basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

Curriculum and Assessment Policy Statement: Technical Occupational

Year 1 – 4

MATHEMATICS

CONTENT

SECTION 1:

INTRODUCTION TO THE CURRICULUM AND ASSESSMENT POLICY STATEMENT: TECHNICAL OCCUPATIONAL

1.1 Background

The South African Constitution, Act 108 of 1996, enshrines the right of every child to access quality basic education without there being any form of discrimination. There are learners participating in the General Education and Training Band who have an interest and talent in applied knowledge and in technical and vocational skills subjects which are currently not available in the National Curriculum Statement, Grades R to 12 (2011). This cohort of learners should be given an opportunity to achieve a formal qualification or recognition of achievement towards a qualification that is related to any vocational and occupational learning within their area of interest and aptitude.

This Subject Statement has been developed to respond more effectively to the needs of these learners who have been identified and assessed through the protocols approved by the Department of Basic Education and who will benefit from curriculum content that is aligned to the Senior Phase of the National Curriculum Statement at a more applied and functional level in accordance with their interest and aptitude.

It is critical, that through differentiated methodologies, the learners enrolled for this qualification will be able to progress with regard to applied competencies, even where they might not be able to attain the minimum theoretical requirements of the respective grades of the senior phase. There should always be high expectations for all learners and the necessary scaffolding and learning support to master foundational competencies (language and numeracy) relevant to the specific subject, so that they are in a position to demonstrate the practical competencies that they have mastered which will make it possible for them to progress to further education and training pathways.

The learning programme will be structured in such a way that it would adequately prepare learners to progress onto the academic, technical vocational or technical occupational pathways of the Further Education and Training Band, albeit with endorsement. It will also enable learners across the range of competencies and aptitudes to obtain a recognised and accredited qualification or certificate of attainment.

The programme aims at contributing to the ideal of education to produce learners who will function **meaningfully** and **effectively** in the society, be able to enter future **careers** and be equipped to meet the requirements of the **economy** (local and global).

1.2 Overview

Through the policy document the Minister of Basic Education will be able to prescribe the minimum norms and standards for technical occupational education in the General Education and Training band.

The following legal framework will be adhered to:

(i) National Curriculum Statement, Grades R to 12 (2011) together with the National Protocol for Assessment and the National Policy pertaining to the Programme and Promotion Requirements of the National Curriculum Statement, Grades R to 12;

(ii) Draft Technical Vocational Subject Statements listed in the Draft General Certificate of Education: Technical Occupational, a Qualification at Level 1 on the National Qualification Framework;

(iii) General and Further Education and Training Quality Assurance Act, 2001 (Act No.58 of 2001); the General and Further Education and Training Amendment Act, 2008 (Act No 50 of 2008); the NQF Act, 2008 (Act no 67 of 2008) and the Continuing Education and Training Act, 2006 as amended by Act No 3 of 2012 and Act No 1 of 2013;

(iv) The General and Further Education and Training Qualifications Sub- Framework (August 2013);

(v) Standards and quality assurance for General and Further Education and Training (June 2008, Revised April 2013);

(vi) Policy and regulations pertaining to the conduct, administration and management of assessment for the General Education and Training Certificate in Skills and Vocational Training: A qualification at Level 1 on the National Qualification Framework (NQF);

(vii) Education White Paper 6 on Special Needs Education: Building an Inclusive Education and Training System (2001);

(viii) The United Nations Convention on the Rights of Persons with Disabilities adopted by the United Nations General Assembly on 13 December 2006 and ratified by the South African parliament on 5 June 2007;

(ix) The White Paper on the Rights of Persons with Disabilities, 2015;

(x) Section 11 of the Children's Act (2007);

(xi) Chapter 5, section 76 of the Children's Act as amended (2007);

(xii) Umalusi's Quality Assurance of Assessment: Directives, Guidelines and Requirements;

(xiii) Skills Development Act, 1998 (Act 97 of 1998); and

(xiv) Assessment Policy for Qualifications and Part Qualifications on the Occupational Qualifications Sub-Framework (OQSF), 2014 of the QCTO.

1.3. General Aims of the Technical Occupational Curriculum

(a) The National Curriculum Statement, Grades R to 9 gives expression to the knowledge, skills and values worth learning in South African schools. The Technical Occupational Curriculum aims to ensure that learners, irrespective of their abilities, have the opportunity to develop competences for meeting challenges and taking up opportunities in the fast changing 21st century and are also guided to 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, including the demands of the fourth industrial revolution. Sustaining development-relevance in the face of constant and rapid change requires curricula to be lifelong learning systems in their own right, capable of constant self-renewal and innovation.

(b) The curriculum 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;
- Promoting critical thinking, creativity and innovation, communication, collaboration, information, media and ICT literacies, flexibility and adaptability, initiative and self-direction, social and cross-cultural, productivity and accountability, leadership and responsibility and life-long learning;
- Facilitating the transition of learners from education institutions to the workplace;

- Providing employers with a sufficient profile of a learner's competences.
- Being sensitive to issues of diversity such as poverty, inequality, race, gender, language, age, 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.

(c) The curriculum 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; and
- Human rights, inclusivity, environmental, gender and social justice and equality: infusing the principles and practices of social justice and human rights as defined in the Constitution of the Republic of South Africa as well as the greening of the economy.

(d) 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, School-based 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 Responding to Learner Diversity in the Classroom (2011), as well as the Standard Operating Procedures for Accommodations in Assessment (2016).

1.3.1. The aims of the General Certificate of Education: Technical Occupational

The specific aims of the qualification are to:

- Give recognition to learners who would meet the requirements and achieve the competencies as specified in the Exit Level Outcomes and associated Assessment Criteria as set out in the GFETQSF along differentiated pathways;
- Provide a foundation of quality, standardised general education which will suit the needs of these learners and help prepare them for life after school and enable them to access particular employment or occupational workplace-based learning. It may also enable the learners to access a vocational qualification at a Technical and Vocational Education Training College;
- Promote Lifelong learning to enable learners to continue with further learning and skills development in the workplace;
- Prepare learners to function better in a fully inclusive society and workplace; and
- Provide employers with a profile of the learner's competence.

Learners successfully completing the qualification will be able to:

- Identify, select, understand and apply knowledge to the intended purpose and identify solutions to problems in the field of study;
- Demonstrate the necessary applied knowledge and skills identified for competence in a subject, as specified in the subject statement;
- Demonstrate knowledge and skills gained for purpose of formal communication and basic numerical operations;
- Have the ability to apply knowledge and skills in changing contexts;
- Reflect on their learning in order to promote an interest in learning and further study; and
- Demonstrate basic entrepreneurial skills that will enable them to create their own work and business opportunities in the contexts in which they live.

1.4. Subjects and Time Allocation

Instructional Time for the Technical Occupational Learning Programmes is 27½ hours in a five-day cycle

<table>
<tr><th colspan="2">Subjects

General Education</th><th colspan="2">Time</th></tr>
<tr><td colspan="2" rowspan="2">Languages
(Home Language and First Additional Language)

All 11 official languages (Afrikaans, English, isiNdebele, isiXhosa, isiZulu, Siswati, Sesotho, Setswana, Sepedi, Tshivenda, Xitsonga)</td><td colspan="2">3 Hours for Home Language</td></tr>
<tr><td colspan="2">2 hours for First Additional Language</td></tr>
<tr><td colspan="2">Mathematics</td><td colspan="2">3 hours</td></tr>
<tr><td rowspan="4">Life Skills</td><td>Personal and Social Well-being
(including aspects of Life Orientation, Social Sciences and Economic and Management Sciences)</td><td>2½ hours</td><td rowspan="4">6 hours</td></tr>
<tr><td>Physical Education</td><td>1 hour</td></tr>
<tr><td>Creative Arts</td><td>1 hour</td></tr>
<tr><td>Natural Sciences</td><td>1½ hours from year 2 onwards
This time to be used in year 1 to support Languages and Mathematics</td></tr>
<tr><td colspan="4">Information Communication Technology
ICT is a compulsory subject for all learners. It can be offered either as a stand-alone or integrated across various subjects. If offered as a stand-alone a school may use time allocated to the Technical Occupational programme. ICT does not count towards the qualification but is a necessary life-long skill. ICT is not to be confused with the Technical Occupational Subject “Office Administration” which is an elective.</td></tr>
</table>

Subjects Technical Occupational: Electives	Time
Agricultural Studies Art and Crafts Civil Technology: Bricklaying and Plastering Civil Technology: Plumbing Civil Technology: Woodworking and Timber Consumer Studies: Food Production Consumer Studies: Sewing Early Childhood Development Electrical Technology: Electrical Hospitality Studies Mechanical Technology: Body Works: Panel Beating and or Spray Painting Mechanical Technology: Motor Mechanics Mechanical Technology: Sheet Metal Work Mechanical Technology: Welding Mechanical Technology: Maintenance Office Administration Personal Care: Ancillary Health Care Personal Care: Beauty and Nail Technology Personal Care: Hairdressing Service Technology: Upholstery Wholesale and Retail	13½ hours
Total: General and Occupational	27½

The table below proposes the learner progression across the years at a School of Skills.

Year 1 Minimum of 1 year of orientation	**Year 2**	**Year 3**	**Year 4**
Base Line Assessment for Language and Mathematics ➢ **Intervention (ISP)** **General Education:** • **Home Language** • **FAL** • **Mathematics** • **Life Skills:** ✓ Personal Social Wellbeing ✓ Physical Education ✓ Creative Arts ➢ ICT Enrichment **Technical Occupational** **Minimum 2 x SKILLS** **Across the year** **Post Assessment** • **Analyse results** Progress to Year 2 with appropriate support for Languages and Mathematics	**General Education:** • **Home Language** • **FAL** • **Mathematics** • **Life Skills:** ✓ Personal Social Wellbeing ✓ Physical Education ✓ Creative Arts ✓ Natural Sciences ➢ ICT Enrichment **Technical Occupational** **Minimum of 1 Skill**	**General Education:** • **Home Language** • **FAL** • **Mathematics** • **Life Skills:** ✓ Personal Social Wellbeing ✓ Physical Education ✓ Creative Arts ✓ Natural Sciences ➢ ICT Enrichment **Technical Occupational** **Minimum of 1 Skill**	**General Education:** • **Home Language** • **FAL** • **Mathematics** • **Life Skills:** ✓ Personal Social Wellbeing ✓ Physical Education ✓ Creative Arts ✓ Natural Sciences ➢ ICT Enrichment **Technical Occupational** **Minimum of 1 Skill** GCE: TO Qualification Or Certificate of Achievement (External exam- results verified / moderated)

Note:

Year One is an orientation year and learners must be exposed to a minimum of two occupational skills so that they can select a skill with which they will continue from Year Two. Schools that offer more than the minimum two skills in Year One may adapt the Annual Teaching Plan for Year One to accommodate their rotation system to expose learners to more skills e.g. schools may offer a skill per term for Terms 1, 2 and 3 and learners then select the skill they will specialise in and start it in Term 4. It is important that learners in Year One experience the core competencies of the skills so that an informed choice can be made.

