESSMENT:

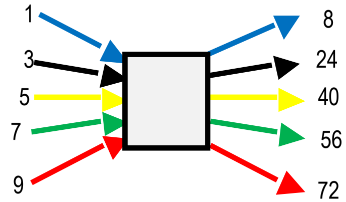
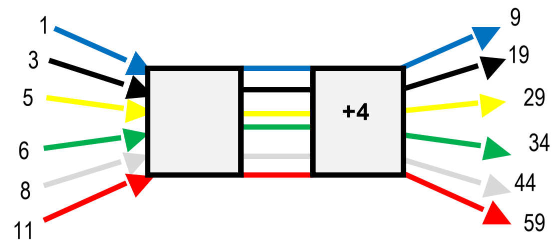
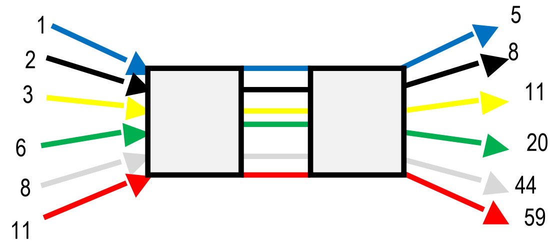
At this stage learners should have been assessed on:

- views
- tranformations- making composite shapes by rotating, translating and reflecting
- temperature

<table>
<tr><th>CONTENT AREA</th><th>TOPICS</th><th>CONCEPTS AND SKILLS</th><th>SOME CLARIFICATION NOTES OR TEACHING GUIDELINES</th><th>DURATION (in hours)</th></tr>
<tr><td rowspan="3">DATA HANDLING</td><td>5.1
Collecting and organising data</td><td>• collect data using tally marks and tables for recording
• order data from smallest group to largest group</td><td rowspan="3">What is different to Grade 4?
The following are new in Grade 5
• ordering data sets
• analyzing data not only according to categories but also taking into account contexts and sources of data
• analyzing ungrouped numerical data sets to find the mode
• pictographs which show many-to-one correspondence
• conclusions and predictions when analysing and summarising data
Teachers in this phase should ensure that different topics are chosen for data collection and analysis in each of the grades.
Analysing graphs
Analysing graphs on environmental or socio-economic contexts by answering questions on graphs. Both graphs and questions to be provided by the teacher or textbook. Learners should work with at least
• 1 pictograph with many to one correspondence
• 1 bar graph
Suitable topics include
• quantities of materials recycled in the town, province, country
• quantities of recycling materials collected by schools around the country
• sources of lighting and heating in SA
• kinds of toilets in SA homes
• kinds of homes in SA
Develop critical analysis skills
Learners compare graphs on the same topic, but where data has been collected from different groups of people, at different times, in different places or in different ways. Here learners will be able to discuss the differences between the graphs. The aim is also for learners to become aware of factors that can impact on the data. Learners can summarize the findings of their comparison in a paragraph. Examples could include:
• comparing data about cars that pass the school at different times or comparing data about cars that pass different venues (busy and quiet areas, poorer and richer areas etc)</td><td rowspan="3">9 hours</td></tr>
<tr><td>5.2
Representing data</td><td>Draw a variety of graphs to display and interpret data including:
• pictographs with a many-to-one representation
• bar graphs</td></tr>
<tr><td>5.3
Analysing, Interpreting and reporting data</td><td>Critically read and interpret data represented in
• words
• pictographs
• bar graphs
• pie charts
Analyse data by answering questions related to:
• data categories
• data sources and contexts
Summarise data verbally and in short written paragraphs that include
• drawing conclusions about the data
• making predictions based on the data</td></tr>
</table>

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
			• comparing data collected at your school to national data from ‘*Census At School* e.g. favourite sports; favourite subjects; transport to school; time taken to get to school; type of dwelling; access to goods and services at home • comparing data collected from girls and boys e.g. favourite sports, favourite movies, favourite school subjects • comparing rainfall each month for a town in summer and winter rainfall areas Learners should do at least 1 example in which they compare graphs. **Complete data cycle: context personal data** The complete data cycle includes asking a question, collectin, organising, representing, analyzing and interpreting data and reporting on the data. Choose a different topic to Term 1. Work through the whole data cycle to make an individual bar graph using contexts that relate to themselves, their class, their school or their family. Suitable topics include: • favourite sports / favourite movies / favourite music / favourite TV programmes / foods or cool drinks/ favourite colours, etc. • heights of learners in class • mass of learners in class • shoe size of learners in class • average time taken to get from home to school • number of people staying in homes of learners in the class **Analyse ungrouped numerical data using measures of central tendency** Learners determine the mode of ungrouped numerical data sets. Suitable topics include: • heights of learners in the class • mass of learners in the class • shoe size of learners in the class • average time taken to get from home to school • number of people staying in the homes of learners in the class • temperatures for a month	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
PATTERNS, FUNCTIONS AND ALGEBRA	**2.1** **Numeric patterns**	**Investigate and extend patterns** • Investigate and extend numeric patterns looking for relationships or rules of patterns - sequences involving a constant difference or ratio - of learner's own creation • Describe observed relationships or rules in learner's own words **Input and output values** Determine input values, output values and rules for patterns and relationships using flow diagrams. **Equivalent forms** Determine equivalence of different descriptions of the same relationship or rule presented • verbally • in a flow diagram • by a number sentence	In Term 1 learners worked with flow diagrams in order to learn about • multiplication and division as inverse operations • multiplication of units by multiples of ten, 100, 1 000 • the associative property with whole numbers and how we can use this property when we multiply **Flow diagrams** are further developed in this term. Learners also work with number sequences. It is useful for learners to be given examples which continue to focus on the properties of operations. For example, learners have seen that they can multiple in any order, and that they can add in any order. They can contrast flow diagrams to see whether order makes a difference if they add and multiply. **Example**   Learners should discuss whether the order of the operations made a difference. Once learners have had practice in finding input values and output values when the rule is stated, they can be given examples where input values and output values are provided but no rule is given. At first these can be flow diagrams in which there is a "one stage rule" i.e. add or subtract or multiply or divide.	**5 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
PATTERNS, FUNCTIONS AND ALGEBRA	**2.1** **Numeric patterns**		**Example** Determine the rule  Work with examples which have a two stage rule e.g. multiply and then add, where one stage is left out **Example** Determine the rule  **Example where learners have to find a rule with two parts** Determine the rule  **Sequences of numbers:** In the Intermediate Phase learners extend sequences of numbers. In Grade 5 they look at three kinds of sequences: • sequences involving a constant difference • sequences involving a constant ratio	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
PATTERNS, FUNCTIONS AND ALGEBRA	**2.1** **Numeric patterns**		• sequences without a constant difference or ratio Some examples of patterns with a constant difference • 2; 4; 6; 8……. • 18; 16; 14; 12 ……….. In the above examples learners are adding 2 or subtracting 2 to create the pattern. Learners may describe it as a pattern of counting on or counting back in twos. Learners should also be given examples which do not start with a multiple of the number they are adding to or subtracting from. Two examples are given below. • 1; 4; 7; 10……. • 87; 66; 45; …….. Examples of patterns with a constant ratio • 1 600; 800; 400; ……… • In the above example learners are dividing by 2. All the numbers in the sequence are multiples of 2. Learners should also be given examples in which the numbers in the sequence are not multiples of the number they are multiplying or dividing by e.g. 3; 6; 12; 24 …… 10; 30; 90; 270; …… Examples of patterns without a constant difference or ratio 3; 7; 12; 18; 0; 2; 6; 12; 24 1, 4; 9; 16; 25; ……..	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Multiplication	**Number range for calculations** Multiplication of at least whole 3-digit by 1-digit numbers **Calculation techniques** Use a range of techniques to perform and check written and mental calculations of whole numbers including • estimation • building up and breaking down numbers **Number range for counting, ordering, representing and place value of digits** • Recognize the place value of digits in whole numbers to at least 6-digit numbers. • Round off to the nearest 10, 100 or 1 000 **Number range for multiples and factors** • Multiples of 2-digit numbers to at least 100 • Factors of 2-digit whole numbers to at least 100 **Multiplication facts for** • units by multiples of 10 • units by multiples of 100 **Properties of whole numbers** • Recognize and use the commutative, associative and distributive properties with whole numbers • 1 in terms of its multiplicative property	This is further practice of multiplication done in Term 2. Refer to those notes	**7 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1 Whole numbers** Multiplication	**Solving problems** Solve problems in contexts involving whole numbers, including financial contexts Solve problems involving whole numbers, including • comparing two or more quantities of the same kind (ratio) • comparing two quantities of different kinds (rate)		
ASSESSMENT: At this stage learners should have been assessed on: • data handling • number patterns • multiplication to at least 3-digits by 2-digits				
REVISION				**3 hours**

GRADE 5 TERM 4				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
NUMBERS, OPERATIONS AND RELATIONSHIPS	**Mental Mathematics**	**Mental calculations involving**: • Addition and subtraction facts of - units - multiples of 10 - multiples of 100 - multiples of 1000 • Multiplication of whole numbers to at least 10 x 10 • Multiplication facts for - units by multiples of 10 - units by multiples of 100 - units by multiples of 1000 - units by multiples of 10 000 **Number range for counting, ordering, comparing and representing, and place value of digits** • Count forwards and backwards in whole number intervals up to at least 10 000 • Order, compare and represent numbers to at least 6-digit numbers • Represent odd and even numbers to at least 1 000 • Recognize the place value of digits in whole numbers to at least 6-digit numbers • Rounding off to the nearest and 5, 10, 100 and 1000	See the notes in Term 2, but be aware that number ranges have increased. The increased number ranges are shown in the column on the left. The mental Mathematics programme should be developed systematically over the year.	**10 minutes every day**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**Mental Mathematics**	**Calculation techniques** Using a range of techniques to perform and check written and mental calculations of whole numbers including: • estimation • adding and subtracting in columns • building up and breaking down numbers • using a number line • rounding off and compensating • doubling and halving • using addition and subtraction as inverse operations • using multiplication and division as inverse operations **Number range for multiples and factors** • Multiples of 2-digits whole numbers to at least 100 • Factors of 2-digit whole numbers to at least 100 **Properties of whole numbers** • Recognize and use the commutative, associative and distributive properties with whole numbers • 0 in terms of its additive property • 1 in terms of its multiplicative property		

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Counting, ordering, comparing, representing and place value of digits	**Number range for counting, ordering, comparing and representing, and place value of digits** • Count forwards and backwards in whole number intervals up to at least 10 000 • Order, compare and represent numbers to at least 6-digit numbers • Represent odd and even numbers to at least 1 000. • Recognize the place value of digits in whole numbers to at least 6-digit numbers • Round off to the nearest and 5, 10, 100 and 1000	See further notes in Term 1, but be aware that number ranges have increased. The increased number ranges are shown in the column 3 on the left and summarised in Term 2. Notes clarifications and teaching guidelines. All work dealt with here can be practised throughout the year in the mental Mathematics programme.	**1 hour**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Addition and subtraction	**Number range for calculating** Addition and subtraction of whole numbers of at least 5 digits. **Calculation techniques** Use a range of techniques to perform and check written and mental calculations of whole numbers including • estimation • building up and breaking down numbers • rounding off and compensating • doubling and halving • using a number line • using addition and subtraction as inverse operations **Number range for multiples and factors** Multiples of 2-digit numbers to at least 100 **Properties of whole numbers** Recognize and use the commutative and associative properties with whole numbers **Solving problems** Solve problems in contexts involving whole numbers, including financial contexts.	This is further practice of addition and subtraction with 5-digit numbers done in Terms 2 and 3.Refer to those notes in both these terms.	**5 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
SPACE AND SHAPE	**3.2** **Properties of 3-D objects**	**Objects learners need to know and name:** • Rectangular prisms and other prisms • Cubes • Cylinders • Cones • Pyramids • Similarities and differences between cubes and rectangular prisms **Characteristics learners use to distinguish, describe, sort and compare shapes** • Shape of faces • Number of faces • Flat and curved surfaces **Further activities to focus learners on characteristics of objects** • Create 3-D models using cut-out polygons • Cutting open boxes to trace and describe their nets	This is further practice of 3-D objects done in Term 2. Refer to the notes in Term 2	**5 hours**

ASSESSMENT:

At this stage learners should have been assessed on:

- addition and subtraction of 5-digit numbers
- 3-D objects

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.2** **Common fractions**	**Describing and ordering fractions** • Count forwards and backwards in fractions • Compare and order common fractions to at least twelfths **Calculations with fractions** • Addition and subtraction of common fractions with the same denominator • Addition and subtraction of mixed numbers • Fractions of whole numbers which result in whole numbers • Recognize, describe and use the equivalence of division and fractions **Solving problems** Solve problems in contexts involving common fractions, including grouping and sharing **Equivalent forms**: Recognize and use equivalent forms of common fractions with denominators which are multiples of each other.	This is further practice of fractions done in Term 3. Refer to those notes. In Term 4 length, capacity and mass can be used as contexts for fractions.	**5 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1 Whole numbers** Division	**Number range for calculations** Division of at least whole 3-digit by 2-digit numbers. **Calculation techniques** Use a range of techniques to perform and check written and mental calculations with whole numbers including • estimation • building up and breaking down numbers **Number range for counting, ordering and representing, and place value of digits** • Recognize the place value of digits in whole numbers to at least 6-digit numbers • Round off to the nearest and 10, 100, 1 000 **Number range for multiples and factors** • Multiples of 2-digit numbers to at least 100 • Factors of 2-digit whole numbers to at least 100 **Multiplication facts** • Units by multiples of 10 • Units by multiples of 100 **Properties of whole numbers** • Recognize and use the commutative; associative and distributive properties with whole numbers • 1 in terms of its multiplicative property	This is further practice of division of 3-digit numbers by 2-digit numbers done in Term 2. Refer to those notes.	**7 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1 Whole numbers** Division	**Solving problems** Solve problems in contexts involving whole numbers, including financial contexts. Solve problems involving whole numbers, including • comparing two or more quantities of the same kind (ratio) • comparing two quantities of different kinds (rate) • grouping and equal sharing with remainders		

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
MEASUREMENT	**4.6** **Perimeter, area and volume**	**Perimeter** Measure perimeter using rulers or measuring tapes **Measurement of area** Find areas of regular and irregular shapes by counting squares on grids in order to develop an understanding of square units **Measurement of volume** Find volume/capacity of objects by packing or filling them in order to develop an understanding of cubic units	Learners are not required to know or apply formulae for the perimeter, area or volume of any shape or objects in the Intermediate Phase. Area and volume are only measured informally in the Intermediate Phase. Grade 5 learners practise and consolidate what they have learned about perimeter, area and volume in Grade 4. In Grade 5 learners measure the perimeters of shapes and spaces with rulers and measuring tapes. They are required to state and record this measurement in standard units: mm, cm, m. They are also required to work from drawings in which side lengths are specified in mm, cm, m or km. Here they add the lengths. At times in Grade 5 they will also count the lengths of the perimeters by counting the number of sides of the square grids. Here learners need to know that the diagonal distances between corners of a grid square are longer than the vertical or horizontal distances between corners of a grid square. In Grade 5 area measurements continue to be informal. Learners continue to count how many grid squares the shape covers. The area is stated in number of grid squares. Shapes should include • regular shapes with straight sides where the sides are all the same length • irregular shapes with straight sides where the sides are not all the same length • shapes with curved sides In Grade 5 learners continue to • count how many cubes or rectangular prisms they use to fill a container - the volume of the container is stated in number of cubes or rectangular prisms (boxes or blocks) • make stacks with cubes or rectangular prisms - the volume of the stack is stated in number of cubes or rectangular prisms (boxes or blocks) • interpret pictures of - stacks made of cubes, rectangular prisms so that they are able to state the volume in terms of the number of cubes or rectangular prisms - containers filled with cubes, rectangular prisms so that they are able to state the volume in terms of the number of cubes or rectangular prisms **What is capacity? What is volume?** **Capacity** is the amount of substance that an object can hold or the amount of space inside the object. **Volume** is the amount of space that an object occupies. So a bottle can have a 1 litre capacity, but it may not be filled to its full capacity, it could e.g., only contain a volume of 250ml.	**7 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
ASSESSMENT: At this stage learners should have been assessed on: • fractions • division of up to 3-digit numbers by 2-digit numbers • area, perimeter and volume				

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
SHAPE AND SPACE	**3.6** **Position and movement**	**Location and directions** Locate position of objects / drawings/ symbols on grid using alpha-numeric grid references Locate positions of objects on a map using alpha-numeric grid references Follow directions to trace a path between positions on a map	Cells in a grid are often labelled with a letter and a number e.g. D4; A3; E7. This is called alpha-numeric referencing. **What is different to Grade 4?** • In Grade 4 learners located positions on grids and maps using alpha-numeric references • In Grade 5 learners follow directions to trace a path between positions on a map with a grid **Location and directions** In Geography in Grade 4, Term 1, learners give directions using left, right and landmarks. In Term 2 of Grade 4 and Term 2 of Grade 5 they also use pair of compasses directions. Learners draw on the work done on alpha-numeric grids in Geography and Mathematics in Grade 4 and the work done involving directions in Grade 4 & 5 Geography, when they find positions and follow directions on grids and maps. The work is developed in Geography and practised in Mathematics.	**2 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
SHAPE AND SPACE	**3.4** **Transforma-tions**	**Use transformations to make composite shapes** Make composite 2-D shapes including shapes with line symmetry by tracing and moving a 2-D shape in one or more of the following ways: • by rotation • by translation • by reflection **Use transformations to make tessellations** Make tessellated patterns including some patterns with line symmetry by tracing and moving 2-D in one or more of the following ways: • by rotation • by translation • by reflection **Describe patterns** Refer to lines, 2-D shapes, 3-D objects, lines of symmetry, rotations, reflections and translations when describing patterns.	In the suggested sequencing of Grade 5 Mathematics, transformations have already been done in Term 3. In that term learners focused on building composite shapes including some shapes with symmetry. In Term 4 learners extend this to focus on tessellations and describing patterns in the world. **What is different to Grade 4?** In Grade 4 learners make tessellations by packing out shapes. In Grade 5 learners trace and move a 2-D shape using reflections, rotations and translations to draw tessellations **Use transformations to make tessellations** Learners use 2-D shapes to make tessellation patterns. In Grade 4 these tiling patterns can be made by packing out the tiles. Grade 5 learners are required to make the patterns by rotating, translating of reflecting a single shape. Learners trace and move a 2-D shape to draw the pattern. Learners need to identify and describe tessellation patterns **Describe patterns** Learners describe patterns of the shapes they see and how they would move that shape if they wanted to continue the pattern e.g. • the pattern I see on the honeycomb looks like a tessellation pattern of hexagons. I can make this pattern by translating a hexagon. • the pattern I see on the bead bracelet looks like a tessellation pattern of triangles. I can make this pattern by reflecting a triangle Learners identify symmetry in patterns e.g. symmetry in Ndebele mural art Learners often find patterns easier to describe, once they have copied or made the patterns. It is useful to link the process of making or copying patterns with the descriptions of patterns from nature, modern everyday life and our cultural heritage. Often the geometrical process you use to make a copy of the pattern is not the same as the original process used to make the pattern. Bees do not tessellate with hexagons to make a honeycomb, but if learners tessellate with a hexagon, they can make a pattern that looks similar to the pattern they see in the honeycomb.	**4 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
PATTERNS, FUNCTIONS AND ALGEBRA	**2.2** **Geometric patterns**	**Investigate and extend patterns** • Investigate and extend geometric patterns looking for relationships or rules of patterns: - represented in physical or diagram form - sequences involving a constant difference or ratio - of learner's own creation • Describe observed relationships or rules in learner's own words **Input and output values** Determine input values, output values and rules for the patterns and relationships using flow diagrams **Equivalent forms** Determine equivalence of different descriptions of the same relationship or rule presented • verbally • in a flow diagram • by a number sentence	This is consolidation of what was done in Term 2. See notes in Term 2. In Term 4 learners should just do moreexamples.	**2 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
PATTERNS, FUNCTIONS AND ALGEBRA	**2.3** **Number sentences** (introduction to algebraic expressions)	**Number sentences** • Write number sentences to describe problem situations • Solve and complete number sentences by: - inspection - trial and improvement • Check solution by substitution	This is a continuation of the work done with number sentences in Term 1. In this term learners are given practice in writing number sentences to describe problem situations. Learners have the opportunity to practise a mixture of all problem types that they have encountered so far during the year. At some point they are asked to write a number sentence to describe the problem. As before number sentences are used to develop the concept of equivalence, but they can also relate to all aspects of number work covered during the year. If learners have not had experience answering multiple choice questions, give them some examples in this second half of the year as it is a common format used in external systemic tests. Number sentences can also consolidate the idea of expressing a rule. For which pairs of numbers does the rule **"multiply the first number by and thensubtract to get the second number**" apply? (a) 16 ✧ 2 (b) 5 ✧ 38 (c) 38 ✧ 5 (d) 3 ✧ 22 Term 1 we used number sentences to focus learners' attention on the properties of operations. Since learners have been using these properties, the examples can focus more on the notion of equivalence. Some examples are provided below: **Examples** focusing on the properties of operations Which of the following statements is TRUE? (a) 9 x ☐ = ☐+ 9 b) 9 x ☐ = ☐ 9 (c) 9 x ☐ = ☐ x 9 (d) 9 x ☐ = 9 + ☐ How much is 24 x 17 less than 25 x 17? (a) 1 (b)17 (c) 25 (d) 45 Choose the correct answer: (26 x 39) + (26 x 1) = (a) 26 x 27 (b) 400 (c) 26 x 4 (d) 26 x 40 Which of the statements below is equivalent to 15 x (4 x 9)? (a) (15 x 4) x 9 (b) 15 x 2 x 2 x 3 x 3 (c) (15 x 4) + (15 x 9) (d) (10 – 1)(15 x 4)	**3 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
DATA HANDLING	**5.2 Probability**	Perform simple repeated events and list possible outcomes for events such as • tossing a coin • rolling a die • spinning a spinner Count and compare the frequency of actual outcomes for a series of trials up to 20 trials.	**Performing simple repeated events** Learners need to perform experiments by tossing a coin, rolling a die, or spinning a spinner. Doing experiments with a coin is easier than with a die because the coin can only have two outcomes (heads or tails), while rolling the die can have 6 outcomes (numbers1 - 6). The spinner can have any number of outcomes, depending on number of divisions made on the spinner. Learners must first list the possible outcomes before doing the experiments. They should learn how to record the results of their experiments in a table using tally marks. They then count how many times heads or tails, or each number, or colour on a spinner, occurs in 20 trials. If learners do this in groups, the results from all the groups can be collated. They can then compare the number of outcomes that occur as the number of trials increase.	**2 hours**
REVISION				**4 hours**
ASSESSMENT				**6 hours**