Years Two, Three and Four are the critical years for learners. It is important that learners are exposed to all the Topics and Specific Aims per selected Occupational skill, acknowledging that not all learners will be successful in all of these.

SECTION 2:

INTRODUCTION TO MATHEMATICS

2.1 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.

2.2 Topics to be studied in Mathematics.

Mathematics topics are organised according to the following five Content Areas:

1. Numbers, Operations and Relationships;
2. Patterns, Functions and Algebra;
3. Space and Shape (Geometry);
4. Measurement; and
5. Data Handling.

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.
- an appreciation for the beauty and elegance of Mathematics.
- a spirit of curiosity and a love for Mathematics.
- recognition that Mathematics is a creative part of human activity.
- deep conceptual understandings 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)

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 that Mathematics plays in real life situations including the personal development of the learner.

2.5 Requirements for Mathematics as a subject

2.5.1 Time allocation

(a) The total number of hours allocated for Mathematics is 3 hours in a five-day cycle.

(b) The table below represents the weighting of Mathematics topics for Year 1 to Year 4 calculated out of 30 weeks for Year 1 and 32 weeks for Years 3 to 4 (excluding weeks for formal summative assessment):

WEIGHTING OF TOPICS				
Content Areas	**Year 1**	**Year 2**	**Year 3**	**Year 4**
Numbers, Operations and Relationships	40%	38%	58%	52%
Patterns, Functions and Algebra	13%	9%	9%	16%
Space and Shapes (Geometry)	10%	19%	19%	16%
Measurement	30%	28%	11%	10%
Data Handling	7%	6%	3%	6%

(c) The weighting of mathematics topics serves two primary purposes:

- guidance regarding the time needed to adequately address the content within each topic, and
- guidance on the spread of topics in the examination (especially end-of-the year summative assessment).

2.5.2 Resources

Resources that each learner should have:

- Exercise book (1 x 72 pages)
- Book with squared paper
- Scissor
- Glue
- Geometry set (Compass, protractor, $30/60^{o}$ set square and 45^{o} set square)
- Calculator (should have squares and square roots)

2.5.3 Infrastructure, Resources and finances

(a) Infrastructure

Since this curriculum is skill-driven, the education sector at all levels must ensure that teachers have the necessary infra-structure, resources (including financial resources) for quality teaching and learning.

(b) Minimum resource requirements for Mathematics

Consumable equipment

- Modelling clay
- A calendar for the current year
- Workbooks
- Paper for copying worksheets

Non-Consumable equipment

- Large Geometry set (for the teachers)
- Counters
- Large dice
- A big counting frame (e.g. abacus)
- A height chart
- number grid posters: 1 – 100 and 101 - 200
- Different number lines (vertical and horizontal)
- A set of playing cards

- Flash cards
- Play money, coins and notes
- A analogue wall clock
- Vocabulary cards
- Balance scale
- Building blocks (e.g. Dienes blocks)
- Volume/capacity set
- Large and small 3-D objects
- Squares (made of plastic or cardboard).
- 2-D shapes (posters)
- Tangrams
- Geo-board
- Wooden pattern blocks
- Fraction set (in different colours)

(c) Finances

Budget and inventory

A budget must be allocated for the subject. The amount will be determined by the number of learners taking the subject across all the years and the nature of the assessment required as stipulated in the curriculum. The budget needs to be revised annually and must consider all resources needed per year. A stock inventory must be maintained by the teacher and verified annually by a Senior Management Team member.

2.6 Career opportunities

Mathematics forms the basis of all calculations used in the Skills and Vocational study areas. A sound knowledge of the core mathematical concepts will support learners in any career choice.

TIME ALLOCATION PER TOPIC:

TIME ALLOCATION PER TOPIC: YEAR 1				
WEEK	**TERM 1**	**TERM 2**	**TERM 3**	**TERM 4**
	Topic	**Topic**	**Topic**	**Topic**
	Mental Mathematics (10 minutes daily)	**Mental Mathematics** (10 minutes daily)	**Mental Mathematics** (10 minutes daily)	**Mental Mathematics** (10 minutes daily)
1	**Whole numbers** Counting, ordering, comparing, representing and place value (3-digit numbers)	**Whole numbers** Counting, ordering, comparing, representing and place value (3/4-digit numbers) Multiples	**Whole numbers** Counting, ordering, comparing, representing and place value (4-digit numbers)	**Whole numbers** Counting, ordering, comparing, representing and place value (4/5-digit numbers) **Whole numbers:** Addition and subtraction (4/5-digit numbers)
2		**Whole numbers** Addition and subtraction (3/4-digit numbers) **Number sentences**	**Whole numbers** Addition and subtraction (4-digit numbers) **Number sentences**	**Whole numbers** Multiplication (3-digit by 1- digit) and division (3-digit by 1- digit) **Number sentences**
3	**Numeric and Geometric patterns** (Numeric only)	**Common fractions**	**Properties of 3-D objects** **Viewing of objects**	**Common Fractions**
4	**Whole numbers** addition and subtraction (3-digit numbers)		**Properties of 2-D shapes** **Symmetry**	
5	**Number sentences**	**Whole numbers** Multiplication (2/3-digit by 1- digit) and division (2-digit by 1- digit)	**Numeric and Geometric patterns** (Geometric only)	**Length**
6	**Whole numbers** multiplication and division (1-digit by 1-digit)	**Length**	**Perimeter, surface area and volume**	**Data handling**
7	**Time**	**Length**		**Data handling**
8		**Mass**	**Capacity / Volume**	**Transformation** **Position and movement**
9	**ASSESSMENT**	**ASSESSMENT**	**ASSESSMENT**	**ASSESSMENT**
10	**FORMAL ASSESSMENT**	**FORMAL ASSESSMENT**	**FORMAL ASSESSMENT**	**FORMAL ASSESSMENT**

TIME ALLOCATION PER TOPIC: YEAR 2				
Week	**Term 1**	**Term 2**	**Term 3**	**Term 4**
	Topic	**Topic**	**Topic**	**Topic**
	Mental Mathematics (10 minutes daily)	**Mental Mathematics** (10 minutes daily)	**Mental Mathematics** (10 minutes daily)	**Mental Mathematics** (10 minutes daily)
1	**Whole numbers**: Counting, ordering, comparing, representing and place value (4-digit numbers)	**Whole numbers**: Counting, ordering, comparing, representing and place value (4/5-digit numbers)	**Whole numbers**: Counting, ordering, comparing, representing and place value (5 digit numbers	**Whole numbers**: Counting, ordering, comparing, representing and place value (5/6-digit numbers
2	**Number sentences**	**Whole numbers**: Addition and subtraction (5/6-digit numbers)	**Length**	**Whole numbers**: Addition and subtraction (6-digit numbers
3	**Whole numbers**: Addition and subtraction (4-digit numbers)	**Common fractions**		**Whole numbers**: Multiplication (3-digit by 2-digit) **Number sentences**
4	**Whole numbers**: Multiplication (2-digit by 2-digit) and division (2-digit by 2-digit)	**Decimal fractions**	**Mass**	**Perimeter, surface area and volume**
5	**Time**	**Numeric patterns and Geometric patterns**	**Properties of 2-D shapes** Symmetry	
6		**Properties of 3-D objects** Viewing of objects	**Temperature**	**Position and movement**
7	**Properties of 2-D shapes**	**Construction of geometric figures**	**Data handling**	**Transformations**
8	**Capacity / volume**	**Whole numbers**: Division (3-digit by 2-digit) **Number sentences**		**Common fractions**
9	**ASSESSMENT**	**FORMAL ASSESSMENT**	**ASSESSMENT**	**FORMAL ASSESSMENT**
10	**FORMAL ASSESSMENT**	**FORMAL ASSESSMENT**	**FORMAL ASSESSMENT**	**FORMAL ASSESSMENT**

TIME ALLOCATION PER TOPIC: YEAR 3				
WEEK	**TERM 1**	**TERM 2**	**TERM 3**	**TERM 4**
	Topic	**Topic**	**Topic**	**Topic**
	Mental Mathematics (10 minutes daily)	**Mental Mathematics** (10 minutes daily)	**Mental Mathematics** (10 minutes daily)	**Mental Mathematics** (10 minutes daily)
1	**Whole numbers**: counting, ordering, comparing, representing and place value (6/7-digit numbers)	**Common fractions**	**Whole numbers**: counting, ordering, comparing, representing and place value (6-8-digit numbers) Length Mass	**Whole numbers**: counting, ordering, comparing, representing and place value (8-digit numbers) **Capacity/Volume** **Time** **Temperature**
2	**Whole numbers**: addition and subtraction (6-digit numbers		**Integers**	**Whole numbers**: multiplication and division (4-digit by 3-digit)
3	**Whole numbers**: Multiples and factors	**Decimal fractions**		**Area and Perimeter,**
4			**Exponents**	**Surface area and Volume**
5	**Whole numbers**: multiplication (3-digit by 2- digit)	**Whole numbers** All four main operations		**Geometry of 2D shapes**
6	**Whole numbers**: division (3-digit by 2-digit)	**Whole numbers Finance**	**Algebraic language**	**Symmetry** **Transformations**
7	**Numeric and geometric patterns**		**Construction of Geometric figures**	**Graphs**
8	**Geometry of straight line**	**Geometry of 3D objects** **Viewing of objects**		**Data handling**
9	**ASSESSMENT**	**ASSESSMENT**	**ASSESSMENT**	**ASSESSMENT**
10	**FORMAL ASSESSMENT**	**FORMAL ASSESSMENT**	**FORMAL ASSESSMENT**	**FORMAL ASSESSMENT**