Problem type	Additional notes	Examples
Summation	A sum	A farmer sells fruit to several stores in his city. He sold 13 789 pears, 35 278 apples and 24 678 oranges in one month. How much fruit did he sell in one month?
	Missing part of a given sum	Farm workers picked 42 345 pears during the morning. After lunch they picked some more. By the end of the day, they had picked 16 589 pears. How many pears did they pick after lunch?
Increase and decrease	Calculate the result	The price for a container of beans is R65 231. Some of the beans are ruined and the price is decreased by R14 789. What is the price of the container of beans now?
	Calculate the change	A salesman earned R34 328 during November. During December, the amount earned increased to R47 435. How much more money did he earn during December tha in November?
	Calculate the initial result	A farmer struggled to sell his farm. He decreased the original price of his farm by R10 456. He sold the farm for R 85 787. What was the original price that the farmer wanted for his farm?
Grouping	• Grouping problems that are solved with division and/or repeated subtraction • Answers to problems have or do not have remainders	A shop gives boxes of toys to a poor school. Each box contains 48 toys. If there are 875 toys, how many boxes are needed? or A company gives 35 bags of soccer balls to a soccer club. If there are 315 soccer balls, how many balls are there in a bag?
	• Grouping problems that are solved with multiplication and/or repeated addition • Answers to problems have or do not have remainders	A school gave 45 boxes of toys to an orphanage. Each box contains 548 toys. How many toys did the school donate?
	• Grouping problems in an array form • These problems can be solved with division (or repeated subtraction) or multiplication (repeated addition)	On a farm there are 134 rows of tomatoes. Each row has 56 tomato plants. How many tomato plants are there in total?
Sharing	• Sharing problems can be solved with division/repeated subtraction • Smaller groups of equal size are formed from a given amount • Answers to calculations that have remainders can lead to the concept of common fractions. See Grade 4 example.	A farmer shares 654 apples equally between 45 shops. How many apples does each shop get? How many apples are left over?
Comparison by difference		Joey and Tana each own a srapyard. Joey's scrapyard sold 65 346 car parts in a year. Tana's scrapyard should sell 34 968 more car parts in a year to equal Joey's number of car parts sold. How many car parts has Tana sold so far?

Problem type	Additional notes	Examples
Treating groups as units		25 candles cost R236. How much will 375 of the same candles cost?
Rate	Learners calculate the total if given rate per object	One box of sweets costs R48. How much will 135 of the same boxes of sweets cost?
	Learners calculate the rate per object	The mass of 12 same-sized bags of sugar is 300 kg. What is the mass of 1 bag of sugar?
	Learners first calculate the rate and then apply it to generate more information	If 16 small tables cost R720, how much will 124 of the same small tables cost?
Comparison by ratio		Joey bought 240 metres of wire to fence his farm. This is 15 times more than Peter bought. How much wire did Peter buy?
Proportional sharing		Feroza works for 7 hours and Jamie for 6 hours at the fast food restaurant. Together they are paid R975. How should the money be shared fairly to reflect the number of hours worked by each one?

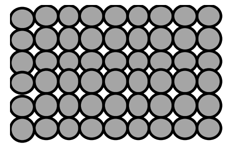
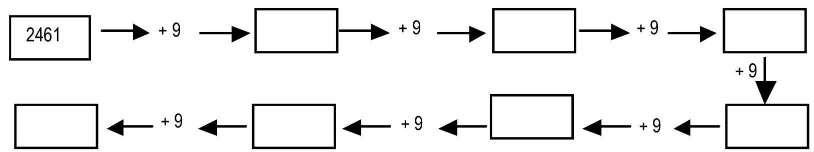
Meaning of the fraction	Examples of problems
Part of a whole where the whole is a single object	Susan eats $\frac{1}{3}$ of a chocolate cake. Another $\frac{1}{4}$ is given away. How much cake is left over?
Part of a whole where the whole is a collection of objects	A wall has 124 panels. A painter paints $\frac{1}{3}$ of these panels. How many panels has he painted? How many panels must still be painted? Or Sue uses $\frac{2}{3}$ of an apple to make a cake. If she has 30 apples, how many cakes can she bake?
Relationship	The daughter earns a quarter of what her father earns per hour. If her father earns R267 per hour, how much does the daughter earn?
Ratio	The recipe says that for every 2 cups of sugar, $\frac{1}{4}$ cup of butter is needed. If 50 cups of sugar are used; how many cups of butter are needed?
Comparator	What is the longest? $\frac{6}{9}$ metres or $\frac{2}{3}$ metres of a strip of material?
Unit of measurement	How many $\frac{1}{3}$ of a metre is there in $5\frac{2}{3}$ metre?
Number	Give a number that is greater than $3\frac{2}{3}$, but less than $3\frac{11}{12}$
Fractional parts put together to make a whole (iterative)	35 children get cool drink. If each child gets $\frac{2}{11}$ of a bottle of cool drink, how many bottles are needed to serve all the children?

TIME ALLOCATION PER TOPIC: GRADE 6							
Term 1		**Term 2**		**Term 3**		**Term 4**	
Topic	**Time**	**Topic**	**Time**	**Topic**	**Time**	**Topic**	**Time**
Mental Mathematics (10 minutes daily)	**8 hours**	Mental Mathematics (10 minutes daily)	**7 hours**	Mental Mathematics (10 minutes daily)	**8 hours**	Mental Mathematics (10 minutes daily)	**7hours**
Whole numbers: counting, ordering, comparing, representing and place value (6-digit numbers)	**2 hours**	Whole numbers: counting, ordering, comparing, representing and place value (9-digit numbers)	**1 hour**	Mass	**5 hours**	Whole numbers: Counting, ordering, comparing, representing and place value (9-digit numbers)	**1 hour**
Number sentences	**3 hours**	Whole numbers: multiplication (4-digit by 2- digit)	**5 hours**	Whole numbers: counting, ordering, comparing, representing and place value (9-digit numbers)	**1 hour**	Whole numbers: Multiplication (4-digit by 3-digit)	**5 hours**
Whole numbers: addition and subtraction (5-digit numbers)	**7 hours**	Properties of 3-D objects	**5 hours**	Whole numbers: addition and subtraction (6-digit numbers)	**8 hours**	Common fractions	**5 hours**
Common fractions	**10 hours**	Geometric patterns	**6 hours**	Viewing objects	**3 hours**	Properties of 3-D objects	**5 hours**
Time	**4 hours**	Symmetry	**2 hours**	Properties of 2-D shapes	**4 hours**	Area, perimeter & volume	**7 hours**
Properties of 2-D shapes	**8 hours**	Whole numbers: division (4-digit by 2-digit)	**8 hours**	Transformations	**3 hours**	History	**1 hour**
Data handling	**10 hours**	Decimal fractions	**10 hours**	Temperature	**1 hour**	Whole numbers: Division (4-digit by 3-digit)	**7 hours**
Numeric patterns	**4 hours**	Capacity/volume	**5 hours**	Percentages	**5 hours**	Number sentences	**3 hours**
				Data handling	**9 hours**	Transformations	**3 hours**
				Numeric patterns	**5 hours**	Position and movement	**2 hours**
				Length	**5 hours**	Probability	**2 hours**
Revision	**4 hours**	Revision	**5 hours**	Revision	**3 hours**	Revision	**6 hours**
		Assessment (all subjects)	**6 hours**			Assessment (all subjects)	**6 hours**
TOTAL: 60 HOURS		**TOTAL: 60 HOURS**		**TOTAL: 60 HOURS**		**TOTAL: 60 HOURS**	

3.3.3 Clarification of content for Grade 6

GRADE 6 TERM 1				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
NUMBERS, OPERATIONS AND RELATIONSHIPS	**Mental Mathematics**	**Mental calculations involving**: • Addition and subtraction facts of: - units - multiples of 10 - multiples of 100 - multiples of 1 000 • Multiplication of whole numbers to at least 12 x 12 • Multiplication facts of: - units and tens by multiples of 10 - units and tens by multiples of 100 - units and tens by multiples of 1 000 - units and tens by multiples of 10 000 **Number range for counting, ordering, comparing and representing, and place value of digits** • Order, compare and represent numbers at least 9-digit numbers • Represent prime numbers to at least • Recognizing the place value of digits in whole numbers to at least 9-digit numbers • Rounding off to the nearest 5, 10, 100 and 1 000 **Calculation techniques** Using a range of techniques to perform and check written and mental calculations with whole numbers including: • estimation	The mental Mathematics programme should be developed systematically over the year. Learners should not be asked to do random calculations each day. As learners cover topics and develop calculating techniques in the main part of the lesson, so aspects of these can be incorporated into the mental Mathematics programme. Concepts and skills are developed through the main lesson, and then practised, sometimes with smaller number ranges in the mental Mathematics programme. Keep the number range lower in Term 1 and increase it during the year. At the start of the year, number ranges and calculations techniques can be based on those developed in Grade 5. The mental Mathematics should systematically develop three aspects of learners' number knowledge • number facts - number bonds: addition and subtraction facts of: ◊ units ◊ multiples of 10 ◊ multiples of - times tables (multiplication of whole numbers to at least • calculation techniques - doubling and halving, - using multiplication to do division, - multiplying by 10, 100 and 1 000 - multiplying by multiples or 10, 100 and 1 000 - dividing by 10, 100 and 1 000 - building up and breaking down numbers, - rounding off to the nearest 5, 10, 100 and1 000 and compensating - adding and subtracting of units, multiples of 10, 100 and 1 000 to/from any 5-digit number • number concept - counting - ordering and comparing	**10 minutes every day**

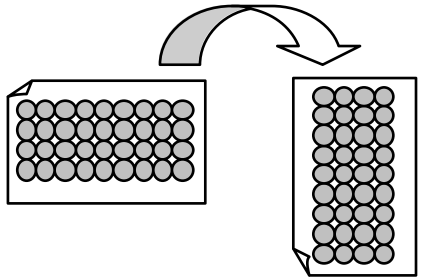
CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**Mental Mathematics**	• adding, subtracting and multiplying in columns • long division • building up and breaking down numbers • rounding off and compensating • using addition and subtraction as inverse operations • using multiplication and division as inverse operations **Number range for multiples and factors** • multiples of 2-digit and 3-digit numbers • factors of 2-digit and 3-digit whole numbers • prime factors of numbers to at least 100 **Properties of whole numbers** • recognize and use the commutative; associative; distributive properties with whole numbers • 0 in terms of its additive property • 1 in terms of its multiplicative property	- place value - building up and breaking down numbers - odd and even numbers - multiples Some mental Mathematics can be done without apparatus, but it is often useful to do mental Mathematics with apparatus **Recommended apparatus** • a number line (structured, semi-structured or unstructured) • a number grid • place value cards • counting beads	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Counting, ordering, representing and place value of digits	**Number range for counting, ordering and representing, and place value of digits** • Order, compare and represent numbers up to at least 9-digit numbers • Represent prime numbers to at least 100 • Recognize the place value of digits in whole numbers to at least 9-digit numbers • Round off to the nearest 5, 10, 100 and 1 000	Although counting in whole numbers is not specified in Grade 6, learners should be proficient in the Grade 5 level of counting. In Term 1, learners should revise and consolidate work done in Grade 5 **Counting** Counting should not only be thought of as verbal counting. Learners should count using apparatus such as • counters • counting beads • number grids • structured, semi-structured and empty number lines • pictures of objects, especially pictures of large numbers of objects that are presented in a grouped or structured way. An example of a picture of objects suitable for counting is provided at the end of the Grade 5 section of Numbers, Operations and Relationships. • arrays or diagrams of arrays e.g.  • other diagrams for counting e.g.  Counting should not always start with the first multiple. Nor should it always start on any other multiple e.g. counting in 25s can start from 27 or 113 , counting in 9's can start from 2 641 or from 38 **Place value**(number range 0 to 999999) Learners should be able to break up numbers into hundreds, tens and units using • the number names (number words) • place value or flash cards • expanded notation Recommended apparatus: place value, flash cards, Dienes blocks	**2 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Counting, ordering, representing and place value of digits		**Compare and order** Here learners should be given a range of exercises • Arrange the given numbers below from the smallest to the biggest: or biggest to smallest • Fill in missing numbers in - a sequence - on a number grid ◊ Show a given number on a number line – structured or semi-structured e.g. show on a number line which number is halfway between 471 340 and 471 350. • Indicate which of two numbers is greater or smaller: 395431 or 395413? • Fill in <, = or > between the following**:** a)247 889 ☐ 247 898 b)784 109 ☐ 785 190 All work developed here can be practised throughout the year in the mental Mathematics programme.	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
Patterns, Functions and Algebra	**2.1** **Number sentences** (introduction to algebraic expressions)	**Number sentences** • Write number sentences to describe problem situations • Solve and complete number sentences by - inspection - trial and improvement • Check solutions by substitution	• Writing number sentences can be seen as a way of preparing learners to write algebraic equations. • Number sentences can be used to describe problem situations. • Sometimes in the Intermediate Phase learners work with number sentences in isolation from other work. However, it is more common for learners to work with number sentences together with other forms of representation e.g. problems specified in words, numbers and calculations represented in diagrams, flow diagrams. Examples are specified in appropriate places at different times of the year. • Number sentences are also a way of showing equivalence. It seems obvious that what is on the one side of the equal sign is equal to what is on the other side. However learners need to be trained to see that there are equivalent expressions on either side of the equals sign. • In Grade 6 it is useful to use number sentences, and patterns made up of number sentences to assist learners to make sense of and learn the following: - multiple operations with and without brackets and the order of operations - multiplication and division as inverse operations - the commutative, associative, and distributive properties with whole numbers and how we can use these properties together with building up and breaking down numbers when we calculate - quick mental calculation techniques especially multiplying by multiples of 10, 100, 100, 10 000 - dividing by 10, 100, 1 000 as this is useful for decimal fractions • The steps in a calculation are sets of equivalent statements. Exploring, understanding and learning the logic of the equivalent statements by working through patterns made up of number sentences, helps learners to learn calculating techniques. • In Grade 6 learners do multiple operations with and without brackets. Learners can practise completing calculations in which the number sentence is written with brackets. This removes any confusion about the order of operations. Learners thus do not have to learn rules such as BODMAS if brackets are used routinely to indicate which operations have to be done first. • Completing number sentences with multiple operations	**3 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
Patterns, Functions and Algebra	**2.1 Number sentences** (introduction to algebraic expressions)		**Examples** a) 12 ÷ (4 + 2) x 5 b) (23 – 7) x (8 – 4) c) (88 ÷ 4) – (88 ÷ 11) d) (79 – 21) ÷ 2 **Example** 25 x 27 is equivalent to which of the following? a) 25 x (20 x 7) b) (20 + 5) x (20 + 7) c) 25(20 + 7) d) 20(20 + 7) + 5(20 + 7) **Example** 39 x 14 is equivalent to which of the following? a) 39 x (10 x 4) b) (30 + 9) x (10 + 4) c) 14 (40 – 1) d) 10 (40 – 1) + 4(40 – 1) e) 30 (10 + 4) + 8 (10 + 4) **Using number sentences helps learners to consolidate the commutative and associative properties** By Grade 6, learners should be familiar with the fact that you can add numbers in any order and that you can change the way you group numbers before adding them. Learners should know how to use the commutative and associative property of addition to simplify calculations. **Commutative property of multiplication** Numbers can be multiplied in any order. **Example**: 37 x 9 = 9 x 37 It is useful to confirm this by using arrays and number sentences. Learners can write a number sentence to show an array and then turn it through a right angle and write another multiplication number sentence to describe it.	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
Patterns, Functions and Algebra	**2.1** **Number sentences** (introduction to algebraic expressions)		**Example** This array shows 36 counters.  Learners can write multiplication number sentences for the array before and after it is turned. This allows them to see that 4 x 9 = 9 x4. Learners can also write division number sentences for the array e.g. 36 ÷ 4 = 9 and 36 ÷ 9 = 4. This helps learners to see that multiplication and division are inverse operations. **Multiplication and division as inverse operations** Learners can continue to use number sentences for thinking about multiplication and division as inverse operations, and how they can change any division calculation into a multiplication calculation. This is especially useful for doing division mentally e.g. if a learner forgets the answer to 49 ÷ 7, they can change this into 7 x ☐= 49 . Often this is easier to remember. **Examples:** 42 ÷ 7 = ☐ because 6 x ☐= 42 63 ÷ 7 = ☐ because 7 x ☐= 63 175 ÷ 7 = ☐ because 7 x ☐ =175 After completing a number of similar examples, learners should explain in their own words what they notice. Learners are not expected to know the names of the properties of operations e.g. commutative property. They only need to know how to use this property to make their calculations or to use equivalent statements. **Examples:** a) 27 ÷ 7 x 7 =☐ b) 38 ÷ 6 x 6 =☐ c) 7 997 ÷6 x 6 =☐	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
Patterns, Functions and Algebra	**2.1** **Number sentences** (introduction to algebraic expressions)		After completing a number of similar such examples, learners should explain in their own words what they notice. They are expected to be able to conclude "When you multiply and divide a number by the same number the number is unchanged". **Using number sentences to consolidate learners' understanding of the multiplicative properties of 1** a) 92 x 1 = □ b) 18 ÷ 18 = □ c) 67 154 ÷ 67 154 = □ d) □÷ 9 = 1 After completing a number of similar examples, learners should explain in their own words what they notice. They are expected to be able to conclude "When you multiply or divide a number by 1 it does not change the number"; "when you divide a number by itself you get one". **Associative property** You can change the way you group numbers when multiplying more than 2 numbers. Example (18 x 4) x 5 = 18 x (5 x 4) **Examples:** (8 x 7) x 3 = □ 8 x (7 x 3) = □ After completing a number of similar examples, learners should explain in their own words what they notice. Learners are not expected to know the names of the properties of operations e.g. associative property. They only need to know how to use them to simplify their calculations. **Using number sentences to consolidate learners' understanding of the additive properties of 0** **Examples:** a) 79 – 4 + 4 = □ b) 237 + 6 – 6 = □ c) 6 997 + 6 – 6 = □ d) 54 + 6 – □ = 54	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
Patterns, Functions and Algebra	**2.1** **Number sentences** (introduction to algebraic expressions)		After completing a number of similar examples, learners should explain in their own words what they notice. They are expected to say “When you add a number and then subtract the same number you get back to the number you have actually added 0”. **Examples:** a) 62 + 5 = ☐ + 4 (learners can use the fact that 5 = 4 + 1, so that 62 + 5 = 63 + 4 b) 47 + 7– ☐ =46 c) 30 – 14= ☐ +14 – 14 d) True or false: 200 + 17 = 212 + 5 **Revise multiplying by multiples of ten, hundred and thousand.** **Examples:** 4 x 20 = 4 x 2 x 10 = 5 x 30 = 5 x 3 x 10 = 7 x 70 = 7 x 7 x 10 = Learners should discuss what they notice 2 x 400= 2 x 4 x 100= 6 x 500= 6 x 5 x 100= 8 x 900= 8 x 9 x 100 = Learners should discuss what they notice. Similar patterns of number sentences can be set for multiplying by multiples of 1 000. Number sentences can also be used to focus on **dividing by tens, hundreds and thousands**. Learners can draw on these techniques when converting between units of measurement and also when they work with decimal fractions. **Examples:** Dividing by 10 50 ÷ 10 = 70 ÷ 10 = 90 ÷ 10 = 500 ÷ 10 = 700 ÷ 10 = 900 ÷ 10 = 5 000 ÷ 10 = 7 000 ÷ 10 = 9 000 ÷ 10 =	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
Patterns, Functions and Algebra	**2.1** **Number sentences** (introduction to algebraic expressions)		**Examples:** Dividing by 100 600 ÷ 100 = 800 ÷ 100 = 400 ÷ 100 = 6 000 ÷ 100 = 8 000 ÷ 100 = 4 000 ÷ 100= 60 000 ÷ 100 = 80 000 ÷ 100 = 40 000 ÷ 100 = Learners discuss what they notice Similar patterns of number sentences can be set for dividing by 1 000 All concepts developed here can be practised throughout the year in the mental Mathematics programme.	
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Addition and subtraction	**Number range for counting, ordering, comparing and representing, and place value of digits** • Order, compare and represent numbers at least 9-digit numbers • Represent prime numbers to at least 100 • Recognizing the place value of digits in whole numbers to at least 9-digit numbers • Rounding off to the nearest 5, 10, 100 and 1 000 **Number range for calculations** • addition and subtraction of whole numbers with at least 6-digit number • multiple operations on whole numbers with or without brackets **Calculation techniques** Using a range of techniques to perform and check written and mental calculations with whole numbers including • estimation • adding, subtracting in columns • building up and breaking down numbers	Numbers, operations and relationships make up about half the Mathematics that learners do in the Intermediate Phase. Rather than focus on addition and subtraction once in the year, it is recommended that learners revisit addition and subtraction in the third term of Grade 6. Although learners can start by revising Grade 5 work i.e. adding and subtracting with numbers up to 5 digits, the number range should be increased to include numbers of any size and more complex problem-solving can be addressed. **Learners should solve problems in contexts and do context free calculations** It helps learners to become more confident in and more independent at Mathematics, if they have techniques • to check their solutions themselves • to judge the reasonableness of their solutions **Judging reasonableness of solutions** Learners should be trained to judge the reasonableness of solutions. One way to do this is to estimate their answers before calculating. They can round off the number involved in the calculations. • When adding or subtracting 4-digit numbers, learners can round off to the nearest 1 000. • When adding or subtracting 5-digit numbers, learners can round off to the nearest 10 000, following the same principles as the rounding they have done with rounding off to smaller numbers, or they can continue to round to 1 000 as the calculations will be sufficiently simplified to do without a calculator. **Example:** 45 678 + 12 345 Rounding off both numbers to the the nearest 1 000 gives 46 000 + 12 000 which equals 58 000. Learners should be able to do this mentally. When adding two numbers that are close to each other e.g. 3 345 and 3 340 learners can use doubling as a way of estimating their answers.	**7 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Addition and subtraction	• rounding off and compensating • using addition and subtraction as inverse operations • using a calculator **Properties of whole numbers** • Recognize and use the commutative; associative; distributive properties of whole numbers • 0 in terms of its additive property **Solving problems** • Solve problems involving whole numbers and decimal fractions, including - financial contexts - measurement contexts • Solve problems involving whole numbers, including comparing two or more quantities of the same kind (ratio)	**Checking solutions** Learners should know that they can • check an addition calculation by subtraction. **Example:** If 45 362 + 32 488 = 77 848; **then** 77 848 – 32 488 = 45 362 • check a subtraction calculation by addition **Example**: If 54 687 – 32 134 = 22 544, **then** 22 544 + 32 134 = 54 687 Using the inverse operation to check solutions is one reason for teaching addition and subtraction simulteneously. Another reason for doing the two operations at the same time is that when learners solve problems, it is sometimes possible to solve the same problem by doing either addition or subtraction. **Example**: Veli's shopping costs R163. He pays with a R200 note. How much change does he get"? Some learners may add on from R163 to get R200 as follows: R163 + R7= R170, then R170 + R30 = R200. Veli gets R37 change. **Example:** Calculate: 56 423 + 7 581 + 21 479 • **Column method for adding** By Grade 6 learners should have had enough experience with breaking up numbers to add and subtract them. The horizontal method of expanding numbers before adding them can get unwieldy when more than two 5-digit numbers are added. Term 1 learners can revisit the expanded vertical method, and then move on to the traditional column method • **Expanded vertical column method to add** 56 423 = 50 000 + 6 000 + 400 + 20 + 3 +7 581 = 7 000 + 500 + 80 + 1 +21 479 = 20 000 + 1 000 + 400 + 70 + 9 Total = 70 000 + 14 000 + 1 300 + 170 + 13 This can be written as 70 000 + 10 000 + 5 000 + 400 + 80 + 3 = 85 483	

<table>
<tr><th>CONTENT AREA</th><th>TOPICS</th><th>CONCEPTS AND SKILLS</th><th>SOME CLARIFICATION NOTES OR TEACHING GUIDELINES</th><th>DURATION
(in hours)</th></tr>
<tr>
<td>NUMBERS, OPERATIONS AND RELATIONSHIPS</td>
<td>1.1
Whole numbers
Addition and subtraction</td>
<td></td>
<td>• The vertical column method to add.
1 1 1 1
56 423
+ 21 479
+ 7 581
85 483
• Expanded vertical column method to subtract
Example: Calculate: 98 743 – 45 684

<table>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td>600</td><td></td><td>130</td><td></td><td>13</td></tr>
<tr><td>98 743</td><td>=</td><td>90 000</td><td>+</td><td>8 000</td><td>+</td><td>700</td><td>+</td><td>40</td><td>+</td><td>3</td></tr>
<tr><td>– 45 684</td><td>=</td><td>40 000</td><td>+</td><td>5 000</td><td>+</td><td>600</td><td>+</td><td>80</td><td>+</td><td>4</td></tr>
<tr><td>Total</td><td>=</td><td>50 000</td><td>+</td><td>3 000</td><td>+</td><td>0</td><td>+</td><td>50</td><td>+</td><td>9</td></tr>
</table>
Therefore 50 000 + 3 000 + 0 + 50 + 9 = 53 059
• The vertical column method to subtract

6 13 13
98 743
– 45 684
53 059
Problems
Summation, increase and decrease, comparison by difference; comparison by ratio
See the description of problem types at the end of the Grade 6 notes
Working with calculators
• The mental Mathematics programme contains work on number concept, number facts and mental calculation techniques. Daily work on mental Mathematics combined with daily written calculations will prevent learners from becoming dependent on calculators and not knowing how to calculate without them.
Calculators are a useful way for learners to explore number patterns and when working with very large numbers.</td>
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CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1 Whole numbers** Addition and subtraction		Learners should be taught how to use calculators including how to clear an incorrectly entered number. Learners should always estimate answers before doing a calculation on a calculator. Learners should estimate whether their answers will be in tens, hundreds, thousands, ten thousands, hundred thousands or millions. For example when adding 12 345 and 87 654 they should estimate that the answer will be between 90 and 100 thousand.	

ASSESSMENT:

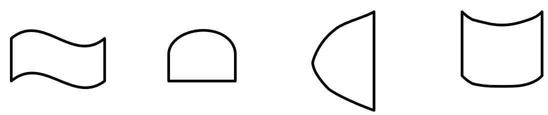
At this stage learners should have been assessed on:

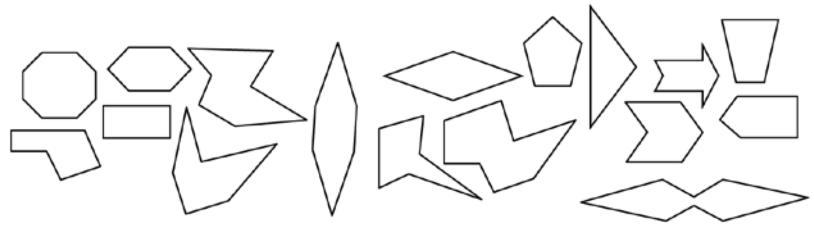
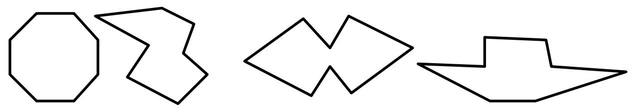
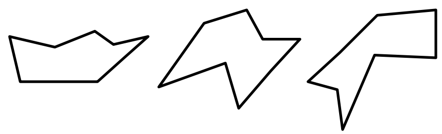
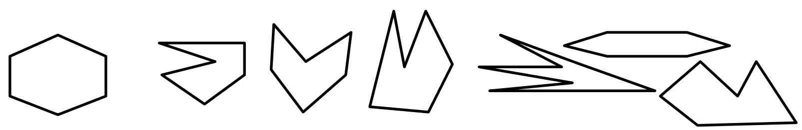
- 6-digit numbers
- adding and subtracting with 5-digit numbers
- working with number sentences

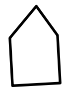
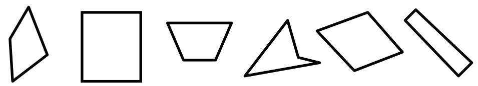
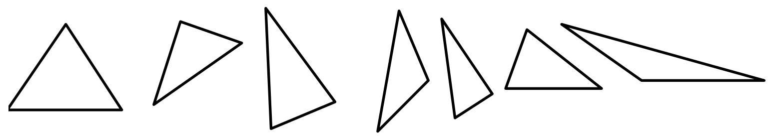
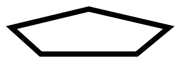
CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.2** **Common fractions**	**Describing and ordering fractions:** Compare and order common fractions, including specifically tenths and hundredths **Calculations with fractions:** • Addition and subtraction of common fractions in which one denominator is a multiple of another • Addition and subtraction of mixed numbers • Fractions of whole numbers **Solving problems** Solve problems in contexts involving common fractions, including grouping and sharing **Percentages** Find percentages of whole numbers **Equivalent forms:** **Learnes should recognize** • equivalent forms of common fractions with 1-digit or 2-digit denominators (denominators which are multiples of each other) • equivalence between common fraction and decimal fraction forms of the same number • equivalence between common fraction, decimal fraction and percentage forms of the same number	**What is different to Grade 5?** • In Grade 6 learners name, order and compare all common fractions • There is a special focus on tenths and hundredths in Grade 6. This is to lay the basis for decimals and percentages. • In Grade 5 learners only added and subtracted common fractions with the same denominator. In Grade 6 they use their knowledge of equivalence and add and subtract common fractions in which one denominator is a multiple of another • When learners calculate fractions of whole numbers, the answers may contain whole numbers or fractions or both. • Decimal fractions are introduced. Learners work with decimals to 2 decimal places • Percentages are introduced. • Learners work with equivalence between - common fraction and decimal fraction forms of the same number - common fraction and percentage forms of the same number - decimal fraction and percentage forms of the same number In Term 1 learners focus on common fractions, which will then be consolidated in Term 4. Learners start by focusing on the meaning of a fraction. Learners should develop the concept of fractions in a variety of ways. Problem-solving contexts can help learners to understand many ways of thinking about fractions. A variety of problems should be given to learners. (See the types of fractions problems stated at the end of the grades notes). Learners can also work with apparatus and diagrams. Different diagrams or apparatus develop different ways of thinking about fractions: • Region or area models develop the concept of fractions as part of a whole. They can also develop the concept of a fraction as a measure. **Examples** of area models include circles cut into fraction pieces or diagrams of pies, rectangles or other geometric shapes divided into fraction pieces by paper folding, fractions using square or dotty grid paper, geoboards • Length or measurement models can be used to develop the concept of fractions as part of a whole and if used in particular ways also of a fraction as a measure **Example:** length models include fraction strips, Cuisenaire rods, number lines. • Set models develop the concept of a fraction of a collection of objects and can lay the basis for thinking about a fraction of a number e.g. $\frac{1}{3}$ of 12. **Examples** of set models include counters of any kind in different arrangements	**5 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.2 Common fractions**		Learners should not only work with one kind of model, because this can limit their understanding of fractions. For example fractions in diagram forms should include region models e.g. circles and other geometric shapes divided into fraction parts, length models including number lines and set models which show collections of objects. Special attention should be paid to tenths and hundredths as learners will need this background when they work with decimal fractions up to 2 decimal places. Learners have been naming fractions since Grade 2. Extending the range of common fractions should not cause difficulties. Time should rather be spent on equivalence, comparing fractions and doing calculations with fractions and calculating. Once learners are comfortable with equivalence, it is easy for them to compare and order fractions. **Calculations with fractions:** Learners continue to • determine fractions through grouping or sharing which is linked to understanding the relationship between division and fractions e.g. If 5 children share sweets equally, they will each get $\frac{1}{5}$ of the sweets • add fractions with the same denominators • subtract fractions with the same denominators • add and subtract mixed numbers. It is not expected that learners know rules for simplifying fractions or for converting between mixed numbers and fraction forms. Learners should know when a fraction is equal to or greater than 1. **Examples** The examples below are illustrated without contexts, but could equally arise in a problem situation. $2\frac{3}{5} + 3\frac{4}{5} = 5\frac{7}{5} = 5 + \frac{5}{5} + \frac{2}{5} = 6\frac{2}{5}$ Similarly to do subtraction, learners can first subtract the whole numbers and then use equivalence and compensation to complete the calculation. $6\frac{3}{5} - 2\frac{4}{5} = 4 + \frac{3}{5} - \frac{4}{5} = 3 + \frac{5}{5} + \frac{3}{5} - \frac{4}{5} = 3\frac{4}{5}$ Learners also find fractions of whole numbers. In Grade 6 learners should do examples in which the answer can be a whole number, a fraction or a mixed number e.g. What is $\frac{1}{4}$ of 18 ? If learners have worked with pictures of collections of objects, and they know the relationship between division and fractions, this can be done without learning a rule or method. Learners can simply draw 18 objects and then create 4 equal groups. An extention of this question would be to find $\frac{3}{4}$ of 18. Here learners first calculate $\frac{1}{4}$ of 18 and use multicplication to find the answer. Measurement is an important context through which to develop and consolidate the fraction concept. Length, mass and capacity can be used to develop the concepts of fractions, equivalence, and adding with fractions, since learners have worked with these since Grade 1.	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
MEASUREMENT	**4.4** **Time**	**Reading time and time instruments** Read, tell and write time in 12-hour and 24-hour formats on both analogue and digital instruments in • hours • minutes • seconds Instruments include clocks, watches and stopwatches **Reading calendars** **Calculations and problem-solving related to time** Solve problems in contexts involving time Read time zone maps and calculating time differences based on time zones Calculation of time intervals where time is given in • seconds and/or minutes; • minutes and/or hours • hours and /or days • days and/or weeks and/or months • years and/or decades • centuries, decades and years **History of time** Know some ways in which time was measured and represented in the past.	**What is different to Grade 5?** • Time zones are introduced. • Centuries are introduced Once learners have been taught to tell the time, this can be practised during the mental Mathematics section of the lesson. Learners continue to read calendars, and do calculations based on dates. **Calculations and problem-solving related to time include** calculations with and conversions between all the units mentioned in the column on the left.time zones Learners should be able to: • read time zone maps and do calculations using zoned maps. Help learners to understand why there are time zone differences between different places in the world • calculate time differences when given clock faces showing the times in different places.	**4 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
SPACE AND SHAPE	**3.1** **Properties of 2-D shapes**	**Shapes learners need to know and name** • Regular and irregular polygons - triangles, squares, rectangles, parallelograms, other quadrilaterals, pentagons, hexagons, heptagons, octagons • Similarities and differences between rectangles and parallelograms **Features of shapes** Describe, sort and compare 2-D shapes in terms of • number of sides • length of sides • size of angles - acute - right - obtuse - straight - reflex - revolution **Further activities** • Draw 2-D shapes on grid paper • Draw circles, patterns in circles and patterns with circles using a pair of compasses **Angles**	**What is different to Grade 5?** • Octagons are new shapes. • Parallelograms are new shapes. • Learners to name angles according to their sizes but still do not work with protractors. Nor do they measure angles in degrees. • Learners use angles, in particular right angles to distinguish shapes. This is the case when distinguishing between rectangles and parallelograms **2-D shapes and their distinguishing features** Learners should first learn characteristics of each shape, before discussing comparisons between shapes. There are four ways in which learners distinguish shapes in Grade 6. 1. By checking whether they have straight or curved sides. 2-D shapes can be grouped as follows: • *<u>Closed shapes with curved sides</u> only*. **Examples**  The only 2-D shape that has curved sides that learners are expected to name is the circle. They should, however, be exposed to other shapes with curved sides which they are not expected to name: for example all these shapes have curved sides • *<u>Closed shapes with curved and straight sides</u>*: **Examples**  Learners are not expected to name any of these shapes.	**8 hours**