TIME ALLOCATION PER TOPIC: YEAR 4				
WEEK	**TERM 1**	**TERM 2**	**TERM 3**	**TERM 4**
	Mental Mathematics (10 minutes daily)	**Mental Mathematics** (10 minutes daily)	**Mental Mathematics** (10 minutes daily)	**Mental Mathematics** (10 minutes daily)
1	**Whole numbers with all four operations**	**Common Fractions**	**Data handling**	**Revision of work done in term 1**
2			**Decimal fraction**	**Revision of work done in term 2 except graphs and finance**
3	**Whole numbers** Multiples and factors	**Number Sentences** Algebraic expressions	**Numeric and Geometric patterns**	**Revision on work done in term 3 except finance**
4		**Number Sentences** Algebraic equations	**Area and Perimeter,**	**Revision of graphs and finances**
5	**Integers**		**Geometry of 3-D objects** **Surface area and Volume**	**EXTERNAL MODERATION OF SCHOOL BASED ASSESSMENT AND FINAL EXTERNAL PEN ON PAPER ASSESSMENT**
6			**Surface area and Volume**	
7	**Exponents**	**Geometry of 2D shapes Graphs**	**Finance**	
8		**Finance**		
9	**ASSESSMENT**	**ASSESSMENT**	**ASSESSMENT**	
10	**FORMAL** **ASSESSMENT**	**FORMAL** **ASSESSMENT**	**FORMAL** **ASSESSMENT**	

SECTION 3:

OVERVIEW OF TOPICS PER TERM AND ANNUAL TEACHING PLANS

3.1. Content overview

SPECIFICATION OF CONTENT (Phase Overview) Numbers, Operations and Relationships
• The main progression in Numbers, Operations and Relationships happens in three ways: o the number range increases o different kinds of numbers are introduced o 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 Year 4, 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.

NUMBERS, OPERATIONS AND RELATIONSHIPS				
TOPIC	**YEAR 1**	**YEAR 2**	**YEAR 3**	**YEAR 4**
1.1 **Whole numbers**	**Mental Mathematics involving**: • Addition and subtraction of: - units - multiples of 10 - multiples of 100 • Multiplication of whole numbers to at least 10 x 10 • Multiplication facts of: - units by multiples of 10 - Units by multiples of 100	**Mental Mathematics involving**: • Addition and subtraction of: - units - multiples of 10 - multiples of 100 - multiples of 1 000 • Multiplication of whole numbers to at least 11x 11 • Multiplication facts of: - units by multiples of 10 - units by multiples of 100 - units by multiples of 1 000	**Mental Mathematics involving**: • Addition and subtraction of: - units - multiples of 10 - multiples of 100 - multiples of 1000 - multiples of 10 000 • 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	**Mental Mathematics** Revise work done in Year 3
1.1	**Number range for counting,**	**Number range for counting,**	**Number range for counting,**	**Number range for counting,**

NUMBERS, OPERATIONS AND RELATIONSHIPS				
TOPIC	**YEAR 1**	**YEAR 2**	**YEAR 3**	**YEAR 4**
Whole numbers	**ordering, comparing and representing, and place value of digits** • Count forward and backwards in 2s, 3s, 5s, 10s, 25s, 50s, 100s between 0 and at least 1000. • Order, compare and represent numbers to at least **4**/5digit numbers • Represent odd and even numbers to at least 100. • Recognize the place value of digits in whole numbers to at least 4-digit numbers • Round off to the nearest 10, 100	**ordering, comparing, representing and place value of digits** • Count forward and backwards in whole number intervals up to at least 10 000 • Order, compare and represent numbers to at least 5/6-digit numbers • Represent odd and even numbers to at least 1 000. • Recognize the place value of digits in whole numbers to at least 5-6-digit numbers. • Round off to the nearest, 10, 100 and 1 000	**ordering, comparing, representing and place value of digits** • Revise the work done in Year 2 • Order, compare and represent numbers to at least 6-8-digit numbers • Recognising the place value of digits in whole numbers up to 6-8 digit numbers • Round off to the nearest 1 000,10 000, 100 000	**ordering, comparing, representing and place value of digits** • Revise the work done in Year 3

NUMBERS, OPERATIONS AND RELATIONSHIPS				
TOPIC	**YEAR 1**	**YEAR 2**	**YEAR 3**	**YEAR 4**
1.1 **Whole numbers**	**Number range for calculations** • Addition and subtraction of whole numbers of **at least** 4 digits • Multiplication of **at least** whole 3-digit by 1-digit numbers • Division of **at least** whole 2-digit by 1-digit numbers	**Number range for calculations** • Addition and subtraction of whole numbers of at least 6 digits • Multiplication of at least whole 3-digit by 2-digit numbers • Division of at least whole 3-digit by 2-digit numbers	**Number range for calculations** • Addition and subtraction of whole numbers of at least 9 digits • Multiplication of up to 4-digit by 3-digit whole numbers • Division of up to 4-digit by 3-digit whole numbers • Multiple operations on whole numbers with or without brackets	**Calculations using whole numbers** • Addition and subtraction of whole numbers • Multiplication whole numbers • Division of whole numbers • Multiple operations on whole numbers with or without brackets

NUMBERS, OPERATIONS AND RELATIONSHIPS				
TOPIC	**YEAR 1**	**YEAR 2**	**YEAR 3**	**YEAR 4**
1.1 **Whole numbers**	**Calculation techniques** Use 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 - 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	**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 - long division - 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 - using a calculator	**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 - long division - 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 - using a calculator	**Calculation techniques** Use a range of strategies to perform and check written and mental calculations of whole numbers including: - estimation - building up and breaking down numbers - long division - 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 - using a calculator

NUMBERS, OPERATIONS AND RELATIONSHIPS				
TOPIC	**YEAR 1**	**YEAR 2**	**YEAR 3**	**YEAR 4**
1.1 Whole numbers	**Number range for multiples and factors** • Multiples of 1-digit numbers to at least 100 **Properties of whole numbers** • 0 in terms of its additive property • 1 in terms of its multiplicative property	**Number range for multiples and factors** • Multiples of 1-digit whole numbers to at least 100 • Factors of 1-digit whole numbers to at least 100 • Represent prime numbers to at least 50. **Properties of whole numbers** • 0 in terms of its additive property • 1 in terms of its multiplicative property	**Number range for multiples and factors** • Multiples of 2-digit numbers • Factors of 2-digit whole numbers • Represent prime numbers to at least 100. • Prime factors of numbers up to 50 **Properties of whole numbers** • 0 in terms of its additive property • 1 in terms of its multiplicative property	**Multiples and factors** • Multiples of up to 3-digit whole numbers • Factors of up to 3-digit whole numbers • Prime factors of numbers up to at least 3-digit whole numbers • Find the LCM and HCF of numbers up to 3-digit whole numbers, by inspection or factorization **Properties of whole numbers** • 0 in terms of its additive property • 1 in terms of its multiplicative property • Recognize the division property of 0, whereby any number divided by 0 is undefined

NUMBERS, OPERATIONS AND RELATIONSHIPS				
TOPIC	**YEAR 1**	**YEAR 2**	**YEAR 3**	**YEAR 4**
1.1 **Whole numbers**	**Solving problems** • Solve problems in contexts involving whole numbers, including - financial contexts - measurement contexts	**Solving problems** • Solve problems involving whole numbers, including - financial contexts - measurement contexts • Solve problems involving whole numbers. -	**Solving problems** • Solve problems that involve whole numbers, percentages and decimal fractions in financial contexts such as: - profit, loss, discount - budgets - accounts • Solve problems involving whole numbers.	**Solving problems** • Solve problems that involve whole numbers, percentages and decimal fractions in financial contexts such as: - profit, loss, discount and VAT - budgets - accounts - loans - simple interest - exchange rate

NUMBERS, OPERATIONS AND RELATIONSHIPS				
TOPIC	**YEAR 1**	**YEAR 2**	**YEAR 3**	**YEAR 4**
1.2 **Common Fractions**	**Describing and ordering fractions:** • Count forward and backwards in fractions • Compare and order common fractions with different denominators (halves; thirds, quarters; fifths) • 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 fractions (not written, practical on number line and fraction wall)	**Describing and ordering fractions:** • Count forward 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 with the same denominator	**Describing and ordering fractions:** • Compare and order common fractions, including tenths and hundredths • Extend to thousandths **Calculations with fractions:** • Addition and subtraction of common fractions in which one denominator is a multiple of another • Addition and subtraction of mixed numbers	**Calculations with fractions** • Revise: - addition and subtraction of common fractions, including mixed numbers - finding fractions of whole numbers - multiplication of common fractions, including mixed

NUMBERS, OPERATIONS AND RELATIONSHIPS				
TOPIC	**YEAR 1**	**YEAR 2**	**YEAR 3**	**YEAR 4**
		• Fractions of whole numbers which result in whole numbers • Recognize, describe and use the equivalence of fractions	• Fractions of whole numbers	numbers

NUMBERS, OPERATIONS AND RELATIONSHIPS				
TOPIC	**YEAR 1**	**YEAR 2**	**YEAR 3**	**YEAR 4**
1.2 **Common Fractions**				• Divide whole numbers and common fractions by common fractions **Calculation techniques** • Revise: - convert mixed numbers to common fractions in order to perform calculations with them - use knowledge of multiples and factors to write fractions in the simplest form before or after calculations - use knowledge of equivalent fractions to add and subtract common fractions • Use knowledge of reciprocal relationships to divide common fractions

NUMBERS, OPERATIONS AND RELATIONSHIPS				
TOPIC	**YEAR 1**	**YEAR 2**	**YEAR 3**	**YEAR 4**
1.2 **Common Fractions**	**Solving problems** Solve problems in contexts involving fractions, including grouping and equal sharing consider fractions used in real life.	**Solving problems** Solve problems in contexts involving common fractions, including grouping and sharing **Percentages** Introduction	**Solving problems** Solve problems in contexts involving common fractions, including grouping and sharing **Percentages** • Find percentages of whole numbers	**Solving problems** Solve problems in contexts involving common fractions and mixed numbers, including grouping, sharing and finding fractions of whole numbers **Percentages** • Revise: - finding percentages of whole numbers - calculating the percentage of part of a whole • Calculating percentage increase or decrease • Calculate amounts if given percentage increase or decrease • Solve problems in contexts involving percentages

NUMBERS, OPERATIONS AND RELATIONSHIPS				
TOPIC	**YEAR 1**	**YEAR 2**	**YEAR 3**	**YEAR 4**
1.2 **Common Fractions**		**Equivalent forms**: • Recognize and use equivalent forms.	**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 fractions • Recognize equivalence between common fraction, decimal fraction and percentage forms of the same number	