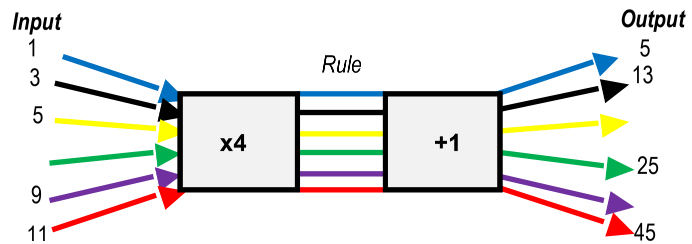
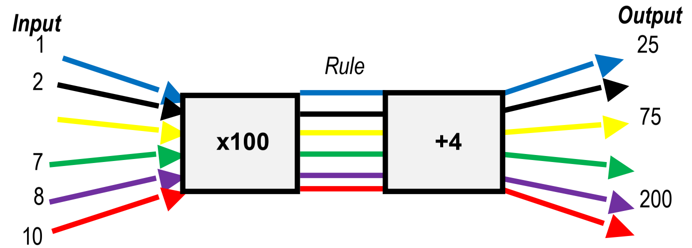
CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
SPACE AND SHAPE	**3.1** **Properties of 2-D shapes**	Recognize and name the following angles in 2-D shapes: - acute - right - obtuse - straight - reflex - revolution	• *<u>Closed shapes with straight sides only</u>*: **Examples** of polygons.  2. By grouping shapes with straight sides according to the number of sides. A polygon is a closed shape with only straight sides. Learners are not expected to know the name polygon. **Polygons** A regular polygon is a straight sided, closed shape with all sides the same length and all its angles the same size. Learners do not have to know the terms “regular” and “irregular”. Learners should be able to identify polygons according to their number of sides. They must be able to identify any octagon, heptagon, hexagon or pentagon. **Examples** of octagons  **Examples** of heptagons/septagons  **Examples** of hexagons 	

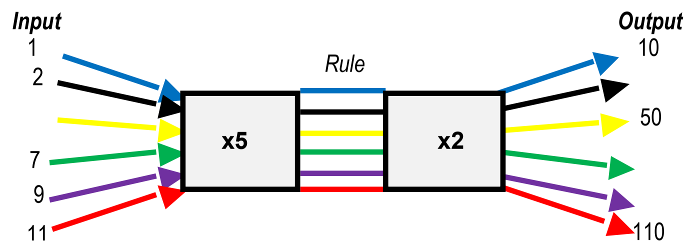
CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
SPACE AND SHAPE	**3.1** **Properties of 2-D shapes**		**Example** of pentagons  Learners need to know that all closed shapes with 4 straight sides are called quadrilaterals. **Examples** of quadrilaterals.  Learners should identify and name squares, rectangles and parallelograms. For other quadrilaterals Grade 6 learners use the group name, quadrilateral. **Triangles:** Learners should be exposed to a range of different triangles, but are not expected to name types of triangles in Grade 6  3. By looking at the length of their sides. Learners differentiate between squares and rectangles by looking at the lengths of their sides. However, learners can also discuss the lengths of the sides of other shapes e.g. a learner may say that the following shape is a pentagon whose sides are not all the same length.  4. By looking at the sizes of their angles. Here learners need to know how to check for a right angle (see notes below). They check whether shapes are rectangles or squares by checking whether all their angles are right angles. **Angles** In the Intermediate Phase learners measure angles informally. They do not use protractors or discuss angles in terms of degrees. In Grade 6 learners identify the following angles by comparing them with right angles and straight angles:	

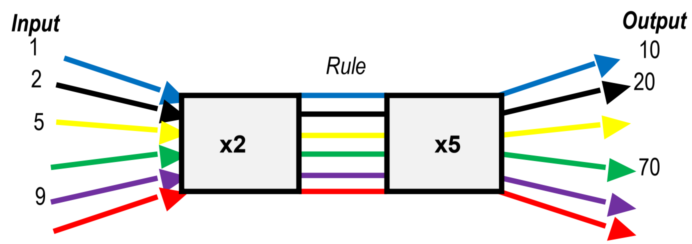
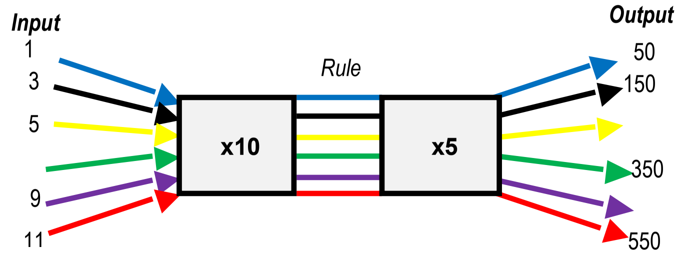
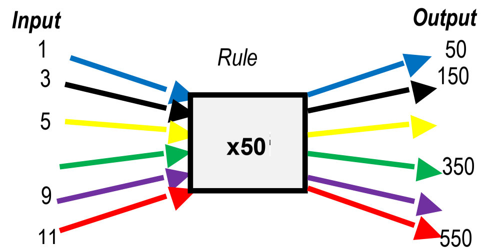
CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
SPACE AND SHAPE	**3.1** **Properties of 2-D shapes**		• An acute angle is smaller than a right angle • A right angle • An obtuse angle bigger than a right angle but smaller than a right angle • A straight angle • A reflex angle bigger than a straight angle but smaller than a revolution • A revolution a complete circle Learners can also be introduced to the size of an angle as the amount of turning between the arms or sides of the angle. Here a right angle is equivalent to a quarter turn; a straight angle is equivalent to a half turn, and a revolution is equivalent to a full turn. Learners use informal angle measurers such as the corner and side of a sheet of paper to check whether shapes or objects have right angles or straight angles. **Activities to focus learners on characteristics of shapes** Most commercially available sets of 2-D shapes do not show irregular shapes. They are however, easy to cut out of cardboard. Learners can draw irregular shapes on grid paper, or if they have geoboards, they can make irregular shapes on geoboards. Learners can also put cut-out or plastic shapes together to create composite irregular shapes. Some examples are given below (this is further described under Transformations).  **Written exercises and recording** Learners should do practical work with concrete apparatus, but they should also do written exercises. Work with pair of compasseses and drawing patterns with circles can be left until the fourth term	

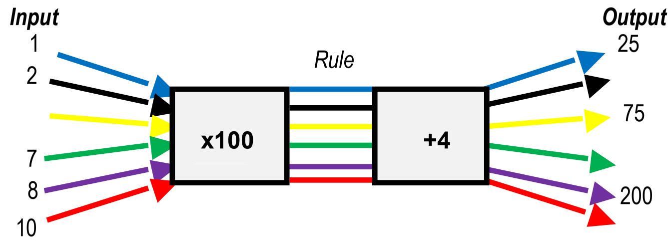
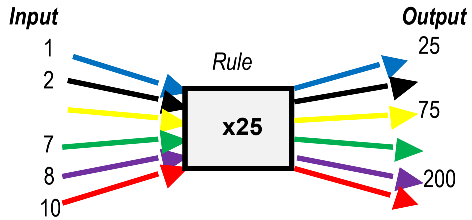
CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
DATA HANDLING	**5.1** **Collecting and organising data**	**Collect data** • Use tally marks and tables for recording • Use simple questionnaires (yes/no type response) Order data from smallest group to largest group	Teachers in the phase should ensure that different topics are chosen for data collection in each of the grades. **What is different to Grade 5?** The following are new in Grade 6 • percentages – graphs can include data expressed in percentages after percentages have been covered in Term 3 (this is important in pie charts, but bar graphs can also sometimes be given in percentages) • collecting data by using simple questionnaires • double bar graphs • median **Complete data cycle including creating an individual bar graph: context environmental data** The complete data cycle includes asking a question, collecting, organising, representing, analyzing and interpreting data and reporting on the data. Work through whole data cycle to create an individual bar graph using environmental data. Suitable topics include: • how much water is used per month by families of learners in the class • amount and kinds of litter in school playgrounds • amount and kinds of recycling collected by the school **Analysing graphs** Analyse graphs on environmental or socio-economic contexts by answering questions on graphs. Both graphs and questions to be provided by teacher or textbook. Learners should work with at least • 2 pie graphs • 1 pictograph with a many to one representation Suitable topics include: • infant mortality rates per country in Southern Africa • common causes of death of children in SA • quantities of materials recycled in the town, province, country • quantities of recycling materials collected by schools around the country • amount of water stored in dams in your province	**10 hours**
	5.2 **Represent-ing data**	**Draw a variety of graphs to display and interpret data including** • pictographs with many-to-one representations • bar graphs and double bar graphs		
	5.3 **Analysing, interpreting and reporting data**	**Critically read and interpret data represented in** • words • pictographs • bar graphs • double bar graphs • pie charts **Analyse data by answering questions related to** • data categories, including data intervals • data sources and contexts • central tendencies – (mode and median) **Summarise data verbally and in short written paragraphs that include** • drawing conclusions about the data • making predictions based on the data		

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
DATA HANDLING		**Examine ungrouped numerical data to determine** • the most frequently occurring score in the data set (mode) • the middlemost score in a data set	**Representing and analyzing data presented in words:** The data presented in words should be represented in other forms such as tally marks, tables or pictographs and then analysed. **Drawing pictographs: using data from socio-economic context** **This is recommended as the Mathematics project in Grade 6** Learners should be given socio-economic data, preferably national or regional, so that the numbers are large. This can be provided as unstructured data, in a paragraph, in a list or in a table or tally. Learners sort and order the data and draw pictographs with many to one correspondence. They then complete the rest of the data cycle. Suitable topics include: • facilities at schools in SA • sources of water of families in SA e.g. piped to house, piped to yard, piped to communal source outside the property, borehole, spring, etc. • what source / sources of lighting used by families in SA e.g. electricity, candles, paraffin, gas, etc. • kinds of homes in SA	
Assessment **Recommended form of assessment: Project**				

<table>
<tr><th>CONTENT AREA</th><th>TOPICS</th><th>CONCEPTS AND SKILLS</th><th>SOME CLARIFICATION NOTES OR TEACHING GUIDELINES</th><th>DURATION (in hours)</th></tr>
<tr>
<td>PATTERNS, FUNCTIONS AND ALGEBRA</td>
<td>2.1
Numeric patterns</td>
<td>Investigate and extend patterns
• Investigate and extend numeric patterns looking for relationships or rules of patterns:
- sequences involving a constant difference or ratio
- of learner’s own creation
• Describe observed relationships or rules in learner’s own words
Input and output values
Determine input values, output values and rules for patterns and relationships using flow diagrams
Equivalent forms
Determine equivalence of different descriptions of the same relationship or rule presented
• verbally
• in a flow diagram
• by a number sentence</td>
<td>Sequences of numbers:
Examples of the above are illustrated in Term 3.
Patterns given in input-output diagrams
Input-output diagrams are sometimes called function diagrams or function machines because they are a way of introducing learners to functional relationships diagrammatically. Functional relationships become very important in the Senior Phase and FET Mathematics.
The forms of input-output diagrams that learners in the Intermediate Phase work with most often are flow diagrams or spidergrams. When using flow diagrams, the correspondence between input and output values should be clear in its representational form i.e. the first input value produces the first output value, the second input produces the second output value etc.
Example 1:

Example 2:

Any input-output diagram can allow learners to see or work out:
• the input value, if the rule is given as well as a corresponding output value
• the output value, if the rule is given as well as a corresponding input value
• the rule, if the rule works for every given input value and its corresponding output value.</td>
<td>4 hours</td>
</tr>
</table>

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
PATTERNS, FUNCTIONS AND ALGEBRA	**2.1** **Numeric patterns**		Learners have already worked with tables in which the rule has been included. In grade 6 learners can work with tables in which the rule has not been stated and use patterns to find the rule. In Term 1 it is recommended that number patterns are used to develop concepts and skills that will be used in multiplication and division. The focus here can be on input-output flow diagrams. In Term 1 it is recommended that learners spend 4 hours working with flow diagrams that help them to understand and learn about • Multiplication and division as inverse operations • Multiplication of units by multiples of 10 multiples of 100 and multiples of 1 000 • The associative property with whole numbers and how to use this property when we multiply. e.g. multiplying by multiples of 10 **Using flow diagrams to help learners understand and use multiplication and division as inverse operations** Learners are not expected to use the expression “inverse operations”. They are expected to know that • multiplication can be used to do division calculations • division can be used to check division calculations **Using flow diagrams to help learners develop multiplication and division techniques** **Commutative property** Numbers can be multiplied in any order. **Example**: 13 x 5 x 2 = 13 x 2 x 5.. 	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
PATTERNS, FUNCTIONS AND ALGEBRA	**2.1** **Numeric patterns**		 Learners can discuss what they notice when they compare the examples. Learners are not required to know the name of the commutative property. They are only expected to be able to use it to simplify calculations or to use equivalent statements. **Using flow diagrams to help learners think about and use techniques for multiplying by multiples of 10:** Learners complete flow diagrams like the one below. They then explain using their own words what they notice when they compare the flow diagrams. They then discuss a short way to multiply by 50   	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
PATTERNS, FUNCTIONS AND ALGEBRA	**2.1** **Numeric patterns**		Similar pairs of flow diagrams can be used, to help learners develop techniques for multiplying by multiples of 100. **Other quick multiplication techniques** can be developed in this way. **Example**   Learners can develop fast mental and written techniques based on this. All concepts developed here can be practised throughout the year in the mental Mathematics programme.	
ASSESSMENT: At this stage learners should have been assessed on: • fractions • time • 2-D shape including angles • number patterns				
REVISION				**4 hours**

GRADE 6 TERM 2				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
NUMBERS, OPERATIONS AND RELATIONSHIPS	**Mental Mathematics**	**Mental calculations involving**: • Addition and subtraction facts of: - units - multiples of 10 - multiples of 100 - multiples of 1000 • Multiplication of whole numbers to at least 12x12 • Multiplication facts of: - units and tens by multiples of 10 - units and tens by multiples of 100 - units and tens by multiples of 1000 - units and tens by multiples of 10 000 **Number range for counting, ordering, representing and place value of numbers** • Order, compare and represent numbers at least 9-digit numbers • Represent prime numbers to at least 100 • Recognize the place value of digits in whole numbers to at least 9-digit numbersRound off to the nearest 5, 10, 100 and 1000 **Calculation techniques** Using a range of techniques to perform and check written and mental calculations with whole numbers including: • estimation • adding, subtracting and multiplying in columns	The mental Mathematics programme should be developed systematically over the year. See Term 1 notes, but notice the increased number range in the column on the left in Term 2	**10 minutes every day**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**Mental Mathematics**	• long division • building up and breaking down numbers • rounding off and compensating • using addition and subtraction as inverse operations • using multiplication and division as inverse operations **Number range for multiples and factors** • Multiples of 2-digit and 3-digit numbers • Factors of 2-digit and 3-digit whole numbers • Prime factors of numbers to at least 100 **Properties of whole numbers** • Recognize and use the commutative; associative; distributive properties of whole numbers • 0 in terms of its additive property • 1 in terms of its multiplicative property		
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Counting, ordering, comparing, representing digits	**Number range for counting, ordering, comparing and representing, and place value of digits** - Order, compare and represent numbers to at least 9-digit numbers - Represent prime numbers to at least 100 - Recognize the place value of digits in whole numbers to at least 9-digit numbers - Round off to the nearest 5, 10, 100 and 1 000	See Term 1 notes, but notice the increased number range in the column on the left in Term 2 All concepts developed here can be practised throughout the year in the mental Mathematics programme.	**1 hour**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Multiplication	**Number range for counting, ordering, comparing and representing, and place value of digits** • Order, compare and represent numbers to at least 9-digit numbers • Represent prime numbers to at least 100 • Recognize the place value of digits in whole numbers to at least 9-digit numbers • Round off to the nearest 5, 10, 100 or 1 000 **Number range for calculations** • Multiplication of at least whole 4-digit by 3-digit numbers • Multiple operations on whole numbers with or without brackets **Calculation techniques include** • estimation • multiplying in columns • building up and breaking down numbers • rounding off and compensating • using a calculator **Number range for multiples and factors** • Multiples of 2-digit and 3-digit numbers • Factors of 2-digit and 3-digit whole numbers • Prime factors of numbers to at least 100	**What is different to Grade 5?** In Grade 5, learners multiply 3-digit by 2-digit numbers, and they still use methods in which they break up numbers. Learners in Grade 6 can start by revising this and then move on to multiply 4-digit by 3-digit numbers using column multiplication. **Learners should do context free calculations and solve problems in contexts** As the numbers learners work with get larger, learners may begin to lose track of some numbers when they break up numbers to do calculations. Using brackets is helpful to show grouping of numbers and so helps learners keep track of what they are doing. Since the operations in brackets have to be done first, it removes any confusion about the order of operations. Learners thus do not have to learn rules such as BODMAS if brackets are used routinely to indicate which operations have to be done first. **Using the distributive property to multiply** **Example:** Calculate 547 x 45 547 x 40 + 5 = 547 x 40 + 547 x 5 → (using the distributive property) = 21 880 + 2 735 = 24 615 or 547 x 50 – 5 = 547x 50 – 547 x 5 → (using the distributive property) = 27 350 – 2 735 = 24 615 Using rounding-off to estimate and judge reasonableness of answer 547 x 45 = 547 x 50 ≈ 27 350 **Using factors to multiply** **Example**: Calculate 547 x 42 547 x 42 = 547 x 6 x7 → breaking up 42 into its factors =547 x 2 x 3 x 7→ breaking up 6 into its factors =(547 x 2) x 3 x 7 =(1 094 x3) x 7 = 3 282 x 7 = 7 x 3 000+ 7 x 200+ 7 x 80+ 7 x 2 = 21 000 + 1 400 + 560 + 14 = 22 974	**5 hours**

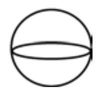
CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Multiplication	**Properties of whole numbers** • Recognize and use the commutative; associative; distributive properties of whole numbers • 0 in terms of its additive property • 1 in terms of its multiplicative property **Solving problems** • Solve problems involving whole numbers and decimal fractions, including - financial contexts - measurement contexts • Solve problems involving whole numbers, including - comparing two or more quantities of the same kind (ratio) - comparing two quantities of different kinds (rate)	Notice that as numbers get larger learners will tend to use more than one calculating strategy at the same time e.g. in the above example the multiplier is broken up into factors, but the multiplicant is broken down into place value parts. The horizontal method of expanding numbers before multiplying the parts can get unwieldy when using the number ranges recommended for Grade 6.The traditional column method helps learners to make sure that they do not lose parts of larger numbers. After about 2 hours consolidating the Grade 5 work, the number ranges can be increased to 4-digit by 3-digit numbers. **Estimation** Learners should judge the reasonableness of their solutions e.g. by estimating before calculating using rounding off to the nearest 10, 100 and 1 000. Depending on which numbers learners round off, and what they round them off to, they will get different estimations. If they round off both numbers, the calculations are easier to do mentally, but the approximation is not as close to the actual answer. **Example** 4 362 x 108 ≈ 4 000 x 100 ≈ 400 000 4 362 x 108 ≈ 4 400 x 108 ≈ 475 200 4 362 x 108 ≈ 4 362 x 100 ≈ 436 200 4 362 x 108 ≈ 4 000 x 108 ≈ 432 000 By the end of the year in Grade 6, learners should have an idea realise the impact their choice of rounding off has on the answer. This depends on how accurate they chose to be or to the numbers in the calculation. • **Use the vertical column method** 4 362 x 108 34 896 ------→ 8 x 4 362 436 200 ------→ 100 x 4 362 471 096 ------→ 108 x 4 362 **Problems** Treating groups as units, see the description of problem types at the end of the Grade 6 notes	