NUMBERS, OPERATIONS AND RELATIONSHIPS				
TOPIC	**YEAR 1**	**YEAR 2**	**YEAR 3**	**YEAR 4**
1.3 **Decimal fractions**		**Recognising, ordering and place value of decimal fractions** • Compare and order decimal fractions to at least one decimal place • Place value of digits to at least one decimal place	**Recognising, ordering and place value of decimal fractions** • Compare and order decimal fractions to at least two decimal places • Place value of digits to at least two decimal places	**Ordering and comparing decimal fractions** • Revise the following done in Year 3: - compare and order decimal fractions to at least two decimal places - place value of digits to at least two decimal places • Rounding off decimal fractions to at least 1 decimal place
1.3 **Decimal fractions**		**Calculations with decimal fractions** • Addition and subtraction of decimal fractions with at least one decimal place	**Calculations with decimal fractions** • Addition and subtraction of decimal fractions with at least two decimal places • Multiply decimal fractions by 10 and 100	**Calculations with decimal fractions** • Addition and subtraction of decimal fractions with at least two decimal places

NUMBERS, OPERATIONS AND RELATIONSHIPS				
TOPIC	**YEAR 1**	**YEAR 2**	**YEAR 3**	**YEAR 4**
			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	

NUMBERS, OPERATIONS AND RELATIONSHIPS				
TOPIC	**YEAR 1**	**YEAR 2**	**YEAR 3**	**YEAR 4**
1.4 Exponents			**Mental Calculations** • Determine squares to at least 12^2 and their square roots • Determine cubes to at least 6^3 and cube roots **Comparing and representing numbers in exponential form** • Compare and represent whole numbers in exponential form: $a^b = a \times a \times a \times \ldots$	**Mental Calculations** • Revise: - Squares to at least 12^2 and their square roots - Cubes to at least 6^3 and their cube roots **Comparing and representing numbers in exponential form** • Revise: - Compare and represent whole numbers in exponential form - Compare and represent integers in exponential form

NUMBERS, OPERATIONS AND RELATIONSHIPS				
TOPIC	**YEAR 1**	**YEAR 2**	**YEAR 3**	**YEAR 4**
1.4 Exponents			**Calculations using numbers in exponential form** • Recognize and use the appropriate laws of operations with numbers involving exponents and square and cube roots • Perform calculations involving all four operations using numbers in exponential form, limited to exponents up to 5, and square and cube roots.	**Calculations using numbers in exponential form** • Establish general laws of exponents, limited to: - natural number exponents - $a^m \times a^n = a^{m+n}$ - $a^m \div a^n = a^{m-n}$, if $m>n$ • Recognize and use the appropriate laws of operations using numbers involving exponents and square and cube roots. • Perform calculations involving all four operations with numbers that involve the squares, cubes, square roots and cube roots of integers. • Calculate the squares, cubes, square roots and cube roots of rational numbers.

NUMBERS, OPERATIONS AND RELATIONSHIPS				
TOPIC	**YEAR 1**	**YEAR 2**	**YEAR 3**	**YEAR 4**
1.5 **Integers**			**Counting, ordering and comparing integers** • Count forward and backwards in integers for any interval • Recognize, order and compare integers **Calculations with integers** • Add and subtract with integers	**Counting, ordering and comparing integers** • Revise: - counting forward and backwards in integers for any interval - recognising, ordering and comparing integers **Calculations with integers** • Revise: - addition and subtraction with integers • Perform calculations involving addition and subtraction operations with integers • Perform calculations involving

NUMBERS, OPERATIONS AND RELATIONSHIPS				
TOPIC	**YEAR 1**	**YEAR 2**	**YEAR 3**	**YEAR 4**
				all four operations with numbers that involve the squares, cubes, square roots and cube roots of integers
1.5 **Integers**			**Properties of integers** • Recognize and use additive inverse for integers	**Properties of integers** • Recognize and use additive and multiplicative inverses for integers

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. • In Year 1 to 4, the emphasis is on practice with completing and extending numeric and geometric 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. Writing and solving number sentences also provide opportunity to consolidate learners' number knowledge.

PATTERNS, FUNCTIONS AND ALGEBRA				
TOPIC	**YEAR 1**	**YEAR 2**	**YEAR 3**	**YEAR 4**
2.1 **Numeric and Geometric patterns**	**Investigate and extend patterns** • Investigate and extend numeric and geometric patterns looking for relationships or rules of patterns: - represented in physical or diagram form - of learner's own creation - involving a constant difference • 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	**Investigate and extend patterns** • Investigate and extend numeric and geometric patterns looking for relationships or rules of patterns: - represented in physical or diagram form - of learner's own creation - involving a constant difference • 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	**Investigate and extend patterns** • Investigate and extend numeric and geometric patterns looking for relationships or rules of patterns: - represented in physical or diagram form - of learner's own creation - involving a constant difference - 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:	**Investigate and extend patterns** • Investigate and extend numeric and geometric patterns looking for relationships between numbers, including patterns: - represented in physical or diagram form - of learner's own creation - represented in tables - in algebraic form - involving a constant difference • Describe and justify the general rules for observed relationships between numbers in own words **Input and output values** • Determine input values, output values or rules for patterns and relationships using: - flow diagrams

PATTERNS, FUNCTIONS AND ALGEBRA				
TOPIC	**YEAR 1**	**YEAR 2**	**YEAR 3**	**YEAR 4**
		- tables	- flow diagrams - tables	- tables - formulae
2.1 **Numeric and Geometric patterns**	**Equivalent forms** Determine equivalence of different descriptions of the same relationship or rule presented - verbally, in a flow diagram - by a n umber 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	**Equivalent forms** Determine, interpret and justify equivalence of different descriptions of the same relationship or rule presented: - verbally - in flow diagrams - in tables - by graphs on a Cartesian plane
2.2 **Number sentences** (Introduction to Algebraic Expressions)	**Number sentences** • Write number sentences to describe problem situations. • Solve and complete number sentences by inspection.	**Number sentences** • Write number sentences to describe problem situations • Solve and complete number sentences by - inspection - trial and improvement	**Number sentences** • Write number sentences to describe problem situations • Solve and complete number sentences by - inspection - trial and improvement • Check solution by substitution	

PATTERNS, FUNCTIONS AND ALGEBRA				
TOPIC	**YEAR 1**	**YEAR 2**	**YEAR 3**	**YEAR 4**
2.2 **Number sentences** (Introduction to Algebraic Expressions)			**Algebraic language** • Recognize and interpret rules or relationships represented in symbolic form • Identify variables and constants in given formulae and/or equations	**Algebraic language** • Recognize and interpret rules or relationships represented in symbolic form • Identify variables and constants in given formulae and/or equations **Equations** • Write equations to describe problem situations - analyse and interpret

PATTERNS, FUNCTIONS AND ALGEBRA				
TOPIC	**YEAR 1**	**YEAR 2**	**YEAR 3**	**YEAR 4**
				equations that describe a given situation - solve equations by inspection - determine the numerical value of an expression by substitution. - identify variables and constants in given formulae or equations • Use substitution in equations to generate tables of ordered pairs
2.4 **Graphs**			**Interpreting graphs** Analyse and interpret global graphs of problem situations, with special focus on the following trends and features: - linear or non-linear - constant increasing and decreasing	**Interpreting graphs** Analyse and interpret global graphs of problem situations, with special focus on the following trends and features: - linear or non-linear - constant increasing and decreasing

PATTERNS, FUNCTIONS AND ALGEBRA				
TOPIC	**YEAR 1**	**YEAR 2**	**YEAR 3**	**YEAR 4**
			Drawing graphs • Draw global graphs from given descriptions of a problem situation.	**Drawing graphs** • Draw global graphs from given descriptions. of a problem situation, identifying features listed above • Use tables or ordered pairs to plot points and draw linear graphs on the Cartesian plane

SPECIFICATION OF CONTENT (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 year.
- 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.

SPACE AND SHAPE (GEOMETRY)

TOPIC	YEAR 1	YEAR 2	YEAR 3	YEAR 4
3.1 **Properties of 2-Dshapes**	**Range of shapes** • Recognize, visualize and name 2-D shapes in the environment and geometric settings - triangles, squares, rectangles - circles	**Range of shapes** • Recognize, visualize and name 2-D shapes in the environment and geometric setting, focusing on: - triangles, squares, rectangles, other quadrilaterals, pentagons, hexagons, heptagons, octagons - circles - similarities and differences between squares and rectangles	**Range of shapes** • Revise the work done in year 2 • Recognize, visualize and name 2-D shapes in the environment and geometric setting, focusing on similarities and differences between rectangles and parallelograms	**Range of shapes** • Revise the work done in years 1 to 3

3.1 **Properties of 2-D shapes**	**Characteristics of shapes** Describe, sort and compare 2-D shapes in terms of: - number of sides - angles in shapes, limited to ▪ right angles ▪ angles smaller than right angles ▪ angles greater than right angles	**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 ▪ acute ▪ right ▪ obtuse ▪ straight	**Characteristics of shapes** Revise 2-D shapes in terms of: - number of sides - lengths of sides - sizes of angles ▪ acute ▪ right ▪ obtuse ▪ straight ▪ reflex ▪ revolution **Classifying 2-D shapes** • Identify triangles in terms of their sides: - equilateral triangles - isosceles triangles - right-angled triangles	 **Classifying 2-D shapes** • Revise work done in Year 3

3.1 **Properties of 2-D shapes**	 **Further activities** • Draw 2-D shapes on grid paper	 **Further activities** • Draw 2-D shapes on grid paper	• Identify quadrilaterals in terms of their sides and angles: - parallelogram - rectangle - square - rhombus - trapezium - kite **Further activities** • Draw 2-D shapes on grid paper	• Revise work done in Year 3 - parallelogram - rectangle - square - rhombus - trapezium - kite

3.2 Properties of 3-D objects	Range of objects	Range of objects	Classifying 3-D objects	Classifying 3-D objects
	• Recognize, visualize and name 3-D objects in the environment and geometric settings, focusing on: - cubes - rectangular prisms,	• 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	• Name and compare polyhedra in terms of the shape and number of faces, the number of vertices and the number of edges **Building 3-D models** Revise using nets to create models of geometric solids, including: - cubes - prisms - pyramids	• Revise the work done in Years 1 to 3

3.2 **Properties of 3-D objects**		**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		
3.3 **Symmetry**	**Symmetry** Recognize and draw line(s) of symmetry in 2-D shapes	**Symmetry** Recognize, draw and describe line(s) of symmetry in 2-D shapes	**Symmetry** Revise the work done in Years1 and 2.	
3.4 **Geometry of straight lines**			**Angle relationships** Recognize and describe pairs of angles formed by: - perpendicular lines - intersecting lines - parallel lines cut by a transversal	Revise the work done in Year 3 in order to support the content on Graphs.

			Solving problems Solve geometric problems using the relationships between pairs of angles described above	
3.5 **Transformations**		**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: - translation - reflection -	**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: - translation - reflection - rotation	

3.5 **Transformations**		**Use transformations to make tessellations** Make tessellated patterns including some patterns with line symmetry by tracing and moving 2-D shapes in through rotation. **Describe patterns** Refer to lines, 2-D shapes, 3-D objects, lines of symmetry, rotations, when describing patterns - in nature - from modern everyday life - from our cultural heritage		
3.5 **Transformations**	**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			

3.6 **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** • Link the position of viewer to views of single or composite objects, or collections of objects, can include both *every day* and geometric objects	
3.7 **Construction of geometric figures**		**Measuring angles** • Accurately use a protractor to measure and classify angles: - <90° (acute angles) - Right-angles - >90° 90^o (obtuse angles) - Straight angles	**Measuring angles** • Accurately use a protractor to measure and classify angles: - <90° (acute angles) - Right-angles - >90° (obtuse angles) - Straight angles - >180° (reflex angles)	

3.7 **Construction of geometric figures**			**Construction** • Accurately construct geometric figures appropriately using compass, ruler and protractor, including: - angles to one degree of accuracy - circles - parallel lines - perpendicular lines - bisecting lines and angles - perpendicular lines at a given point or from a given point - triangles - quadrilaterals • Construct angles of 30°, 45°, 60° and their multiples without using a protractor **Investigating properties of geometric figures** • By construction, investigate the angles in a triangle, focusing on:	

			- the sum of the interior angles of triangles - the size of angles in an equilateral triangle - the sides and base angles of an isosceles triangle	

3.7 **Construction of geometric figures**			• By construction, investigate sides and angles in quadrilaterals, focusing on: - the sum of the interior angles of quadrilaterals - the sides and opposite angles of parallelograms	
3.8 **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 • Follow directions to trace a path between positions on a map		

SPECIFICATION OF CONTENT (Overview) MEASUREMENT
• The main progression in measurement across year 1 to 4 is achieved by - the introduction of new measuring units. - the increase in number range and complexity of calculations that learners are able to do in each year • Practical measuring using measuring instruments are central to measurement in year 1 to 4. • 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.

MEASUREMENT

TOPIC	YEAR 1	YEAR 2	YEAR 3	YEAR 4
4.1 **Length**	**Practical measuring** of 2-D shapes and 3-D objects by: - estimating - measuring - recording - comparing and ordering **Measuring instruments**: rulers, meter sticks, tape measures, trundle wheels **Units:** millimetres(mm), centimetres (cm), metres(m)	**Practical measuring** of 2-D shapes and 3-Dobjects by: - estimating - measuring - recording - comparing and ordering **Measuring instruments**: rulers, meter sticks, tape measures, trundle wheels **Units:** millimetres(mm), centimetres(cm), metres(m),kilometres(km)	**Practical measuring** of 2-D shapes and 3-Dobjects by: - estimating - measuring - recording - comparing and ordering **Measuring instruments**: rulers, meter sticks, tape measures, trundle wheels **Units:** millimetres(mm), centimetres(cm), metres(m),kilometres(km)	

4.1 **Length**	**Calculations and problem-solving involving length** • Solve problems in contexts involving length • Conversions include converting between - millimetres (mm) ↔ centimetre (cm) • Conversions limited to whole numbers	**Calculations and problem-solving involving length** • Solve problems in contexts involving length • Conversions include converting between the following units: - millimetres (mm) ↔ centimetre (cm) - centimetres (cm) ↔ metres (m) - metre (m) ↔ kilometres (km) • Conversions should include common fraction to at least one decimal place	**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	Revise work done in Year 3 to use appropriate formulas and the calculation of perimeter and area.
4.2 **Mass**	**Practical measuring** of 3-D objects by: - estimating - measuring - recording - comparing and ordering	**Practical measuring** of 3-D objects by: - estimating - measuring - recording - comparing and ordering	**Practical measuring** of 3-D objects by: - estimating - measuring - recording - comparing and ordering	**Practical measuring** of 3-D objects by revising all the work done in Year 1 to 3
4.2	**Measuring instruments:** bathroom scales, kitchen scales	**Measuring instruments:** bathroom scales, kitchen scales	**Measuring instruments:** bathroom scales, kitchen scales	

Mass	and any other appropriate instrument for measuring mass **Units:** grams (g) and kilograms (kg); **Calculations and problem-solving involving mass include:** • problems in contexts involving mass • conversions should be limited to examples with whole numbers	and any other appropriate instrument for measuring mass **Units:** grams (g) and kilograms (kg); **Calculations and problem-solving involving mass include:** • problems in contexts involving mass • converting between grams (g) ↔ kilograms (kg) • Conversions should include common fraction and decimal forms to one decimal place	and any other appropriate instrument for measuring mass **Units:** grams (g) and kilograms (kg); **Calculations and problem-solving involving mass include:** • problems in contexts involving mass • converting between grams (g) ↔ kilograms (kg) • Conversions should include common 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	**Practical measuring of 3-D objects by:** - estimating - measuring - recording - comparing and ordering	**Practical measuring of 3-D objects by:** - estimating - measuring - recording - comparing and ordering	**Practical measuring of 3-D objects by** revising all the work done in Years 1 to 3

	Measuring instruments: measuring spoons, measuring cups, measuring jugs and any other appropriate instrument for measuring volume/capacity **Units:** millilitres (*ml*) , litres (*l*)	**Measuring instruments:** measuring spoons, measuring cups, measuring jugs and any other appropriate instrument for measuring volume/capacity **Units:** millilitres (*ml*) , litres (*l*)	**Measuring instruments:** measuring spoons, measuring cups, measuring jugs and any other appropriate instrument for measuring volume/capacity **Units:** millilitres (*ml*), litres (*l*) and kilolitres (*kl*)	
4.3 **Capacity/Volume**	**Calculations and problem solving involving capacity/ volume include**: • problems in contexts involving capacity/volume • converting between - millilitres (ml) ↔ litres (l) - limited to examples with whole numbers	**Calculations and problem solving involving capacity/ volume include**: • problems in contexts involving capacity/volume • converting between millilitres (ml) ↔ litres (l) • conversions should include common fraction	**Calculations and problem solving involving capacity/ volume include**: • problems in contexts involving capacity/volume • converting between - millilitre (ml) ↔ litre (l) - litre (l) ↔kilolitres (kl), • conversions should include fraction and decimal forms to 2 decimal places	

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 • Instruments include clocks and watches **Reading calendars.**	**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**	**Reading time and time instruments** • Revise work done in years 1 to 2 **Reading calendars and other related time schedules**	**Reading time and time instruments** • Revise work done in years 1 to 3
4.4 **Time**	**Calculations and problem solving time include:** • problems in contexts involving time • calculation of the number of days between any two dates within the same year **Calculation of time intervals** - 5 minute intervals,	**Calculations and problem solving time include** problems in contexts involving time **Calculation of time intervals where time is given in**	**Calculations and problem solving time include** problems in contexts involving time	

	- quarter past and quarter to - half hour - hour **History of time** Know some ways in which time was measured and represented in the past	- seconds and/or minutes - minutes and/or hours - hours and/or days - days, weeks and/or months - years and/or decades - centuries and millenniums		
4.5 **Temperature**		**Practical measuring of temperature by**: • estimating • measuring • recording • comparing and ordering **Measuring instrument:** thermometer **Units:** degrees Celsius **Calculations and problem-solving related to temperature include:**	**Calculations and problem-solving related to temperature**	

		• problems in contexts related to temperatures • calculating temperature differences limited to positive whole numbers	**include:** • problems in contexts related to temperatures • calculating temperature differences limited to positive and negative whole numbers	
4.6 **Perimeter, surface area and volume**	**Perimeter** Measure perimeter using rulers or measuring tapes and any other appropriate instrument for measuring perimeter **Calculation of area** • Determine areas of regular shapes by counting squares on grids in order to develop an understanding of square units	**Perimeter** Measure perimeter using rulers or measuring tapes and any other appropriate instrument for measuring perimeter **Calculation of area** • Determine areas of regular and irregular shapes by counting squares on grids in order to develop an understanding of square units	**Perimeter** Measure perimeter using rulers or measuring tapes and any other appropriate instrument for measuring perimeter **Calculation of area** • Continue to determine areas of regular and irregular shapes by counting squares on grids. • Develop rules for calculating the areas of squares, rectangle and triangles.	**Area and perimeter** • Calculate the perimeter of regular and irregular polygons • Use appropriate formulae to calculate perimeter and area of: - squares - rectangles - triangles - circles **Calculations and solving problems** • Solve problems involving perimeter and area of polygons to at least 1 decimal place.