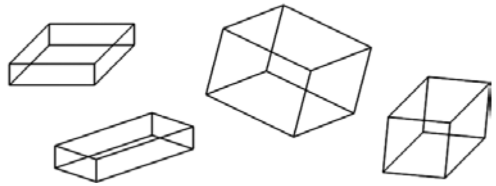
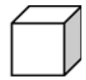
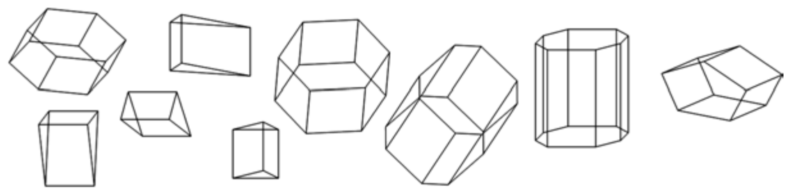
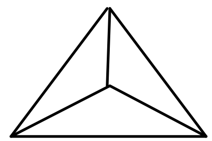
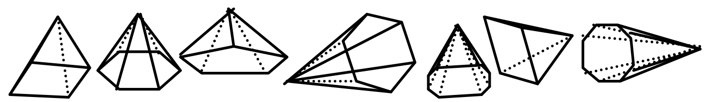
CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Multiplication		**Working with calculators** The mental Mathematics programme contains work on number concept, number facts and mental calculating techniques. Daily work on mental Mathematics combined with daily written calculations will prevent learners from becoming dependent on calculators and not knowing how to calculate without them. Calculators are useful tools to explore number patterns, or when working with very large numbers, e.g. multiplying and dividing numbers with more than 4 digits. Learners should be taught how to use calculators including how to clear an incorrectly entered number. Learners should always estimate answers before doing a calculation on a calculator. Learners should estimate whether their answers will be in tens, hundreds, thousands, ten thousands, hundred thousands or millions. For example, when adding 12 345 and 87 654 they should estimate that the answer will be in the 90 thousands but closer to 100 thousand. Similarly if learners calculate 2 345 x 7, they should be able to estimate that the answer will be in the region of 2 000 x 70 or 20 000 x 7	

ASSESSMENT:

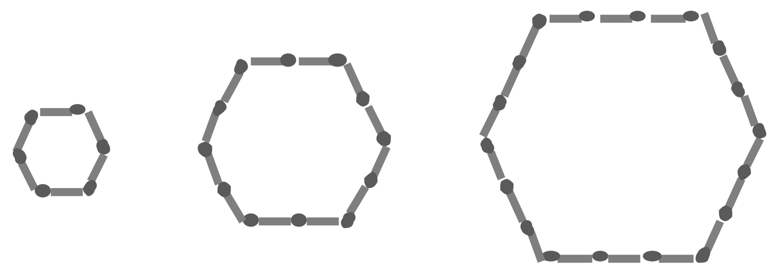
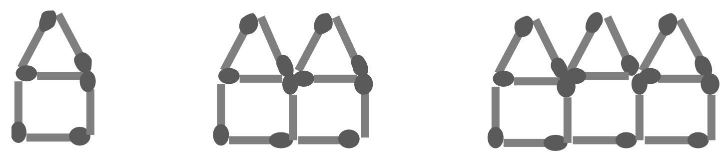
At this stage learners should have been assessed on:

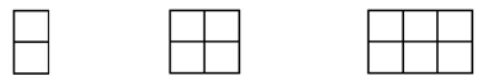
- whole number with up to 9-digits
- Multiplication of up to 4-digit by 3-digit numbers
- 3-D objects

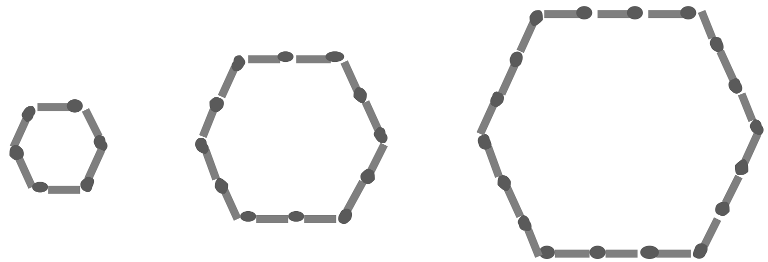
CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
SPACE AND SHAPE	**3.2** **Properties of 3-D objects**	**Objects learners need to know and name** • rectangular prisms • cubes • tetrahedrons and other pyramids • similarities and differences between tetrahedrons and other pyramids **Features learners use to distinguish, describe, sort and compare objects** Describe, sort and compare 2-D shapes and 3-D objects in terms of: • number and shape of faces • number of vertices • number of edges **Further activities to focus learners on charactaristics of objects** Make 3-D models using: • drinking straws/toothpicks, etc. to form a skeleton • nets	**What is different to Grade 5?** • Tetrahedrons are new objects • Other pyramids are new objects • Learners distinguish between tetrahedrons and other pyramids by looking at the shapes of their bases, • Learners use nets to build objects • Learners match nets with drawings of objects • Learners count the number of edges of 3-D objects • Learners build skeleton objects using drinking straws • Learners count the number of vertices of objects. **Objects and their distinguishing characteristics** There are three ways in which learners distinguish 3-D objects in Grade 6. 1. Checking whether they have flat or curved surfaces. Three dimensional objects can be grouped as follows: • *Objects with a curved surface only: spheres* Sphere  • *Objects with flat and curved surfaces* Cone  Cylinders 	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
SPACE AND SHAPE	**3.2** **Properties of 3-D objects**		• *Objects with only flat surfaces.* In Grade 6 learners only identify and name the objects. Prisms **rectangular prisms**  **cubes**  **other prisms**  Pyramids: **tetrahedron or triangular pyramid**  **other pyramids** 	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
SPACE AND SHAPE	**3.2** **Properties of 3-D objects**		2. When looking at the group of objects with flat surfaces, learners should know that the flat surfaces of 3-D objects are called faces. They describe these objects according to • the kinds and numbers of 2-D shapes that make up the flat surfaces e.g. a rectangular prism can have 6 faces that are rectangles or 4 that are rectangles and 2 that are squares. • the number of edges • the number of vertices 3. Learners can also look for right angles on the faces of objects. If the object that they are examining has faces with only right angles, then it will be either a cube or a rectangular prism. **Further activities: making models of 3-D objects** Learners create 3-D objects from nets Learners create skeletons of 3-D objects with straws / toothpicks, etc. **Interpreting drawings of 3-D objects and written exercises** Learners need to work with real objects. However they also need to do written exercises on 3-D objects. Interpreting pictures of 3-D objects is more difficult than working with the real objects. Learners should practise interpreting drawings of 3-D objects. They should identify and name 3-D objects in drawings identify everyday objects that look like geometric objects e.g. a milk carton looks like a rectangular prism, match nets of objects to drawing of objects, describe 3-D objects by stating the number of flat and curved surfaces, count the number of vertices, edges, and number and shape of faces when shown drawings of 3-D objects. In Term 2 learners focus on the kind of surface the shape number of faces of 3-D object. They also build objects using nets. In Term 4 they can consolidate what they have learned in Term 1 and build skeleton shapes with straws or toothpicks. They will then focus on the edges and vertices of the objects. This means that by the end of the year they will be able to describe 3-D geometric objects according to surfaces, faces, edges and vertices.	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
PATTERNS, FUNCTIONS AND ALGEBRA	**2.2** **Geometric patterns**	**Investigate and extend patterns** • Investigate and extend geometric patterns looking for relationships or rules of patterns: - represented in physical or diagram form - sequences involving a constant difference or ratio - of learner's own creation • Describe observed relationships or rules in learner's own words **Input and output values** Determine input values, output values and rules for the patterns and relationships using flow diagrams **Equivalent forms** • Determine equivalence of different descriptions of the same relationship or rule presented: - verbally - in a flow diagram - by a number sentence	Learners work with patterns that are made from 2-D shapes and 3-D objects or from drawings / diagrams of these shapes and objects. In Patterns, Functions and Algebra we choose geometric patterns that can be re-described using a number pattern this does not mean that it can't be described in words. In fact the description in words is usually the starting point. In Shape and Space learners also work with visual patterns that are geometric. However, in Shape and Space they are only required to describe the patterns using the language of geometry and to make copies of the patterns. While many of these patterns can be described using algebraic expressions, this is beyond the scope of Intermediate Phase learners. Learners show the same patterns in different ways: in a diagram, as a verbal description, as a flow diagram, a table and in a number sentence. Sometimes learners are able to see different aspects of a pattern when they change the form in which the pattern is presented. **What is different to Grade 5?** There is more emphasis on presenting patterns in tables. There is more emphasis on stating the general rule of the pattern. What kinds of geometric patterns should learners work with? The patterns shown below are in picture or diagram form. Learners can also work with patterns which are made from real shapes, or objects concrete apparatus. What kinds of patterns should learners work with? Patterns in which the shapes grow or decrease in different ways. **Examples:** • Patterns in which the shape keeps its form, but gets **larger (or smaller)** at each stage.  • Patterns in which a shape or part of a shape is **added** at each stage. 	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
PATTERNS, FUNCTIONS AND ALGEBRA	**2.2** **Geometric patterns**		In each of the examples above the patterns are made by adding the same number of matches. In the top pattern 3 matches are added each time. In the second pattern two matches are added each time. Both patterns are **patterns with a constant difference.** Most geometric patterns learners see in Grade 6 will be patterns with a constant difference**.** They are more likely to get patterns with a constant ratio when working only with number sequences. The pattern below is also a pattern with a constant difference: **two squares are added each time**  • Patterns with neither a constant difference nor a constant ratio **Examples:**  What should learners do? • Copy and extend the pattern. This helps them to understand how the pattern is formed. • Describe the pattern in words. - Different learners will describe different aspects of the pattern - Learners should describe the relationship between shapes in the sequence or rules in their own words. To do this, learners need discuss how they made the pattern or be able to answer the question “How do I get from one stage in the pattern to the next?” • Learners need to have opportunities to see that changing the form of representation e.g geometric to verbal or to a flow diagram or to a table can sometimes help them to understand the pattern in different ways. Learners should “translate” these geometric sequences into other forms of expression or representation namely: - verbally describe the pattern - draw flow diagrams or input–output diagrams - record number sequence in a table-form	

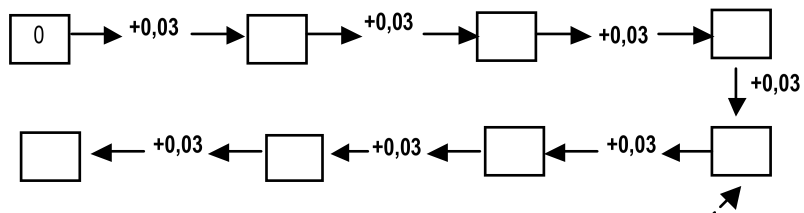
<table>
<tr><th>CONTENT AREA</th><th>TOPICS</th><th>CONCEPTS AND SKILLS</th><th>SOME CLARIFICATION NOTES OR TEACHING GUIDELINES</th><th>DURATION (in hours)</th></tr>
<tr><td>PATTERNS, FUNCTIONS AND ALGEBRA</td><td>2.2
Geometric patterns</td><td></td><td>Example: Extending the pattern:

Describing the pattern in own words
“It is a pattern of hexagons”
“Each hexagon is bigger than the one before”
Describing how they made the pattern or answering the question “How do I get from one stage to the next?”
“I added one more match to each side of each hexagon”
“Each hexagon has one more match in each side than the hexagon on the left”
Recording the number pattern in a table
When learners fill in a table like the one below, they can begin to see that the number of matches used for each hexagon is 6 multiplied by the position number of the hexagon in the sequence. They will see that the rule is hexagon position number multiplied by 6.
Learners can then be asked to predict how many matches will be used for hexagons not built e.g. 10^{th}, 100^{th}, etc.
<table>
<tr><td>Hexagon number</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>10</td></tr>
<tr><td>Number of matches</td><td>6</td><td>12</td><td>18</td><td></td><td></td><td></td></tr>
</table></td><td>6 hours</td></tr>
<tr><td>SHAPE AND SPACE</td><td>3.3
Symmetry</td><td>Recognize, draw and describe lines of symmetry in 2-D shapes</td><td>This should include shapes in which there is more than one line of symmetry.
Drawings of 2-D shapes should include those where the line of symmetry is not necessarily vertical.</td><td>2 hours</td></tr>
</table>

<table>
<tr><th>CONTENT AREA</th><th>TOPICS</th><th>CONCEPTS AND SKILLS</th><th>SOME CLARIFICATION NOTES OR TEACHING GUIDELINES</th><th>DURATION (in hours)</th></tr>
<tr>
<td>NUMBERS, OPERATIONS AND RELATIONSHIPS</td>
<td>1.1
Whole numbers
Division</td>
<td>Number range for counting, ordering and representing, and place value of digits
• Order, compare and represent numbers up to at least 9-digit numbers
• Represent prime numbers to at least 100
• Recognize the place value of digits in whole numbers up to at least 9-digit numbers
• Round off to the nearest 5, 10, 100 and 1 000
Number range for calculations
• Division of at least whole 4-digit by 3-digit numbers
• Multiple operations on whole numbers with or without brackets
Calculation techniques
• estimation
• using the reciprocal relationship between multiplication and division
• long division
• building up and breaking down numbers
• rounding off and compensating
• using a calculator
Number range for multiples and factors
• Multiples of 2-digit and 3-digit numbers
• Factors of 2-digit and 3-digit whole numbers
• Prime factors of numbers up to at least 100</td>
<td>What is different to Grade 5?
Initially learners revise and consolidate work done in Grade 5 .i.e. learners divide at least whole 3-digit by 1-digit numbers. Then they move on to divide 4-digit numbers by 3-digit numbers.
Learners should solve problems in contexts and do context free calculations
The following problem types remain important:
sharing, grouping, rate (see the description of problem types at the end of the Grade 6 notes)
Learners should continue to be given problems with and without remainders.
Learners continue to
• check their solutions themselves, by multiplying or using a calculator
• judge the reasonableness of their solutions, by estimating before calculating.
Using multiplying to divide
Example
3 447 ÷ 17
Learners can write out a “clue board” of what they know about multiplying by 17. While they do not know the multiplication table of 17, learners should know 17 x 10 and how to use this to get multiples of 17 x 10, and 17 x 100 and how to use this to get multiples of 17 x 100.
Learners find 17 x 5 by halving 17 x 10
Learners use doubling to find 17 x 2; 17 x 4; 17 x 8.
Learners fill in other multiples as they need to use them
Learners use this to calculate by approximation. Multiplying and then subtracting.

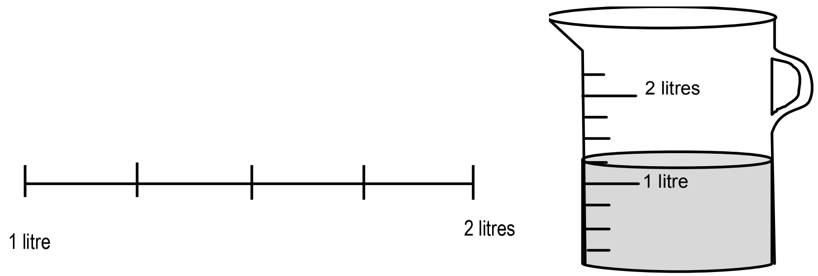
CLUE BOARD
100 x 17 = 1 700
200 x 17 = 3 400
10 x 17 = 170
20 x 17 = 340
5 x 17 = 85
2 x 17 = 34
3 x 17 = 51

<table><tr><td>Multiply</td><td>Subtract</td></tr><tr><td>200 x 17 = 3400</td><td>3447 – 3400 = 47</td></tr><tr><td>2 x 17 = 34</td><td>47 – 34 = 13</td></tr></table>3447 ÷ 17 = 200 + 2 + remainder 13= 202 remainder 13</td>
<td>8 hours</td>
</tr>
</table>

<table>
<tr><th>CONTENT AREA</th><th>TOPICS</th><th>CONCEPTS AND SKILLS</th><th>SOME CLARIFICATION NOTES OR TEACHING GUIDELINES</th><th>DURATION (in hours)</th></tr>
<tr><td>NUMBERS, OPERATIONS AND RELATIONSHIPS</td><td>1.1
Whole numbers
Division</td><td>Properties of whole numbers
• Recognize and use the commutative; associative; distributive properties of whole numbers
• 0 in terms of its additive property
• 1 in terms of its multiplicative property
Solving problems
• Solve problems involving whole numbers and decimal fractions, including
- financial contexts
- measurement contexts
• Solve problems involving whole numbers, including
- comparing two or more quantities of the same kind (ratio)
- comparing two quantities of different kinds (rate)
- grouping and equal sharing with remainders</td><td>Learners should check their calculations by multiplying:
202x17=202x10+202 x 7
=2020+1414
= 3434 +13 (NOTE: 13 is the remainder)
=3447
The size of the numbers required in Grade 6, means that methods used until now can become cumbersome. Now it is advisiableto use the traditional long division method. The skills learnt in previous methods, will now be used in long division.
The long division method:
Example: Calculate: 3 848 ÷ 132
26 remainder 52
132 | 3 848
- 2 640 ------▶ 132 x 20
848
- 792 ------▶ 132 x 6
52
Learners should check their calculations by multiplying with or without a calculator. Learners can also check their manual division by dividing on a calculator.
Working with calculators
The mental Mathematics programme contains work on number concept, number facts and mental calculating techniques. Daily work on mental mathematics combined with daily written calculations will prevent learners from becoming dependent on calculators and not knowing how to calculate without them.
Use of calculators is a useful way for learners to explore number patterns. They are also helpful when working with very large numbers e.g. multiplying and dividing numbers with more than 4 digits.
Learners should be taught how to use calculators including how to clear an incorrectly entered number. Learners should always estimate answers before doing a calculation on a calculator. Learners should estimate whether their answers will be in tens, hundreds, thousands, ten thousands, hundred thousands or millions. For example if multiplying 2 345 x 67, they should be able to estimate that the answer will be in the region of 20 000 x 70 = 140 000</td><td></td></tr>
</table>

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.3** **Decimal fractions**	**Recognizing, ordering and place value of decimal fractions** • Count forwards and backwards in decimal fractions to at least two decimal places • Compare and order decimal fractions to at least two decimal places • Place value of digits to at least two decimal places C**alculations with decimal fractions** • Addition and subtraction of decimal fractions of at least two decimal places • Multiply decimal fractions by 10 and 100 **Solving problems** Solve problems in context involving decimal fractions **Equivalent forms**: Recognize equivalence between common fraction and decimal fraction forms of the same number	Decimal fraction is a new topic for Grade 6 learners. Learners should already have worked with tenths and hundredths in common fraction form. They should start by rewriting and converting tenths and hundredths in common fraction form to decimal fractions. Where denominators of other fractions are factors of 10 e.g. 2, 5 or factors of 100 e.g. 2, 4, 25, 20, 50 learners can convert these to hundredths using what they know about equivalence Dividing whole numbers by 10, 100, 1 000, etc. helps to build learners' understanding of the place value of the digits in decimal fractions. Calculators can be useful tools for learners to learn about patterns when multiplying or dividing decimal fractions by 10, 100, etc. **Counting in decimals** Learners should not spend a lot of time doing verbal counting in decimals. A more useful exercise is using number chains like the one below: These counting or "adding on" exercises often help learners to increase their understanding of place value.  **Possible error**: At this point learners often lose track of the place value and instead of writing 12 hundredths as 0,12 they write it as 0,012 Exercises like the one above can be checked using calculators and learners can explain any differences between their answers and those shown by the calculator. **Equivalence between common fractions and decimal fraction forms** Learners are not expected to be able to convert all common fraction into its decimal fraction form, merely to see the relationship between tenths and hundredths in their decimal forms. **Calculating using decimals** Learners add and subtract decimal fractions. Learner should estimate their answers before calculating. They should be able to judge the reasonableness of answers and also check their own answers. Understanding place value of digits in decimals will help learners when adding and subtracting. Learners can use the column method as they do with whole numbers. All problem types that are used for whole numbers can be used for decimal fractions. During lessons on measurement, learners can practise what they know about decimals.	**10 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
MEASUREMENT	**4.3** **Capacity / volume**	**Practical measuring of 3-D objects by** estimating, measuring, recording, comparing and ordering **Measuring instruments** measuring jugs **Units** millilitre (ml); litres (l) and kilolitres (kl) **Calculations and problem-solving related to capacity/volume include:** • solving problems in context with capacity • converting between kilolitres, litres and millilitres • conversions should include fraction and decimal forms to 2 decimal places	**What is capacity? What is volume?** Capacity is the amountof substance that an object can hold or the amount of space inside the object. Volume is the amount of space an object occupies. So a bottle can have a 1 litre capacity, but it may not be filled to its full capacity It could, for example, only contain a volume of 250ml **What is different to Grade 5?** • Decimals are introduced. • Kilolitres are introduced. In Grade 6 learners continue work with litres and millilitres, but now they also work with kilolitres. Learners work with the same measuring instruments as they did in Grades 4 and 5 but less emphasis is placed on measuring spoons and cups. Learners need to: • consolidate their sense of how much 1 litre is • consolidate their sense of how much 1 millilitre is • understand and know the relationship between litres and millilitres • understand and know the relationship between kilolitres and litres and millilitres Check whether learners have a sense of which units and instruments are appropriate for measuring which sorts of capacities e.g. What units would you use if you wanted to measure • the amount of water you use in a month • the amount of water to use when mixing baby milk formula for one feed • the amount of water in a full bathtub. What instrument would you use if you wanted to measure: • liquid medicine to give to a baby • milk for a pudding recipe • water to dilute a packet of powdered cool drink. **Measuring capacity and reading capacity measuring instruments** Learners find it easy to measure with measuring spoons or measuring cups, because this only requires filling them and pouring the contents out. Measuring with calibrated measuring jugs or other instruments with numbered and un-numbered gradation lines is more difficult. Learners need to be taught the skills which include	**5 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
MEASUREMENT	**4.3** **Capacity / volume**		• knowing where to stand to read the measuring jug correctly • knowing how to read the numbered gradation lines and to calculate what the un-numbered gradation lines mean Learners need to read • different kinds of measuring jugs • measuring jugs in which the numbered intervals, gradation lines, calibration represent different intervals /amounts. • measuring jugs in which there are a different number of un-numbered intervals within each numbered interval. Learners need practice using examples in which the numbered intervals are divided into: • 2 un-numbered intervals • 4 un-numbered intervals • 5 un-numbered intervals • 10 un-numbered intervals **Example:** Here the numbered gradation lines on the jugs show 1 litre amounts. Think about the gradations as a number line.  There are 4 spaces between each litre. This means that each small space shows 1 000ml ÷ 4 = 250ml The liquid is filled to 1space above 1 litre i.e. 1 000ml + 250ml = 1 250ml It is sometimes easier and cheaper to get a range of syringes with calibrated gradation lines, than it is to get a range of measuring jugs. Learners will learn the same measurement reading skills if they work with syringes rather than jugs.	