			• Apply rules for calculating the areas of squares, rectangles and triangles.	
4.6 **Perimeter, surface area and volume**	**Measurement of volume** • Determine volume/capacity of objects by packing or filling them in order to develop an understanding of cubic units	**Measurement of volume** • Determine volume/capacity of objects by packing or filling them in order to develop an understanding of cubic units	**Measurement of volume** • Continue to determine 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 - triangular prisms is given by the surface area of the base multiplied by the height	• Describe the interrelationship between surface area and volume of the objects mentioned above

4.6 **Perimeter, surface area and volume**				**Calculations and solving problems** • Solve problems involving surface area, volume and capacity

SPECIFICATION OF CONTENT (Overview) DATA HANDLING
• The main progression in Data Handling across the years 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, organising, representing, analysing, 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.**

DATA HANDLING				
TOPIC	**YEAR 1**	**YEAR 2**	**YEAR 3**	**YEAR 4**
5.1 **Collect, organise and summarise data**	**Collecting and organizing data** • Collect data using tally marks and tables for recording	**Collecting and organizing data** • Collect data using tally marks and tables for recording • Order data from smallest group to largest group	**Collecting and organizing 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	

<table>
<tr><th colspan="5">DATA HANDLING</th></tr>
<tr><th>TOPIC</th><th>YEAR 1</th><th>YEAR 2</th><th>YEAR 3</th><th>YEAR 4</th></tr>
<tr>
<td>5.1
Collect, organise and summarise data</td>
<td>Organize and summarize data.
• Mode</td>
<td>Organize and summarize data
• Mode
• Median</td>
<td>Organize and summarize data
• Organise (including grouping where appropriate) and record data using
- tally marks
- tables
• Group data into intervals
• Summarise and distinguishing between ungrouped numerical data by determining:
- mean
- median
- mode</td>
<td>Organize and summarise data
• Organise (including grouping where appropriate) and record data using
- tally marks
- tables
• Group data into intervals
• Summarise data using measures of central tendency, including:
- mean
- median
- mode</td>
</tr>
</table>

DATA HANDLING				
TOPIC	**YEAR 1**	**YEAR 2**	**YEAR 3**	**YEAR 4**
5.2 **Representing data**	**Representing data** Draw 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	**Represent data** Draw a variety of graphs by hand/technology to display and interpret data (grouped and ungrouped) including: • bar graphs and double bar graphs • pie charts	**Represent data** Draw a variety of graphs by hand/technology to display and interpret data (grouped and ungrouped) including: • bar graphs and double bar graphs pie charts **Critically read and interpret data by:** Using tables or ordered pairs to plot points and draw graphs on the Cartesian plane

DATA HANDLING				
TOPIC	**YEAR 1**	**YEAR 2**	**YEAR 3**	**YEAR 4**
5.3 **Analysing, Interpreting and Reporting data**	**Interpreting data** Read and interpret data represented in: • words • pictographs	**Interpreting data** Critically read and interpret data represented in: • words • pictographs • bar graphs • pie charts	**Interpreting data** Critically read and interpret data represented in: • words • pictographs • bar graphs • double bar graphs • pie charts	**Analyse data** Critically read and interpret data by answering questions related to central tendencies • mean, mode and median • scales used on graphs
5.3 **Analysing, Interpreting and Reporting data**	**Analyse data** Analyse data by answering. questions related to: • data categories • central tendencies – (mode)	**Analyse data** Analyse data by answering questions related to: • data categories • data sources and contexts • central tendencies – (mode and median)	**Analyse data** Analyse data by answering questions related to: • data categories, including data intervals • data sources and contexts • central tendencies – (mode, mean and median)	**Analyse data** Critically analyse data by answering questions related to: • central tendencies (mean, mode, median) • scales used on graphs

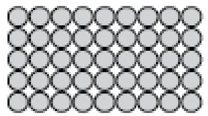
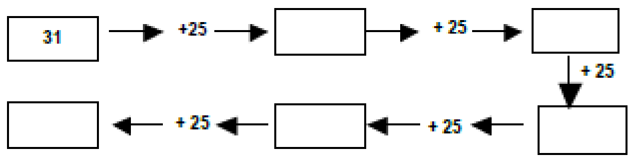
DATA HANDLING				
TOPIC	**YEAR 1**	**YEAR 2**	**YEAR 3**	**YEAR 4**
	Reporting data Summarise data verbally for consolidation.	**Reporting data** Summarise data verbally for consolidation.	**Reporting data** Summarise data verbally for consolidation.	**Reporting data** Summarise data verbally for consolidation.

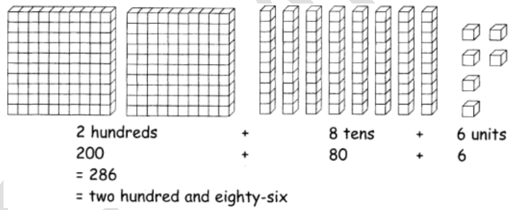
3.2 Content outline per term

Year 1 Term 1

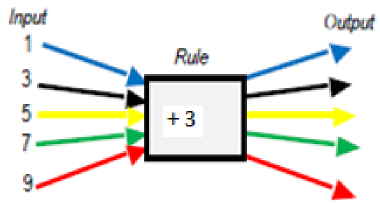
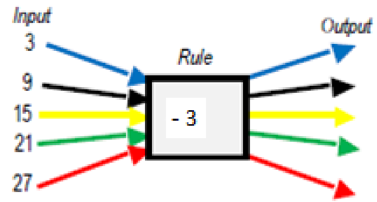
YEAR 1 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
	1.1 **Whole numbers** Mental Mathematics	**Mental Mathematics involving**: • Addition and subtraction of: - units - multiples of 10 - multiples of 100 • Multiplication of whole numbers to at least 10 x 10 • Multiplication facts of: - units by multiples of 10 - units by multiples of 100	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. 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,

YEAR 1 TERM 1			
WEEK	TOPIC	CONTENT	Techniques, activities, resources and process notes
			- multiplying by 10 and 100 - multiplying by multiples 10 and 100 - 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 **Recommended resources** • a number line (structured and empty) • a number grid • place value cards (flash cards) • counting beads

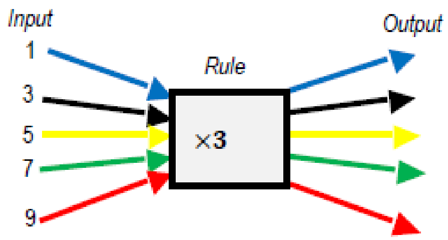
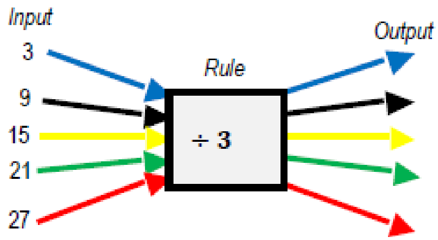
YEAR 1 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
1	**1.1** **Whole numbers:** Counting, ordering, comparing, representing and place value	The learner must be able to: • count, order, compare, represent and recognise place value • count forward and backwards in 2's, 5's, 10's, between 0 and at least 1 000. • order, compare and represent numbers to at least 3-digit numbers • recognise the place value of digits in whole numbers to at least 3-digit numbers. • round off to the nearest 10	**Start counting in 2's, 5's and 10's for Term 1** Counting should **not** only be thought of as verbal counting. Learners should also 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. • 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 2's can start from 5 or 27 or 348. **Place value** (number range 0 to 999)

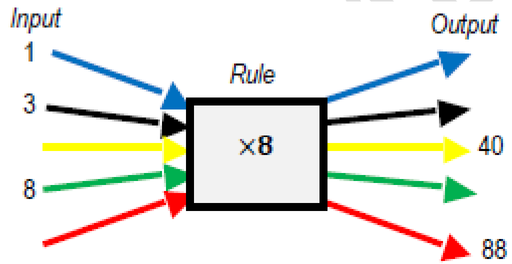
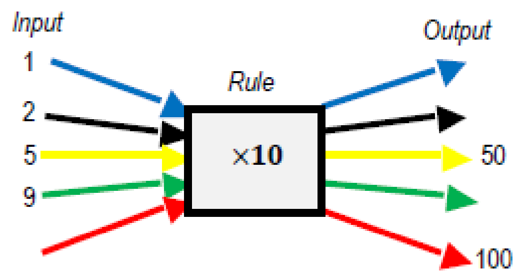
YEAR 1 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			Learners should be able to break up numbers into hundreds, tens and units using - the number names (number words) - place value or flash cards - expanded notation Recommended apparatus: place value/flash 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. 431 or 413 - Replace * with <,= or > **Example:** 89 * 98, 109 * 190

YEAR 1 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			- **All work developed here can be practised throughout the year in the mental Mathematics programme.**
1.	**2.1** **Numeric and Geometric patterns** (Numeric patterns only)	The learner must be able to: • investigate and extend numeric patterns looking for relationships or rules of patterns: - represented in physical or diagram form - of learner's own creation - involving a constant difference • describe observed relationships or rules in learner's own words	In Year 1 learners copy, investigate, extend and describe patterns made with numbers. The descriptions are only verbal. Learners also work with flow diagrams, as a form of input-output diagram. The kinds of patterns become more complex later. **Examples** of patterns which can be completed: a) 20; ___; 60; ___; 100; ___; 140; ___; ___; ___ b) 990; 980; 970; ___; ___; ___; ___; ___ c) 636; 633; ___; ___; ___; 621; ___; ___ d) 50; 100; 150; ___; ___; ___; ___; ___; ___; ___; ___ e) 50; 75; ___; 125; 150; ___; ___; ___; ___

YEAR 1 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		The learner must be able to determine input values, output values and rules for patterns and relationships using • flow diagrams	**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. The forms of input-output diagrams that learners use most often are flow diagrams or spider grams. When using flow diagrams, the correspondence between input and output values should be clear in its representational form.
		The learner must be able to determine equivalence of different descriptions of the same relationship or rule presented: • verbally • in a flow diagram • by a number sentence	Flow diagrams  

YEAR 1 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			Examples of number sentences: 1 + 3 = □, 4 – 3 = □ 2 + 3 = □, 5 – 3 = □ 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 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

YEAR 1 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			• they can use division to check multiplication calculations   Examples of number sentences: 1 x 3 = □, 3 ÷ 1 = □ 3 x 3 = □, 9 ÷ 3 = □ 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

YEAR 1 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			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. **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 

YEAR 1 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
2.	**1.1** **Whole numbers**: Addition and subtraction	The learner must be able to do: • addition and subtraction of whole numbers of at least 3 digits • 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	Find short cuts to work out the answers. Compare your answers and explain your short cuts to each other. Race your partner. Practise subtraction number bonds as well as doubling and halving numbers. Practise using terminology for addition and subtraction every day. Practise adding and subtracting numbers quickly Find the answers - word sums/ algebraic expression a) Subtract 6 from 11 b) What is 15 more than 24 c) Halve 74 d) Find the difference between 56 and 31 e) Increase 56 by 14 **Use the commutative property of addition** Investigate what happens when you add or subtract numbers in a different order 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.

YEAR 1 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			Using number sentences helps learners develop addition and subtraction techniques **Examples:** 36+13 = □ therefore 49 – 13 = □ 261+36 = □ therefore 297 – 36 = □ 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”. Use the inverse operation to teach addition and subtraction simultaneously, and to check solutions. Write down the input or output numbers by add or subtract it from the number Write down the rule
	2.2 **Number sentences**	The learner must be able to: • write number sentences to describe problem situations • use the commutative, associative, and distributive	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.