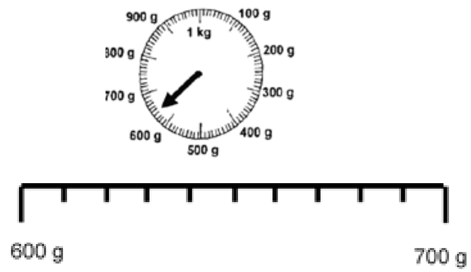
CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
MEASUREMENT	**4.3** **Capacity / volume**		**Compare capacities** with up to 6 digits in millilitres and litres Learners should already in previous grades haves equenced containers marked in millilitres and/litres. Here learners need to be able to translate the decimal numbers on some packaging into fractions e.g. 1,5 litres of cool drink is the same as $1\frac{1}{2}$ litres of cool drink. Examples should be chosen to allow learners to realize that the height of a container is not directly proportional to the capacity and that learners need to take into account the diameter of the container. In Grade 6 this can be done as an exercise from the textbook. **Recording capacities** Measurement provides a context within which learners can practise what they have learned about decimal fractions. In Grade 6 they should record capacities as • kilolitres only e.g. $20l$ • litres only e.g. $5l$ • millilitres only e.g. $250ml$ • fractional parts of kilolitres or litre, written either as common or decimal fractions e.g. $2\frac{3}{4}$ litres or 2,75 litres **Calculations including conversions and problem solving** Measurement provides a context in which to practise skills acquired in Numbers, Operations and Relationships. The skills, operations and number ranges required are given below. **Estimate and calculate** using millilitres and litres • rounding numbers up or down to the most appropriate unit of capacity • rounding off to 5, 10, 100 and 1 000 Measurement especially when focusing on measuring instruments can help learners to understand the meaning behind rounding up or down • adding and subtracting numbers Calculations and problems should include fractional parts of litres or kilolitres expressed either as common fractions or decimal fractions up to 2 decimal places • multiplication of up to 4-digit by 3-digit whole numbers • division of up to 4-digit by 3-digit whole numbers • find percentages of whole numbers • multiple operations with or without brackets	

<table>
<tr><th>CONTENT AREA</th><th>TOPICS</th><th>CONCEPTS AND SKILLS</th><th>SOME CLARIFICATION NOTES OR TEACHING GUIDELINES</th><th>DURATION
(in hours)</th></tr>
<tr><td>MEASUREMENT</td><td>4.3
Capacity / volume</td><td></td><td>Solve problems relating to capacity
• including rate e.g price per liter and ratio problems e.g. increasing ingredients in a recipe by fixed ratios, or calculations where ingredients are mixed in a fixed ratio e.g. 1 part to 4 parts
• problems with decimals should be limited to addition and subtraction
Convert between units:
$ml \leftrightarrow l$
$l \leftrightarrow kl$
$ml \leftrightarrow kl$
Conversions can also include converting whole numbers, fractions and decimal fractions.Decimal fraction calculations should be carefully chosen so as only to include, even in the answers, decimal fractions with one or two decimal places. Problems with decimals should be limited to addition and subtraction</td><td></td></tr>
<tr><td colspan="5">ASSESSMENT:
At this stage learners should have been assessed on:
• division to 4-digit by 3-digit numbers
• 3-D objects</td></tr>
<tr><td colspan="4">REVISION</td><td>5 hours</td></tr>
<tr><td colspan="4">ASSESSMENT</td><td>6hours</td></tr>
</table>

GRADE 6 TERM 3				
CONTENT AREA	**TOPICS**	**CONCEPTS AND SKILLS**	**SOME CLARIFICATION NOTES OR TEACHING GUIDELINES**	**DURATION (in hours)**
NUMBERS, OPERATIONS AND RELATIONSHIPS	**Mental Mathematics**	**Mental calculations involving**: • Addition and subtraction facts of: - units - multiples of 10 - multiples of 100 - multiples of 1000 • Multiplication of whole numbers to at least 12x12 • Multiplication facts of: - units and tens by multiples of 10 - units and tens by multiples of 100 - units and tens by multiples of 1 000 - units and tens by multiples of 10 000 **Number range for counting, ordering and representing, and place value of digits** • Order, compare and represent numbers to least 9-digit numbers • Represent prime numbers to at least 100 • Recognize the place value of digits in whole numbers to at least 9-digit numbers • Round off to the nearest 5, 10, 100 and 1 000 **Calculation techniques** Using a range of techniques to perform and check written and mental calculations with whole numbers including: • estimation • adding, subtracting and multiplying in columns	The mental Mathematics programme should be developed systematically over the year. See Term 1 notes, but notice the increased number range in the column on the left in Term 2	**10 minutes every day**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**Mental Mathematics**	• long division • building up and breaking down numbers • rounding off and compensating • using addition and subtraction as inverse operations • using multiplication and division as inverse operations **Number range for multiples and factors** • Multiples of 2-digit and 3-digit numbers • Factors of 2-digit and 3-digit whole numbers • Prime factors of numbers to at least 100 **Properties of whole numbers** • Recognize and use the commutative; associative; distributive properties of whole numbers • 0 in terms of its additive property • 1 in terms of its multiplicative property		

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
MEASUREMENT	**4.2** **Mass**	**Practical measuring of 3-D objects by** estimating measuring recording comparing and ordering **Measuring instruments** bathroom scales (analogue and digital), kitchen scales (analogue and digital) and balances **Units** grams (g) and kilograms (kg) **Calculations and problem-solving related to mass include** Solve problems in context using mass converting between grams and kilograms conversions should include fraction and decimal forms (to 2 decimal places).	**What is different to Grade 5?** It makes sense to let learners work with digital scales, particularly ones that give readings up to one or two decimal places. Problems, calculations and conversions around mass provide a context for practising calculating with decimal fractions. Supermarkets with electronic scales often print the mass labels including decimal places e.g. 2,25kg potatoes. These contexts can be used to practise the reading, writing and understanding of decimal fractions, and for rounding off, converting, adding and subtracting decimal fractions. In Grade 6 learners work with the same units of mass they worked with in Grades 4 and 5. They also work with the same measuring instruments. Learners need to • consolidate their sense of how much is 1kg • consolidate their sense of how much is 1g • to understand and know the relationship between kilograms and grams. Learners should have a sense of which units are appropriate for measuring which different masses. For example, they need to know which units to use to state the mass of • a cow • a baby • flour for baking a cake • their own mass **Reading scales and balances** Learners need to • estimate mass in grams and kilograms • read kitchen scales (grams and kilograms) bathroom scales (kilograms) and balances scales (grams and kilograms) This includes reading the mass on: • real digital scales • pictures of decimal scales • real analogue scales • pictures of analogue scales	**5 hours**

<table>
<tr><th>CONTENT AREA</th><th>TOPICS</th><th>CONCEPTS AND SKILLS</th><th>SOME CLARIFICATION NOTES OR TEACHING GUIDELINES</th><th>DURATION (in hours)</th></tr>
<tr><td>MEASUREMENT</td><td>4.2
Mass</td><td></td><td>The skills involved in reading analogue scales include
• knowing where to stand to read the scales correctly
• Knowing how to read the numbered gradation lines and to calculate what the un-numbered gradation lines indicate.
Learners need to read
• different kinds of measuring apparatus
• apparatus in which the numbered intervals,gradation lines or calibration represent different intervals
• Apparatus in which there are a different number of un-numbered intervals within each numbered interval. Learners need practice with examples in which the numbered intervals are divided into
- 2 un-numbered intervals
- 4 un-numbered intervals
- 5 un-numbered intervals
- 10 un-numbered intervals
Example:


Here the numbered lines show 100 g intervals: 100g; 200g; 300g; 400g; 500g; 600g; 700g.
It is sometimes useful to convert the circular dial into a number line
There are 10 spaces between each 100g.
Each 100g interval has been divided into 10 smaller spaces.
This means that each un-numbered interval shows 100g ÷ 10 = 10g</td><td></td></tr>
</table>

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
MEASUREMENT	**4.2** **Mass**		**Compare, order, sequence masses** of up to 9 digits in grams and kilograms If learners have not in previous grades sequenced containers marked in grams and kilograms, it is worth doing. Choose examples that allow learners to realize that the size of a container or the volume it contains is not directly proportional to the mass because some substances have a greater density than others. Learners should do exercises from their textbook that ask them to order and compare the mass of objects including grocery items labelled in grams and kilograms. Learners should also compare, order, sequence masses stated in different units. **Calculations (including conversions) and problem-solving** Measurement provides a context in which to practise skills acquired in Numbers, Operations and Relationships. The skills, operations and number rangesusing grams and kilograms required are given below. • Rounding numbers up or down to the most appropriate unit of mass • Rounding off to 5, 10, 100 and 1 000 Measurement especially when focusing on reading analogue measuring instruments can help learners to understand the meaning behind rounding up or down • Addition and subtraction Calculations and problems should include fractional parts of kilograms expressed either as common fractions or decimal fractions- up to 2 decimal places • Multiplication of up to 4-digit by 3-digit whole numbers • Division of up to 4-digit by 3-digit whole numbers • Find percentages of whole numbers • Multiple operations with or without brackets **Solve problems** relating to mass • Including rate e.g price per kilogram and ratio problems • problems with decimals should be limited to addition and subtration **Convert** between units: $g \leftrightarrow kg$ Conversions should be given in the following forms: whole numbers, common fractions, decimal fractions up to 2 decimal places This provides a context for learners to practise multiplying and dividing by 1 000 If conversions require more than 2 decimal places e.g. 3 245 grams converted to kilograms learners can continue to write this as $3kg$ and $245g$ as in previous grades. On the whole though examples should be chosen to avoid this problem.	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Counting, ordering, comparing, representing and place value of digits	**Number range for counting, ordering, comparing and representing, and place value of digits** • Order, compare and represent numbers to at least 9-digit numbers • Represent prime numbers to at least 100 • Recognize the place value of digits in whole numbers to at least 9-digit numbers • Round off to the nearest 5, 10, 100 and 1 000	See Term 1 notes, but notice the increased number range in the column on the left in Term 2	**1 hour**
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Addition and Subtraction	**Number range for counting, ordering, comparing and representing, and place value of digits** • Order, compare and represent numbers at least 9-digit numbers • Represent prime numbers to at least 100 • Recognizing the place value of digits in whole numbers to at least 9-digit numbers • Rounding off to the nearest 5, 10, 100 and 1 000 **Number range for calculations** • Addition and subtraction of whole numbers of at least 6-digit numbers • Multiple operations on whole numbers with or without brackets **Calculation techniques** Using a range of techniques to perform and check written and mental calculations of whole numbers including: • estimation	Learners should get a lot of practice adding and subtracting large numbers. Problem situations can become more complex. Learners can also focus on multiple operations, especially in problem contexts. Learners should continue to judge the reasonableness of the solutions and to check their answers. When learners can add and subtract 6 digit numbers confidently, they may beasked to add or subtract very large numbers until more than 6 digits with or without using calculators. The mental Mathematics programme contains work on **number concept, number facts** and **mental calculating techniques**. Daily work on mental Mathematics combined with daily written calculations will prevent learners from becoming dependent on calculators and not knowing how to calculate without them.	**8 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Addition and Subtraction	• adding, subtracting in columns • building up and breaking down numbers • rounding off and compensating • using addition and subtraction as inverse operations • using a calculator **Properties of whole numbers** • Recognize and use the commutative; associative; distributive properties of whole numbers • 0 in terms of its additive property **Solving problems** • Solve problems involving whole numbers and decimal fractions, including - financial contexts - measurement contexts • Solve problems involving whole numbers, including comparing two or more quantities of the same kind (ratio)		
SPACE AND SHAPE	**3.5** **Viewing objects**	**Position and views** Link the position of viewer to views of single or composite objects, or collections of objects, can include both everyday and geometric objects	**What is different to Grade 5?** In Grade 5 learners work with views of single everyday objects or collections of everyday objects. They match views of the object or objects with the position of the viewer. In Grade 6 this is extended to geometric objects or collections of geometric objects or composite geometric objects. Learners are presented with multiple views of an everyday or geometric object or collections of objects or composite geometric objects, as well as positions of viewers in relation to the object or objects. They match each view with a viewer or viewpoint.	**3 hours**

ASSESSMENT:

At this stage learnes should have beeen assessed on:

- mass
- 9-digit numbers
- addition and subtraction of whole numbers
- views

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
SPACE AND SHAPE	**3.1** **Properties of 2-D shapes**	**Shapes learners need to know and name** • Regular and irregular polygons - triangles, squares, rectangles, parallelograms, other quadrilaterals, pentagons, hexagons, heptagons, octagons • Similarities and differences between rectangles and parallelograms **Characteristics learners use to distinguish, describe, sort and compare shapes:** • number of sides • length of sides • size of angles - acute - right - obtuse - straight - reflex - revolution **Further activities to focus learners on characteristicsof shapes** • Draw 2-D shapes on grid paper • Draw circles, patterns in circles and patterns with circles using a pair of compasses	**What is different to Term 1?** Learners draw circles and patterns with circles using a pair of pair of compasses Learners revise and consolidate what they learned in Term 1 (see notes). They also spend time working with a pair of compasseses and drawing circles and patterns in and with circles.	**4 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
SPACE AND SHAPE	**3.4** **Transforma-tions**	**Describe patterns** Refer to lines, 2-D shapes, 3-D objects and/or lines of symmetry and/or rotations and/or reflections and/or translations when describing patterns • in nature, • from modern everyday life • from our cultural heritage **Enlargement and reductions** Draw enlargement and reductions of 2-D shapes to compare size and shape of: • triangles • quadrilaterals	**What is different to Grade 5?** Learners are no longer required to draw composite shapes or tessellations using reflections, rotations, and translations. They are only required to use the transformation concepts in describing patterns. **Use transformation to describe patterns** Learners describe patterns by discussing the shapes they see in the pattern and how they would transform that shape if they wanted to extend the pattern • The pattern I see on the honeycomb looks like a tessellation pattern of hexagons. I can make this pattern by translating the hexagon. • The pattern I see on the bead bracelet looks like a tessellation pattern of triangles. I can make this pattern by reflecting the triangle. • I can make a pattern like the one I see on the doily by translating the parallelogram. **Use symmetry to describe patterns** Learners identify symmetry in patterns. Although learners are not required to draw the patterns in Grade 6, they often find patterns easier to describe, once they have copied or made the patterns. It is useful to link the process of making or copying patterns with the descriptions of patterns from nature, modern everyday life and our cultural heritage. Often the geometrical process you use to make a copy of the pattern is not the same as the original process used to make the pattern. Bees do not tessellate with hexagons to make a honeycomb, but if learners tessellate with a hexagon, they can make a pattern that looks similar to the pattern they see in the honeycomb. **Enlargements and reductions** This can be dealt with in Term 4	**3 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
MEASUREMENT	**4.5 Temperature**	**Practical measuring of temperature by** estimating measuring recording comparing and ordering **Measuring instruments** thermometers (analogue and digital) **Units** degrees Celsius **Calculations and problem-solving related temperature include** Solving problems in contexts related to temperatures	**What is new in Grade 6?** It makes sense to allow learners to read digital thermometers, since the reading is given in a decimal form. Recording, calculating and solving problems concerning temperature can also be used as a context for practising reading and calculating with decimal fractions. Learners need to consolidate their sense of how hot or cold things are when described in degrees Celsius. This can be achieved through learning about common temperature referents, e.g. • The freezing point of pure water is 0°C • The boiling point of pure water is 100°C • The average normal human body temperature is 37°C • daily environmental temperatures **Reading temperature measurement** Learners should read temperatures off pictures of both digital and analogue thermometers. Where possible learners should read temperatures off real of both digital and analogue thermometers. **Reading temperatures and temperature measuring instruments** Reading analogue thermometers requires learners to be able to read off the temperature at numbered and un-numbered gradation lines. In thermometers designed to read the environmental temperatures the un-numbered gradation lines often refer to whole degrees. In thermometers designed to read human body temperature the un-numbered gradation lines often refer to fractions of degrees. **Recording and reporting on temperature measurements** Learners should record and report on whole number temperature measurements read on thermometers. This may involve rounding up or down. They can also record and report temperatures by using decimal fraction notation e.g. 36,7°C **Calculations and problem-solving related to temperature** Calculations and problem-solving related to temperatures should be limited to positive whole numbers and decimal fractions	**1 hour**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.2** **Percentages**	**Calculations** Find percentages of whole numbers **Equivalent forms**: • Recognize equivalence between common fraction and decimal fraction forms of the same number • Recognize equivalence between common fraction, decimal fraction and percentage forms of the same number	**Percentages is a new topic for Grade 6 learners.** Learners have already worked with tenths and hundredths in common fraction form. They should start by rewriting and converting tenths and hundredths in common fraction form to percentages. Where denominators of other fractions are factors of 10 e.g. 2, 5 or factors of 100 e.g. 2, 4, 5, 20, 25, 50 learners can convert these to hundredths using what they know about equivalence. **Equivalence between common fractions and percentage** Learners are not expected to be able to convert any common fraction into its percentage form, merely to see the relationship between tenths and hundredths in their percentage form. Learners should be able to convert any decimal fraction in tenths or hundredths into a percentage. **Calculations** Learners should be able to find percentages of whole numbers e.g. What is 25% of R300? Here learners use what they know about both converting between percentage and common fraction form and also what they know about finding fractions of whole numbers e.g. 25% of R30 = $\frac{1}{4}$ of R300 = R75.	**5 hours**