YEAR 1 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		properties with whole numbers	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, learners need to be trained to understand the equivalence. 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 • **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.

YEAR 1 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			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 with whole numbers. This will prepare them for the calculations that follow.
3.	**1.1** **Whole numbers**: Multiplication and division	**Number range for calculations** The learner must be able to do: • multiplication of at least 1-digit by 1-digit whole numbers • division of at least 1-digit by 1-digit whole numbers **Calculation techniques** The learner must be able to 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	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 it is recommended that learners develop and practise multiplication tables. In this section 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 colspan="4">YEAR 1 TERM 1</th></tr>
<tr><th>WEEK</th><th>TOPIC</th><th>CONTENT</th><th>Techniques, activities, resources and process notes</th></tr>
<tr>
<td></td>
<td></td>
<td>

- 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

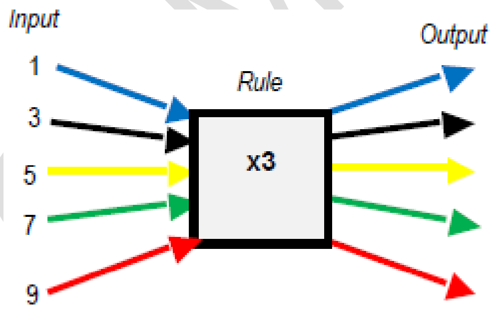
The learner must be able to: recognise and use the commutative; associative; and distributive properties of whole numbers

</td>
<td>

	1	2	3	4	5	6	7	8	9	10
x 7	7	14	21		35					70

Learners can also use flow diagrams to record multiplication facts.

Example



Commutative property of multiplication

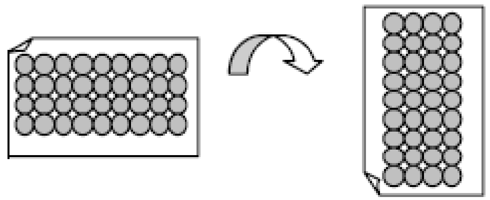
Numbers can be multiplied in any order.

Example: 4 x 9 = 9 x 4

Learners can be convinced of this by providing them with an array of counters, which can be rotated.

Learners can write a multiplication number sentence for the array before and after it is

</td>
</tr>
</table>

YEAR 1 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			rotated. 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. **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** a) 5 x ☐ = 35 35 ÷ 5 = ☐ b) 6 x ☐ = 24 24 ÷ 6 = ☐ c) 8 x ☐ = 56 56 ÷ 8 = ☐

YEAR 1 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		Solving problems The learner must be able to solve problems in contexts involving whole numbers:	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:** 5 learners share 28 sweets. How many sweets does each learner get? **Problems involving grouping**: Vusi has one large packet with 28 sweets. How many smaller packets can she make with 5 sweets in each? Some problems and calculations should have a remainder, and some should not. All work developed here can be practised throughout the year in the mental Mathematics programme.
4.	**4.4** **Time**	The learner must be able to: • read, tell and write time in 12-hour and 24-hourformats on both analogue and digital instruments in - hours - minutes • read instruments which include	Skills, knowledge, value and attitudes develop naturally through language, so it is important to allow the learners to define time concepts in their own language. Discuss the use of the term earlier and later with the learners by asking questions such as: • Who gets up earlier than you in the family? • Which member of your family goes to bed later than you? Read time in multiples of 5-minute intervals. Learners should count and write the time in words and fill in times on an analogue clock.

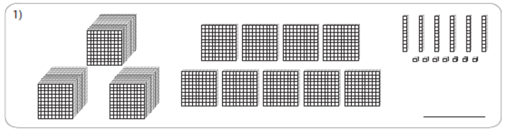
YEAR 1 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		clocks and watches	Use activities to give learners opportunities to develop a sense of responsibility for themselves in punctuality and planning, for example, using a timetable to plan their activities. **Assignment**: Ask learners to make an analogue clock and a digital clock out of cardboard or a paper plate. Draw a table, discussing the diagrams of the two watches – guide the learners through questions to realise the difference between the two types of clocks.
5.	**4.4** **Time**	The learner must be able to do calculations and problem solving of time including: • problems in contexts involving time • calculation of the number of days between any two dates within the same year • calculation of time intervals - 5 minute intervals, - quarter past and quarter to - half hour - hour	After sufficient practice in reading and converting time from analogue to digital mode, do the quarters. Ask learners to come forward and to put the long hand on the demonstration clock at: 3: it is Quarter past the hour (15 min past the hour) 6: it is half past the hour (30 minutes past the hour) 9: it is quarter to the hour (45 minutes to the hour) The other learners in class do the same with their clocks and write the corresponding time in digital time and words Once learners have been learnt to tell the time, further practise can take place during mental mathematics time. Learners continue to read calendars.

YEAR 1 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			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.
	History of time	• Know some ways in which time was measured and represented in the past	Make use of the internet to show the learners how time was measured and represented in the ancient times. You can ask the learners to make their own water clock or do it as a class/group activity. They can then measure the time taken for water to run out of one container into another or for a candle to burn down and use this as a standard period of time.
9 10	**FORMAL ASSESSMENT**	Although week 9 and 10 are allocated for assessment, the assessment can be done at any stage from week 2 to 10 **In this term Learners must be assessed on the following topics**:	

YEAR 1 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		• Counting, ordering, comparing representing and place value • Numeric and Geometric patterns • Addition and subtraction • Multiplication and division • Time **Make use of the following forms of assessment** • Assignment 1 • Assignment 2 • **Test** Scope is all the work done during the term	

Year 1 Term 2

YEAR 1 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
	1.1 **Whole numbers** Mental Mathematics	**Mental Mathematics involving**: • addition and subtraction of: - units - multiples of 10 - multiples of 100 • multiplication of whole numbers to at least 10 x 10 • multiplication facts of: - units by multiples of 10 - Units by multiples of 100	Refer to Year 1 Term 1 for techniques. Check the time allocation for progression in whole numbers.
1.	**1.1** **Whole numbers**: Counting, ordering, comparing, representing and place value	The learner must be able to: • count forward and backwards in 3's, between 0 and at least 1 000 • order, compare and represent numbers to at least 4-digit numbers. • write numbers shown by Dienes'	**This Term the learners will count in 3's.** Counting should **not** always start on the first multiple, **nor** should it always start on any other multiple e.g. counting in 3's can start from 5 or 27 or 348. **<u>Resources</u>** • Calculator, flash cards, number grids, counters, bead boxes, abacuses

YEAR 1 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		blocks • represent odd and even numbers to at least 100. • recognise the place value of digits in whole numbers to at least 4-digit numbers • round off to the nearest 10, 100 **Multiples** The learner must be able to count and order multiples of 1-digit numbers to at least 100	and number lines. • Dotted and squared paper, scissors  • Counting number interval change to 3 • 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.**
2.	**1.1** **Whole numbers**: Addition and subtraction	The learner must be able to: • do addition and subtraction of whole numbers of at least 4 digits • use a range of techniques to perform and check written and mental calculations of whole numbers	**<u>Resources</u>** The more practice the learners get of mentally adding and subtracting, the better. For this purpose, a whiteboard and whiteboard marker are very useful. (If whiteboards are not available, the learners can use a sheet of blank paper placed inside a plastic sleeve) Counters, stones and different kind of pasta shapes (units, tens, hundreds

YEAR 1 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		including - estimation - building up and breaking down numbers - rounding off and compensating - doubling and halving - using a number line **Solving problems** The learner must be able to solve problems in contexts involving whole numbers, including • financial contexts • measurement contexts	and thousands) are useful concrete objects to help the learners The learners complete number patterns, they do it by adding or subtracting 10, 100 and 1 000 each time. **Example:** a) 78; 88; 98; __; __; __; 138; __; __; __; __ b) 2 550; 2 650; 2 750; __; __; __; __ c) 1 885; 2 885; 3 885; __; __; __; __ Learners read numbers from a number line and fill in the missing number on the number line. Learners do addition and subtraction calculations and discuss the patterns results. Encourage the learners to share with the rest of the class what they have noticed about the patterns. Have a class discussion about the different observations. This should help the learners realise that the same method is used for adding and subtracting digits in tens, hundreds and thousands position. Rounding off numbers to the nearest 100 helps learners to get an idea of what the answer should be. Estimating can sometimes help the learners to

YEAR 1 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
	2.2 **Number Sentences**	**Number sentences** The learner must be able to • write number sentences to describe problem situations • solve and complete number sentences by inspection	pick up mistakes. Use a range of techniques to perform written and mental calculations with whole numbers, including: • building up and breaking down numbers; • rounding off and compensating; • using a number line. Learners discuss the importance of budgeting Ask learners why people budget Ask learners to give examples of when people budget, **Example**: • they plan their grocery shopping within the limits of a certain amount of money • they plan for extra expenses or luxuries • schools and business draw up budget so that they know how much money they can spend Ask the learners work with a budget **Using number sentences to help learners understand and use the fact**

YEAR 1 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			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 = □

YEAR 1 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		Properties of whole numbers The learner must be able to: • apply the commutative, associative, distributive properties of whole numbers • recognise 0 in terms of its additive property • recognise 1 in terms of its multiplicative property	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 = □ 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".