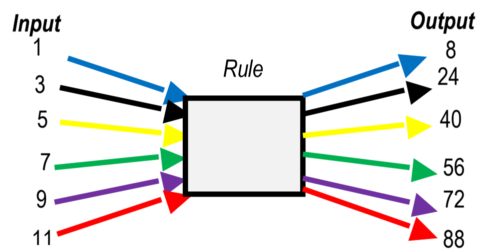
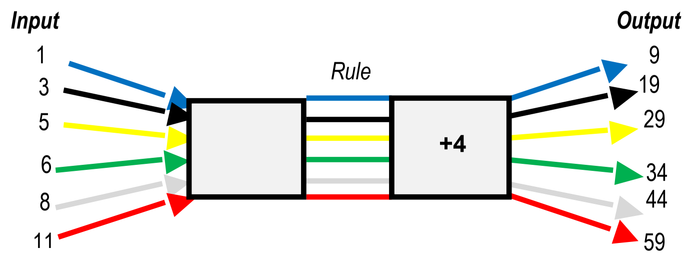
ASSESSMENT:

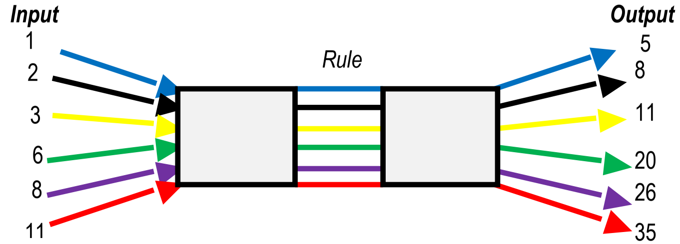
At this stage learners should have been assessed on:

- 2-D shapes
- transformation especially describing patterns
- temperature
- percentages

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
DATA HANDLING	**5.1** **Collecting and organising data**	Collect data using: • tally marks and tables for recording • simple questionnaires with a (yes/ no type response) order data from smallest group to largest group	Teachers in this phase should ensure that different topics are chosen for data collection in each of the grades. **What is different to Grade 5?** The following are new in Grade 6 • graphs can include data expressed in percentages. This is important in pie charts, but percentages can also be used in bar graphs or double bar graphs • collecting data by using simple questionnaires • double bar graphs • the median of a data set **Complete a data cycle including drawing a double bar graph: context personal data** **This is recommended as the Mathematics project in Grade 6** The complete data cycle includes posing a question, collecting, organising, representing, analyzing, interpreting data and reporting on the data. Learners work through the whole data cycle to make an individual double bar graph using contexts that relate to themselves, their class, their school or their family. Suitable topics include: • favourite sports / favourite movies / favourite music / favourite TV programmes / foods or cool drinks/ favourite colours, etc. Include boys versus girls • heights of learners in class. Include boys versus girls • mass of learners in class. Include boys versus girls • shoe size of learners in class. Include boys versus girls **Analysing ungrouped numerical data using measures of central tendency** Learners find the mode and median of ungrouped numerical data sets. Suitable topics include: • heights of learners in class • mass of learners in class • shoe sizes of learners in class • average time taken to get from home to school • number of people staying in homes of learners in the class • temperatures for a month	**9 hours**
	5.2 **Representing data**	Draw a variety of graphs to display and interpret data including: • pictographs (many-to-one correspondence) • bar graphs and double bar graphs		
	5.3 **Analysing, Interpreting and reporting data**	Critically read and interpret data represented in • words • pictographs • par graphs • double bar graphs • pie charts **Analyse data by answering questions related to:** • data categories, including data intervals • data sources and contexts • central tendencies (mode and median) **Summarise data verbally and in short written paragraphs that include** • drawing conclusions about the data • making predictions based on the data **Examine ungrouped numerical data to determine** • the most frequently occurring score in the data set called the mode • the middlemost score in the data set called the median of the data set		

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
DATA HANDLING			**Analysing graphs** Analyse graphs on environmental or socio-economic contexts by answering questions on graphs. Both graphs and questions must be provided by the teacher or a textbook. Learners should work with at least • 2 pie charts involving percentages • 2 double bar graphs Suitable topics include: • populations of the provinces of SA • percentage of foreign tourists from different countries visiting SA • percentage of pregnant women who are HIV positive in each province • percentage of population with access to safe drinking water in countries in Africa • infant mortality rates per country in Southern Africa • common causes of death in children in SA • quantities of materials recycled in the town, province, country • quantities of recycling materials collected by schools around the country • amount of water stored in dams in your province • comparison of the rainfall of a summer rainfall and a winter rainfall town • percentages of girls and boys who smoke in Grades 6 – 10 or age group 12 – 18 • Size of rural and urban population per province in SA • Size of rural and urban population per country in Southern Africa **Developing critical analysis skills** Learners compare graphs on the same topic but where data has been collected from different groups of people, at different times, in different places or in different ways. Here learners will be able to discuss the differences between the graphs. The aim is also for learners to become aware of factors that can impact on the data. Learners should do at least one example. Learners can summarize the findings of their comparison in a paragraph for at least one example. Examples could include: • comparing data about cars that pass the school at different times or comparing data about cars that pass different venues (busy and quiet areas, poorer and richer areas, etc.) • comparing national data from Statistics South Africa (StatsSA) to data collected at your school e.g. sources of heating, sources of lighting, sources of water • comparing data collected over a month or over a year, e.g. average rainfall figures for different towns for a month or for a year	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
PATTERNS, FUNCTIONS AND ALGEBRA	**2.1** **Numeric patterns**	**Investigate and extend patterns** • Investigate and extend numeric patterns looking for relationships or rules of patterns: - sequences involving a constant difference or ratio - of learner's own creation • Describe observed relationships or rules in learner's own words **Input and output values** Determine input values, output values and rules for patterns and relationships using flow diagrams **Equivalent forms** Determine equivalence of different descriptions of the same relationship or rule presented • verbally • in a flow diagram • by a number sentence	In Term 1 learners worked with flow diagrams in order to learn about • multiplication and division as inverse operations • multiplication of units by multiples of ten, multiples of 100 , multiplies of 1 000 • the associative property of whole numbers and how this property can be used when multiplying numbers. **Flow diagrams** are further developed in this term. Learners also work with number sequences. Learners have been working with flow diagrams since Grade 4. Towards the end of Grade 6 the focus can be on "finding the rule". First these can be flow diagrams in which there is a "one stage rule" i.e. add; or subtract or multiply or divide. **Example:** Determine the rule  Then they can work with examples which have a two-stage rule e.g. multiply and then add, where one stage is left out **Example:** Determine the rule 	**5 hours**

<table>
<tr><th>CONTENT AREA</th><th>TOPICS</th><th>CONCEPTS AND SKILLS</th><th>SOME CLARIFICATION NOTES OR TEACHING GUIDELINES</th><th>DURATION (in hours)</th></tr>
<tr>
<td>PATTERNS, FUNCTIONS AND ALGEBRA</td>
<td>2.1
Numeric patterns</td>
<td></td>
<td>
Example where learners have to find a rule involving 2 operations
Determine the rule


Learners can do similar examples using a table format.
Start with a simple example where the rule has one operation.
<table>
<tr><td>Input</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td></tr>
<tr><td>Output</td><td>17</td><td>34</td><td>51</td><td></td><td>70</td><td></td><td></td><td></td><td></td><td>170</td></tr>
</table>
Learners should state the rule e.g. in this case “input value x17”
Then do more complicated examples where the rule invovles two operations
<table>
<tr><td>Input</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td></tr>
<tr><td>Output</td><td>3</td><td>3,5</td><td>4</td><td>4,5</td><td>5</td><td></td><td></td><td></td><td></td><td>7,5</td></tr>
</table>
Learners should not only complete the table, because this can sometimes be done by counting on. They should also try to state the rule e.g. “add 5 to the input value and then diveide by 2.
Sequences of numbers:
In the Intermediate Phase learners extend sequences of numbers. In Grade 6 they study:
• sequences involving a constant difference
• sequences involving a constant ratio
• sequences without a constant difference or ratio
Examples of patterns with a constant difference
• 125; 250; 375; 500;…
• 16; 14; 12 …
</td>
<td></td>
</tr>
</table>

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
PATTERNS, FUNCTIONS AND ALGEBRA	**2.1** **Numeric patterns**		In the example above learners are subtracting 2 to create the pattern. Learners may describe it as a pattern of counting back in twos. Learners should also be given examples which do not start on a multiple of the number they are adding or subtracting. **Examples:** a)1; 4; 7; 10; … b)87; 66; 45; ... c)857; 807; 757; 707; … Patterns involving a constant ratio: In the sequence 400, 200, 100, ... all the numbers are multiples of 2 and learners must divide by 2 to get the next number. Learners should also be given examples in which the numbers in the sequence are not multiples of the number they are multiplying or dividing by, e.g. 8; 24; 72;... **Examples** of patterns without a constant difference or ratio: a)1; 2; 4; 7; 11; 16; b)1; 6; 3; 8; 5; 10; 7 ……..	
MEASUREMENT	**4.1** **Length**	**Practical measuring of 2-D shapes and 3-D objects by** estimating, measuring, recording, comparing and ordering **Measuring instruments** rulers, metre sticks, tape measures, trundle wheels **Units** millimetres (mm), centimetres (cm), metres (m), kilometres (km) **Calculations and problem-solving related to length** Solve problems in contexts related to length Conversions include converting between any of the following units: millimetres (mm), centimetres (cm), metres (m) and kilometres (km) Conversions should include fraction and decimal forms (to 2 decimal places)	In Grade 6 learners work with the same units of length that they worked with in Grades 4 & 5 .They also work with the same measuring instruments. Check whether learners understand which units and instruments are appropriate for measuring which lengths, heights and distances. Learners should understand which units are appropriate for measuring various lengths or distances. They need to know which units to use in order to find: • the length and width of a desk • the distance to the next town • the length of a nail Learners must know which instrument to use to measure: • the length and width of a desk • the length of a classroom • the length of a rugby field **What is different to Grade 6? Decimals are introduced.** This allows learners to express conversions and parts of measures in decimal fraction form to one or two decimal places. Use the contexts of length measurement to practise the reading, writing and understanding of decimal fractions, and for rounding off, converting, adding and subtracting with decimal fractions.	**5 Hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
MEASUREMENT	**4.1** **Length**		**Reading instruments for measuring lengths** Learners should measure lengths using • rulers (mm, cm) • metre sticks (m) • tape measures (m, cm, mm) • trundle wheels (in m) Learners find rulers easy to use for measuring because • centimetres are always numbered • there are always 10mm divisions in a centimetre **Stating and recording length measurements** In Grade 6 learners should be given opportunities to record their measurements using rulers, in decimal fraction from e.g. e.g. the eraser is 2,5cm long. Tape measures that are longer than 1m and 2m should also be used e.g. builder tapes or surveyor tapes can be more than 10 metres. The longer measuring tapes are more difficult to use. Learners can't only read off the number at the end of the distance. They also need to know how many metres they have unrolled the tape. For example, the distance may be 4m and 78cm, but at the end of the object / distance the tape may only show the number 78. With these longer tape measures estimation becomes even more important. Recording this in one unit of measurement can also become more complex: in this example 4,78m or 478cm. But if the measurement is 4m and 7cm, learners need to remember to convert correctly into 4,07m or 407cm **Compare and order lengths** up to 9 digits in mm, cm, m, km In the Intermediate Phase learners need to work with drawings of objects with specified lengths, or written descriptions of objects with specified lengths. In Grade 6 the focus is on comparing lengths given in decimal form **Calculations (including conversions) and problem-solving** Measurement provides a context in which to practise skills acquired in Numbers, Operations and Relationships. The skills, operations and number ranges required are given below.	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
MEASUREMENT	**4.1** **Length**		**Estimate and calculate** using mm, cm, m, km • round numbers up or down to the appropriate unit of length • rounding off to 5, 10, 100, 1 000 (reading measurements from rulers and tape measures can help learners to understand the meaning behind rounding up or down) • addition and subtraction calculations can include calculations with common fractions and decimal fractions to 2 decimal places • multiplication of 4-digit by 3-digit numbers • division of 4-digit by 3-digit numbers • find percentages of whole numbers • multiple operations with or without brackets **Solve problems relating to distance and length** • Include rate and ratio problems. • Problems with decimals should be limited to adding and subtracting the numbers. **Conversions b**etween units • $mm \leftrightarrow cm$ • $cm \leftrightarrow m$ • $m \leftrightarrow km$ • $mm \leftrightarrow m$ • $mm \leftrightarrow km$ • $cm \leftrightarrow km$ using whole numbers, common fractions and decimal fractions. This provides a context for learners to practise multiplying and dividing by 10, 100 and 1 000. If conversions require more than 2 decimal places e.g. 3245m converted to kilometres, learners can continue to write this as 3km and 245m as they have in previous grades. On the whole though examples should be chosen to avoid this problem.	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
ASSESSMENT: At this stage learners should have been assessed on: • data handling • number patterns • length				
			REVISION	**3 hours**

GRADE 6 TERM 4

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**Mental Mathematics**	**Mental calculations involving**: • Addition and subtraction facts of: - units - multiples of 10 - multiples of 100 - multiples of 1000 • Multiplication of whole numbers to at least 12x12 • Multiplication facts of: - units and tens by multiples of 10 - units and tens by multiples of 100 - units and tens by multiples of 1 000 - units and tens by multiples of 10 000 **Number range for counting, ordering and representing, and place value of digits** • Order, compare and represent numbers to at least 9-digit numbers • Represent prime numbers to at least 100 • Recognize the place value of digits in whole numbers to at least 9-digit numbers • Round off to the nearest 5, 10, 100 and 1 000 **Calculation techniques** Using a range of techniques to perform and check written and mental calculations with whole numbers including: • estimation	See the notes in Term 2, but be aware that number ranges have increased. The increased number ranges are shown in the column on the left. The mental Mathematics programme should be developed systematically over the year.	**10 minutes every day**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**Mental Mathematics**	• adding, subtracting and multiplying in columns • long division • building up and breaking down numbers • rounding off and compensating • using addition and subtraction as inverse operations • using multiplication and division as inverse operations **Number range for multiples and factors** • Multiples of 2-digit and 3-digit numbers • Factors of 2-digit and 3-digit whole numbers • Prime factors of numbers to at least 100 **Properties of whole numbers** • Recognize and use the commutative, associative and distributive properties of whole numbers • 0 in terms of its additive property • 1 in terms of its multiplicative property		

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers:** Counting, ordering and representing and place value of digits	**Number range for counting, ordering and representing, and place value of digits** • Order, compare and represent numbers at least 9-digit numbers • Represent prime numbers to at least 100 • Recognize the place value of digits in whole numbers to at least 9-digit numbers • Round off to the nearest 5, 10, 100 and 1 000 • Round off to the nearest 10, 100 and1 000.	See Term 1 notes, but notice the increased number range in the column on the left in Term 2	**1 hour**
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Multiplication	**Number range for counting, ordering and representing, and place value of digits** • Order, compare and represent numbers at least 9-digit numbers • Represent prime numbers to at least 100 • Recognize the place value of digits in whole numbers to at least 9-digit numbers • Round off to the nearest 5, 10, 100 and1 000 **Number range for calculations** • Multiplication of at least whole 4-digit by 3-digit numbers • Multiple operations on whole numbers with or without brackets **Calculation techniques** • estimation • multiplying in columns	This is further practice of multiplication of 4-digit by 3-digit numbers done in Term 2. Refer to those notes.	**5 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Multiplication	• building up and breaking down numbers • rounding off and compensating • using a calculator **Number range for multiples and factors** • Multiples of 2-digit and 3-digit numbers • Factors of 2-digit and 3-digit whole numbers • Prime factors of numbers to at least 100 **Properties of whole numbers** • Recognize and use the commutative, associative and distributive properties of whole numbers • 0 in terms of its additive property • 1 in terms of its multiplicative property **Solving problems** • Solve problems involving whole numbers and decimal fractions, including: - financial contexts - measurement contexts • Solve problems involving whole numbers, including the following types of problems: - comparing two or more quantities of the same kind (ratio) - comparing two quantities of different kinds (rate)		

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.2** **Common fractions**	**Describing and ordering fractions** • Compare and order common fractions, including specifically tenths and hundredths **Calculations using fractions** • Addition and subtraction of common fractions with denominators which are multiples of each other. • Addition and subtraction of mixed numbers • Fractions of whole numbers **Solving problems** • Solve problems in contexts involving common fractions, including grouping and sharing **Percentages** • Calculate percentages of whole numbers **Equivalent forms:** • Recognize and use equivalent forms of common fractions with 1-digit or 2-digit denominators with denominators which are multiples of each other • Recognize equivalence between common fraction and decimal fraction forms of the same number • Recognize equivalence between common fraction, decimal fraction and percentage forms of the same number	This is revision and consolidation of the concepts developed in Term 2. See Term 1 notes. However, since decimals and percentages have both been done, it is useful to practise equivalence between the common fraction, decimal fractions and percentage forms of the same number in Term 4.	**5 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
ASSESSMENT: At this stage learners should have been assessed on: • 9-digit numbers • multiplication with up to 4-digits by 3-digits • fractions				
	3.2 **3-D objects**	**Objects learners need to know and name** • Rectangular prisms • Cubes • Tetrahedrons • Pyramids • Similarities and differences between tetrahedrons and other pyramids **Charateristics which learners use to distinguish, describe, sort and compare objects** Describe, sort and compare 2-D shapes and 3-D objects in terms of: • number and shape of faces • number of vertices • number of edges **Further activities to focus learners on characteristics of objects** Create 3-D models using • drinking straws, toothpicks, etc. to make a skeleton • nets	**What is different to Term 2?** • Learners build skeleton objects using drinking straws • Learners count the number of vertices of objects. In Term 4 learners should consolidate what they learnt about 3-D objects earlier in the year. This includes working with all of the objects described in the column on the left. Learners focused on the kind of surface and the shape and number of faces. They built objects using nets in Term 2. In Term 4 learners can build skeleton shapes with straws or toothpicks. They will then focus on the edges and vertices of the objects. This means that by the end of the year they will be able to describe 3-D geometric objects according to the number and shape of faces and the number of edges and vertices of 3-D Objects. Learners need to work with real objects. However, they also need to do written exercises on 3-D objects. Interpreting pictures about 3-D objects is more difficult than working with the real objects. Learners should practise interpreting drawings of 3-D objects. They should identify and name 3-D objects in drawings; identify everyday objects that look like geometric objects (e.g. a milk carton looks like a rectangular prism), match nets of objects to drawing of objects, describe 3-D objects by stating the number of flat and/or curved surfaces, the number of vertices, edges, and number and shape of faces when shown drawings of 3-D objects.	**5 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
MEASUREMENT	**4.6** **Perimeter, area and volume**	**Perimeter** Measure perimeter using rulers or measuring tapes **Measurement of area** • Continue to find areas of regular and irregular shapes by counting squares on grids • Develop an understanding of why the area of rectangles can be described as their length multiplied by their width	Learners are not required to know or apply formulae for the perimeter, area or volume of any shape or object in the Intermediate Phase. Area and volume are only measured informally in the Intermediate Phase. **Perimeter** In Grade 6 learners measure the perimeters of shapes and spaces with rulers and measuring tapes. They are required to state and record this measurement in standard units: mm, cm, m. They are also required to work from drawings in which side lengths are specified in mm / cm / m / km. Here they add up the distances. At times in Grade 6 they will also count the lengths of the perimeters by counting the number of sides of square grids on which shapes are drawn or placed. Here learners need to know that the diagonal distances between corners of a grid square are longer than the vertical or horizontal distances between corners of a grid square. No formulae for perimeters of shapes are required **Area** In Grade 6 area measurements continue to be informal. Learners should examine the areas of • regular shapes where the sides are all the same length with straight sides • irregular shapes where the sides are not all the same length with straight sides • shapes with curved sides. Learners continue to count how many grid squares are covered by the shape. The area is stated in number of grid squares. Learners have been stating the areas of shapes in terms of squares counted since Grade 4. In Grade 6 they should investigate why the area of a rectangle can be stated as its length multiplied by its width. They are not required to know this formula off by heart, nor are they required to apply this formula in area calculations. The relationship between the area and perimeter of rectangles and squares. This investigation can be done as an Assessment Task. There are two different investigations that learners can do. • If learners are given the perimeter of a rectangle, they can draw a number of rectangles of differing areas. Does this also work with squares? Similarly if they are given the area of a square, there will only be one possibility for the length of the sides. Is this the same for rectangles? • Investigating the relationship between the areas and perimeters of squares and rectangles can be combined with the shape and space requirement. Draw enlargements and reductions of 2-D shapes using grid paper to compare their size and shape.	**7 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
MEASUREMENT	**4.6** **Perimeter, area and volume**	**Measurement of volume** • Continue to find volume/capacity of objects (by packing or filling them. • Develop an understanding of why the volume of rectangular prisms can be described as their length multiplied by their width multiplied by their height **Investigate the:** • relationship between perimeter and area of rectangles and squares • relationship between surface area and volume of rectangular prisms	Here learners can draw a square or rectangle with specified side lengths. Then they can investigate what happens to the area of the shape, if the length of one pair of opposite sides of the shape are doubled or halved. **Volume** In Grade 6 learners continue to • count how many cubes or rectangular prisms they use to fill a container. The volume of the container is stated in number of cubes or rectangular prisms such as boxes or blocks. • make stacks with cubes or rectangular prisms. The volume of the stack is stated in number of cubes or rectangular prisms such as boxes or blocks. • interpret pictures of: - stacks made of cubes / rectangular prisms so that they are able to state the volume in terms of the number of cubes / rectangular prisms - containers filled with cubes / rectangular prisms so that they are able to state the volume in terms of the number of cubes / rectangular prisms.	
MEASUREMENT	**4.7** **History of measurement**	Know how people measured and recorded measurement in the past.	Here learners should read and discuss a short history of measurement provided in the textbook.	**1 hour**

ASSESSMENT:

At this stage learners should have been assessed on:

- 3-D objects
- area and rerimeter
- volume

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Division	**Number range for counting, ordering, comparing and representing, and place value of digits** • Order, compare and represent numbers up to at least 9-digit numbers • Represent prime numbers to at least 100 • Recognize the place value of digits in whole numbers to at least 9-digit numbers • Round off to the nearest 5, 10, 100 and 1 000 **Number range for calculations** • Division of at least whole 4-digit by 3-digit numbers • Multiple operations on whole numbers with or without brackets **Calculation techniques include** • estimation • using the reciprocal relationship between multiplication and division • long division • building up and breaking down numbers • rounding off and compensating • using a calculator **Number range for multiples and factors** • Multiples of 2-digit and 3-digit numbers • Factors of 2-digit and 3-digit whole numbers	This is further practice of division of 4-digit numbers by 3-digit numbers done in Term 2. Refer to those notes	**7 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.1** **Whole numbers** Division	• Prime factors of numbers to at least 100 **Properties of whole numbers** • Recognize and use the commutative, associative distributive properties with whole numbers • 0 in terms of its additive property • 1 in terms of its multiplicative property **Solving problems** • Solve problems involving whole numbers and decimal fractions, including - financial contexts - measurement contexts • Solve problems involving whole numbers, including - comparing two or more quantities of the same kind (ratio) - comparing two quantities of different kinds (rate) - grouping and equal sharing with remainders		

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
PATTERNS, FUNCTIONS AND ALGEBRA	**Number sentences** (introduction to algebraic expressions)	**Number sentences** • Write number sentences to describe problem situations • Solve and complete number sentences by: - inspection - trial and improvement • Check answers by substitution	This is a continuation of the work done on number sentences in Term 1. In this term learners are given practice in writing number sentences to describe problem situations. Learners have the opportunity to practise a mixture of all problem types see the notes on problem types at the end of the grade that they have encountered so far during the year. See the notes. As before, number sentences are used to develop the concept of equivalence, but they can also relate to all aspects of number work covered during the year. If learners have not had experience of answering multiple choice questions, then provide examples in the second half of the year to prepare them for this format which is commonly used in systemic external tests. A number sentence can also consolidate the idea of expressing a rule For which pair of numbers does the rule “multiply the first number by 7 and then subtract 5 to get the second number apply“? (a) 11✧2 (b) 5 ✧30 (c) 30✧ 5 (d) 3 ✧10 In Term 1 we used number sentences to focus learners’ attention on the properties of operations. Learners should now focus more on the concept of equivalence. **Examples** focusing on the properties of arithmetic Which of the following will always have the same value as 17 x ☐? a) ☐ + 17 b) ☐ – 17 c) ☐ x 17 d) 9 + ☐ Which statement below is equivalent to: (26 x 39) + (26 x 1)? a) 26 x 27 b) 400 c) 26 x 4 d) 26 x 40	**3 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
PATTERNS, FUNCTIONS AND ALGEBRA	**Number sentences** (introduction to algebraic expressions)		By how much is 34 x 17 less than 35 x 17? a) 1 b) 17 c) 35 d) 65 Which of the statements below are equivalent to: 15 x (4 x 9)= ? a) (15 x 4) x 9 b) 15 x 2 x 2 x 3 x 3 c) (15 x 4) + (15 x 9) d) (10 – 1)(15 x 4) Choose the correct answer to (48 x 48) + (48 x 2) a) 2 400 b) 4 000 c) 4 800 d) 9 600 Learners can be challenged to use what they know about equivalence and applying it to a number sentence in which the parts are not equal. Which of the following values will make the number sentence true: 4 x ☐ < 17? a) 5 b) 4 c) 3 d) 2 e) 1	

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
SPACE AND SHAPE	**3.4** **Transforma-tions**	**Describe patterns** Refer to lines, 2-D shapes, 3-D objects and/or lines of symmetry and/or rotations and/or reflections and/or translations when describing patterns • in nature • from modern everyday life • from our cultural heritage **Enlargement and reductions** Draw enlargement and reductions of 2-D shapes to compare size and shape of • triangles • quadrilaterals	**What is different to Term 3?** Learners should focus on drawing enlargements and reductions in this term. This links with work that they have done on area. Learners can revise using language of transformation to describe patterns see notes Term 3 notes. **Enlargements and reductions** Learners draw a larger or smaller copy of a triangle by increasing or decreasing the lengths of all sides by the same ratio, e.g. doubling. This is a practical geometrical ratio problem. Learners discuss what has changed and what has stayed the same regarding shape and size. Learners draw larger or smaller copies of quadrilaterals by increasing or decreasing the lengths of one or both pairs of opposite sides of quadrilaterals. See area investigation under Measurement.	**3 hours**
SPACE AND SHAPE	**3.6** **Location and directions**	**Location and directions** Locate position of objects / drawings/ symbols on grid with alpha-numeric grid references Locate positions of objects on a map by using alpha-numeric grid references Give directions to move between positions or places on a map	Cells in a grid are often labelled with a letter and a number e.g. D4; A3; E7. This is called alpha-numeric referencing. **What is different to Grade 5?** In Grade 5 learners locate objects on grids and maps using alpha-numeric codes. They follow directions to trace a path between positions on a map with a grid. In Grade 6 they give directions to move between positions on a grid or map. In Geography in Grades 4 & 5 learners give directions using left and right, landmarks, street names, and compass directions. The work is developed in Geography and practised in Mathematics. In Geography and Mathematics in Grade 4 & 5 learners work with alpha-numeric grids and maps with alpha-numeric codes. Locating positions in an alpha-numeric grid and giving directions for moving between positions on the grid are skills learners should already have mastered. These skills are merely practised and consolidated in Mathematics	**2 hours**

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
DATA HANDLING	**5.1** **Probability**	Perform simple repeated events and list possible outcomes for events such as: • tossing a coin • rolling a die • spinning a spinner Count and compare the frequency of actual outcomes for a series of trials: • Up to 50 trials	**Performing simple repeated events** Learners need to perform experiments by tossing a coin, rolling a die or spinning a spinner. Doing experiments with a coin is easier than with a die because the coin can only have two outcomes (heads or tails), while rolling the die can have 6 outcomes (numbers 1 - 6). The spinner can have any number of outcomes, depending on the number of divisions made on the spinner. Learners must first list the possible outcomes before doing the experiments. They should learn how to record the results of their experiments in a table using tally marks. Learners then count how many times heads or tails, or each number, or colour on a spinner, occurs in 20 trials. If learners do this in groups, the results from all the groups can be collated. They can then compare the number of outcomes that occur as the number of trials increase.	**2 hours**
ASSESSMENT: At this stage learners should have been assessed on: • division with up to 4-digit numbers by 3-digit numbers • number Sentences • transformations • probability				
REVSION				**6 hours**
ASSESSMENT (end of the year)				**6 hours**

Problem type	Additional notes	Examples
Summation	A sum	A man buys a specific brand of DVD players for all his stores. He buys 126 789 black, 341 567 white and 344 532 silver DVD players. How many DVD players did he buy altogether?
	Missing part of a given sum	Farm workers picked 342 345 pears during the morning. After lunch they picked some more. By the end of the day, they had 866 589 pears. How many pears did they pick after lunch?
Increase and decrease	Calculate the result	The price of anumber of containers of sugar is R268 231. Water leaked into some of the containers and the price was decreased by R43 789. Calculae the decreased price of the sugar?
	Calculate the change	A clothing factory generated R864 328 during November. During December, the amount decreased to R367 435. How much less money did the factory generate during December than in November?
	Calculate the initial result	A farmer struggled to sell his farm. He decreased the original price of his farm by R10 456. He sold the farm for R985 787. What was the original price that the farmer wanted for his farm?
Grouping	• Grouping problems that are solved with division and/or repeated subtraction • Answers to problems have or do not have remainders	A rich man gave 5375 toys packed in boxes to a school. Each box contained 126 toys. How many boxes of toys did the school get?
	• Grouping problems that are solved with multiplication and/or repeated addition • Answers to problems have or do not have remainders	This year a company gave 523 boxes of rugby balls to schools. Each box contained 3 126 rugby balls. How many rugby balls did the company give away?
	• Grouping problems in an array form • These problems can be solved using division (or repeated subtraction) or multiplication (repeated addition)	A farmer wants to plant 6 708 apple trees. He wants to plant the same number of trees in each of 156 rows. How many apple trees must he plant in each row?
Sharing	• Sharing problems can be solved using division/repeated subtraction • Smaller groups of equal size are formed from a given quantity or number • Answers to calculations that have remainders can lead to the concept of common fractions decimal fractions - see Grade 4 example	A man owns 346 shops. He bought 8 654 radios on sale and shares them equally between these shops. How many radios does each shop get?
Comparison by difference		Thombi spent R175 322 on building materials for his house. Ziggi spent R25 789 more than Thombi on building materials. How much money did Ziggi spend?
Treating groups as units		Houses in a town need new toilets. 123 toilets will cost the municipality R4 132. How much will 17 835 of these new toilets cost?

Problem type	Additional notes	Examples
Rate	• Calculate the total if given rate per object • Calculate the rate per object • First calculate the rate and then apply it to generate more information	A second hand MP3 player costs R145. How much will 3 445 of the same MP3 players cost? 156 pairs of shoes cost R7 020. How much will one pair of the same shoes cost? If 12 chairs cost R2 808, how much will 2 567 of the same chairs cost?
Comparison by ratio		Zwi collected 132 bottles for recycling. Her friend collected $\frac{5}{6}$ of this number of bottles. How many bottles did the friend collect?
Proportional sharing		Denozo works for 8 days and Chino works for 7 days at a building site. Together they are paid R6 780. How should the money be shared fairly between the two to show the number of days each worked?

Meaning of the fraction	Grade 6
Part of a whole where the whole is a single object	Susan eats one half of a chocolate bar. The remainder is equally divided between two friends. How much does each one get? Show your answer in a drawing.
Part of a whole where the whole is a collection of objects	During the holidays, Avril spends $\frac{1}{3}$ of his day watching TV and $\frac{1}{4}$ of his day sleeping. How many hours of his day are left?
Relationship	The son earns $\frac{20}{100}$ of what his father earns per month. If his father earns R18 000 per month, how much does the son earn?
Ratio	$\frac{2}{5}$ cup of milk is needed to make 40 biscuits. How many cups are needed for 2 000 biscuits? Or is 10litre of milk enough to bake 2 000 of these biscuits?
Comparison comparator	What is the longest? $\frac{6}{100}$ of a metre or $\frac{7}{10}$ of a metre of material?
Unit of measurement	Nomfundo needs $2\frac{2}{10}$ metres of rope to make a basked. How many baskets can she make with $28\frac{1}{5}$ metres of rope?
Number	Indicate the position of the numbers 0,1; $\frac{8}{10}$; $\frac{2}{5}$; $1\frac{40}{100}$ on a number line
Fractional parts put together to make a whole (iterative)	On a sports day, 500 children get: $\frac{20}{100}$ of a bottle of cool drink and $\frac{4}{10}$ of a bar of chocolate. How many bottles and chocolate bars are needed to serve all the children?
Operator	Calculate: $\frac{2}{3}$ x336

SECTION 4: ASSESSMENT

4.1 INTRODUCTION

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

4.2 TYPES OF ASSESSMENT

The following types of assessment are very useful in Mathematics and teachers are encouraged to use them to serve the purpose associated with each.

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

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

Formative assessment: Formative assessment is used to aid the teaching and learning processes, hence assessment ***for*** learning. It is the most commonly used type of assessment because it can be used in different forms at any time during a mathematics lesson, e.g. short class works during or at the end of each lesson, verbal questioning during the lesson. It is mainly informal and should not be used for promotion purposes. The fundamental distinguishing characteristic of formative assessment is constant feedback to learners, particularly with regard to learners' learning processes. The information provided by formative assessment can also be used by teachers to inform their methods of teaching.

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

4.3 INFORMAL OR DAILY ASSESSMENT

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

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

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

4.4 FORMAL ASSESSMENT

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

Table 4.1 Minimum requirements for formal assessment: Intermediate Phase Mathematics

	Forms of assessment	**Minimum requirements per term**				**Number of tasks per year**	**Weighting**
		Term 1	Term 2	Term 3	Term 4		
SBA	Tests	1	1	1		**3**	**75%**
	Examination		1			1	
	Assignment	1			1	2	
	Investigation				1	1	
	Project			1		1	
	Total	**2**	**2**	**2**	**2**	**8***	
End of the year Examination						**1**	**25%**

*To be completed before the End of the year Examination

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

Assignment, as is the case with tests and examinations, is mainly an individualised task. It can be a collection of past questions, but should focus on the more demanding work as any resource material can be used, which is not the case in a task that is done in class under supervision.

Projects are used to assess a range of skills and competencies. Through projects, learners are able to demonstrate their understanding of different Mathematics concepts and apply them in real-life situations. Caution should however; be exercised not to give projects that are above learners' cognitive levels. The assessment criteria should be clearly indicated on the project specification and should focus on the Mathematics involved and not on duplicated pictures and facts copied from reference material. Good projects contain the collection and display of real data, followed by deductions that can be substantiated.

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

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

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

Table 4.2 Cognitive levels

Cognitive levels	Description of skills to be demonstrated	Examples
Knowledge **(≈25%)**	• Estimation and appropriate rounding off of numbers • Straight recall • Identification and direct use of correct formula • Use of mathematical facts • Appropriate use of mathematical vocabulary	1. Write down the next three numbers in the sequence: 103; 105; 107…**[Grade 4]** 2. Determine the factors of 64 **[Grade 5]** 3. Write down the prime numbers that are factors of 36 **[Grade 6]**
Routine procedures **(≈45%)**	• Perform well-known procedures • Simple applications and calculations, which might involve many steps • Derivation from given information may be involved • Identification and use (after changing the subject) of correct formula generally similar to those encountered in class	1. Determine the value for if $x + 4 = 10$. **[Grade 4]** 2. Use three different techniques of calculating 488 16 **[Grade 5]** 3. Calculate: $1\frac{1}{5} + \frac{3}{10} - \frac{1}{2}$. **[Grade 6]**
Complex procedures **(≈20%)**	• Problems involving complex calculations and/or higher order reasoning • Investigations to describe rules and relationships - there is often not an obvious route to the solution • Problems not based on a real world context - could involve making significant connections between different representations • Conceptual understanding	1. Peggy is 4 years old and Jock is 8 years old. Determine the ratio between their ages. Write the ratio in simplest fractional form. **[Grade 4]** 2. Investigate the properties of rectangles and squares to identify similarities and differences. **[Grade 5]** 3. There were 20 sweets in the packet. William and his friend ate $\frac{2}{5}$ of the sweets. How many sweets are left? **[Grade 6]**
Problem- solving **(≈10%)**	• Unseen, non-routine problems (which are not necessarily difficult) • Higher order understanding and processes are often involved • Might require the ability to break the problem down into its constituent parts	1. The sum of three consecutive whole numbers is 27. Find the numbers. **[Grade 4]** 2. Heidi divided a certain number by 16.He found an answer of 246 with a remainder of 4. What is the number? **[Grade 5]** 3. Busi has a bag containing six coloured balls: 1 blue, 2 red ball and 3 yellow balls. She puts her hand in the bag and draws a ball. What is the chance that she will draw a red ball? Write the answer in simplest fractional form. **[Grade 6]**

4.5 RECORDING AND REPORTING

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

Reporting is a process of communicating learner performance to learners, parents, schools, and other stakeholders. Primary schooling is a critical period for the acquisition of foundational Mathematics skills and conceptual knowledge.

Reporting of learner performance is therefore essential and should not be limited to the quarterly report card. Other methods of reporting should be explored, e.g. parents' meetings, school visitation days, parent-teacher conferences, phone calls, letters. These extreme, but worthwhile modalities will ensure that any underperformance is communicated promptly and appropriate measures of intervention are implemented collaboratively by teachers and parents. Formal reporting is done on a 7-point rating scale.

Table 4.3: Scale of achievement for the National Curriculum Statement Grades 4 - 6

RATING CODE	DESCRIPTION OF COMPETENCE	PERCENTAGE
7	Outstanding achievement	80 – 100
6	Meritorious achievement	70 – 79
5	Substantial achievement	60 – 69
4	Adequate achievement	50 – 59
3	Moderate achievement	40 – 49
2	Elementary achievement	30 – 39
1	Not achieved	0 – 29

4.6 MODERATION OF ASSESSMENT

Moderation refers to the process that ensures that the assessment tasks are fair, valid and reliable. Moderation should be carried out internally at school and/or externally at district, provincial and national levels. Given that the promotion of learners in the Intermediate Phase is largely dependent upon the SBA (which contributes 75%) the moderation process should be intensified to ensure that:

- learners are not disadvantaged by invalid and unreliable assessment tasks,
- quality assessment is given and high but achievable standards are maintained.

4.7 GENERAL

This document should be read in conjunction with:

4.7.1 *National policy pertaining to the programme and promotion requirements of the National Curriculum Statement Grades R-12*; and

4.7.2 *National Protocol for Assessment Grades R-12.*