YEAR 1 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			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 whole 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 = □

YEAR 1 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			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 simultaneously. • 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 **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

YEAR 1 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			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

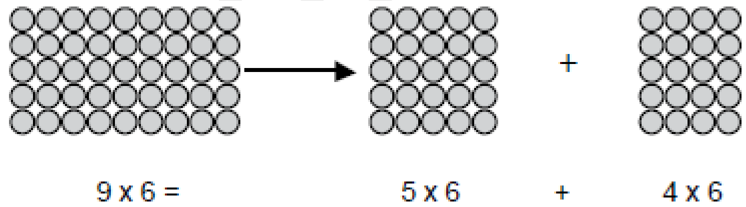
<table>
<tr><th colspan="4">YEAR 1 TERM 2</th></tr>
<tr><th>WEEK</th><th>TOPIC</th><th>CONTENT</th><th>Techniques, activities, resources and process notes</th></tr>
<tr><td></td><td></td><td></td><td>13 + 7 = □ 14 + 6 = □ 12 + 8= □ 15 + 5 = □
17 + □= 20 14 + □= 20 8 + □= 20 3 + □= 20
20 – 7 =□ 20 – □= 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.</td></tr>
<tr><td>3.
4.</td><td>1.2
Common fractions</td><td>The learner must be able to:
• count forward and backwards in fractions
• compare and order common fractions with different denominators (halves; thirds, quarters; fifths; sixths; sevenths; eighths)
• describe and compare common</td><td>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. The concept of a fraction should first be developed before learners focus on equivalence and calculating.
<u>Resources</u></td></tr>
</table>

YEAR 1 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		fractions in diagram form • recognise, describe and use the equivalence of fractions	• Paper for folding to investigate fractions. Other objects such as bottle tops, marbles and beads for investigating a fraction of a group of objects. • Fraction wall - Learners should not only work with one kind of model, because this can limit their understanding of fractions. For example, fractions in diagram form 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). - At this point, you should assess learners' work to check whether they understand the concept of equal parts of an object and dividing objects into groups with equal numbers of objects in each group. They need to have this concept in place before they work with more difficult fractions. Ask individual learners to show you fractions of concrete objects. **Examples:** a) a quarter of 8 bottle tops b) a third of 12 pencils (a packet) c) halve of 500*ml* coke

YEAR 1 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process 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 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 Ask learners to write shaded fractions and the unshaded fraction in words and in numeric notation (common fraction). Cut different shapes into fraction pieces. Use fraction pieces to help learners to understand equivalent fractions. **Example**: a) how many halves fit onto one whole? b) how many eighths fit onto one whole? c) how many quarters fit onto one halve? Other concepts of common fractions will be dealt with in the fourth term.

YEAR 1 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
5.	**1.1** **Whole numbers**: multiplication and division	The learner must be able to: • multiply numbers by 10, 100 and 1000, and multiples of 10 and 100 • multiply 2-digit numbers and then 3-digit numbers by 1-digit numbers divide 2-digit numbers by 1-digit numbers **Calculation techniques** The learner must be able to 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	**<u>Resources</u>** Learners can work out a calculation on their white boards or slates Concrete apparatus can be used for counting Encourage them to show and explain their methods to the rest of the class. Where learners draw sticks and count them, encourage them to use one of the other methods. Learners continue to use what they know about multiplication to do division. **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**

YEAR 1 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		• using addition and subtraction as inverse operations • using multiplication and division as inverse operations The learner must be able to solve problems	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. 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. **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.

YEAR 1 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			Example  The distributive law allows you to split the number and then multiply each part separately. **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 **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

YEAR 1 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			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:** 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 Learners multiply and then subtract to calculate

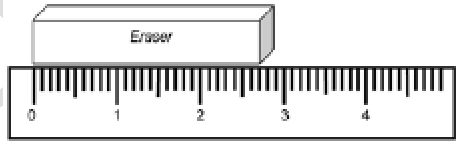
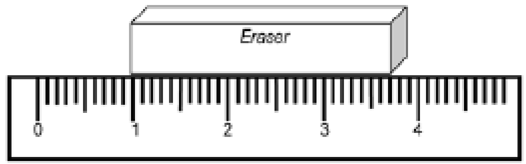
Multiply	Subtract
4 x **10** = 40	75 – 40 = 35
4 x **5** = 20	35 – 20 = 15
4 x **3** = 12	15 – 12 = 3

75 ÷ 4 = 10 + 5 + 3 + remainder 3 = 18 remainder 3

Learners should check their calculations by multiplying: 18 x 4 = 72 therefore 72 + 3 = 75.

YEAR 1 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
6.	**4.1**		
7.	**Length**	**Practical measuring** The learner must be able to do practical measuring of 2-D shapes by: • estimating • measuring • recording • comparing and ordering The learner must be able to make use of: • rulers, meter sticks, tape measures, trundle wheels • units**:** - millimetres (*mm*), centimetres (*cm*), metres (*m)*	**Resources** A ruler marked in millimetres and centimetres, tape measure, metre stick, trundle wheel, piece of wool / string. This unit focuses on: • the concept of length • providing practical activities that develop the learners' measuring skills and their knowledge of shape • exploring how ways of measuring have developed • provides terminology for measuring length which links to language. **Measuring with body parts** Encourage learners to use their own digit, palm and orbit to do the measurement. Learners should work in pairs/groups and decide how best to measure in each case. Once they have finished the measuring, discuss how the learners did the

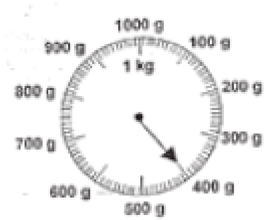
YEAR 1 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			measurement and which the best method to use was. **Measuring in meters** The learners measure distances using metres. Learners need to be shown that measurements always start from the 0-point on the ruler or tape measure. Learners need to develop the understanding of how long, or how high, or how deep 1 meter is. **Measuring all** Give the learners many opportunities to measure different things. **Example**: • length/width of a classroom/cupboard/window/fence • height of a wall/cupboard/desk • distance from the classroom door to the school gate • distance that they can jump, etc. Learners can assess each other's ability to draw lines of a given length by measuring the lines drawn by their partner. At the same time, they are practising their own measuring ability. As a line is curved, you cannot measure it accurately with a ruler. You can measure it by placing a piece of string along the curve, then measuring the

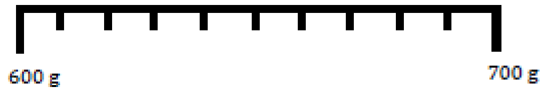
YEAR 1 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			length of the string along the ruler/tape measure/metre stick. Check that learners know how to **start measuring from zero**, OR **to subtract the initial measurement** from the final measurement. This is illustrated below. **Example:**   The eraser is (3*cm* –1*cm)* + 7*mm* = 2*cm* + 7*mm* or 20*mm* + 7*mm* or 27*mm* 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*.

YEAR 1 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		The learner must be able to do calculations and problem-solving involving length:	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 and *m*. Learners place objects next to each other and discuss which is longer or shorter. 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.

YEAR 1 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		• solve problems in contexts involving length • conversions include converting between - millimetres (*mm*) ↔ centimetre (*cm*) - centimetres (*cm*) ↔ metres (*m*) • conversions limited to whole numbers	**Estimate** and **calculate using *mm*, *cm* and *m*** • rounding numbers up or down to the appropriate unit of length • rounding off to 10 • 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
8.	**4.2** **Mass**	**Practical measuring** The learner must be able to do practical measuring of 3-D objects by: • estimating • measuring • recording • comparing and ordering **Measuring instruments:** The learner must be able to use:	**<u>Resources</u>** • A table for practical work in the classroom. • different scales, such as a kitchen scale, a bathroom scale, a balance with mass pieces and • objects such as marbles, bottle tops and blocks of wood for the learners to experiment with mass Learners must learn the relationship between the two units, grams(*g*) and kilograms(*kg*). Learners need to • consolidate their sense of how much 1*kg* is

YEAR 1 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		• bathroom scales, kitchen scales and any other appropriate instrument for measuring mass **Units:** The learner must be able to use the following units: • milligrams (*mg*), grams (*g*) and kilograms (*kg*);	• further develop a sense of how much 1*g* 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 Learners need to read: • different kinds of mass meters • mass meters on which the numbered intervals/ gradation lines /

YEAR 1 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			calibration represent different intervals /masses • apparatus which have different numbers of un-numbered intervals within each numbered interval. 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 100*g* intervals: 100*g*, 200*g*, 300*g*, 400*g*, 500*g*, 600*g*, 700*g*, 800*g*, 900*g*, 1 000*g*  It is sometimes useful to convert the circular dial into a number line for learners

YEAR 1 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		Calculations and problem-solving involving mass include: The learner must be able to do: • problems in contexts involving mass	 There are 10 spaces between each 100*g*. Each 100*g* interval has been divided into 10 smaller spaces. This means that each un-numbered interval shows 100*g* ÷ 10 = 10*g* **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. 2,5*kg* 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.

YEAR 1 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		• converting between - grams (g) ↔ kilograms (kg) • limited to examples with whole numbers	**Calculate and estimate (**using grams and kilograms) • round numbers up or down to the appropriate unit of mass • rounding to 10 • addition and subtraction of up to 4-digit numbers • multiplication 3-digit by 1-digit numbers • division: 3-digit by 1-digit numbers **Solve problems** relating to mass • 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. **Recording masses** Because learners will only work with decimal fractions in Year 3, they should record masses in

YEAR 1 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			• kilograms only e.g. 5*kg* • grams only e.g. 250*g* 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 year.
9. 10.	**FORMAL ASSESSMENT**	Although weeks 9 and 10 are allocated for assessment, the assessment can be done at any stage from week 1 to 10 **In this term Learners must be assessed on the following topics**: • Counting, ordering, comparing representing and place value • Addition and subtraction • Common fractions • Multiplication and division • Length • Mass **Make use of the following forms of assessment** • Assignment 1 • Project • **Examination** Scope is all the work done during the term	

Year 1 Term 3

YEAR 1 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
	1.1 **Whole numbers** Mental Mathematics	**Mental Mathematics involving**: • addition and subtraction of: - units - multiples of 10 - multiples of 100 • multiplication of whole numbers to at least 10 x 10 • multiplication facts of: - units by multiples of 10 - Units by multiples of 100	Refer to Year 1 Term 1 for techniques. Check the time allocation for progression in whole numbers.
1.	**1.1** **Whole numbers**: counting, ordering, comparing, representing and place value	The learner must be able to: • count forward and backwards in 25's, 50's between 0 and at least 1 000 • order, compare and represent numbers to at least 4/5-digit	**<u>Resources</u>** Calculator, flash cards, number grids, counters, bead boxes, abacuses and number lines. Dotted and squared paper, scissors **This Term the counting number interval change to 25 and 50.**

YEAR 1 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		numbers. • write numbers shown by Dienes' blocks • represent odd and even numbers to at least 100. • recognise the place value of digits in whole numbers to at least 4/5-digit numbers • round off to the nearest 10, 100 **Multiples** The learner must be able to count and order multiples of 1-digit numbers to at least 100.	Counting should **not** always start on the first multiple, **nor** should it always start on any other multiple e.g. counting in 3's can start from 5 or 27 or 348. Count forward and backwards from the bigger to the smaller number 4/5-digit whole numbers are compared by first looking at their ten thousands, then thousand, then hundreds, then tens, then units. If you compare only two numbers, the answer is written by using the symbol '<'(is less than), '='(is equal to) or '>'(is more than) If you compare more than two numbers, the answer can be written in ascending order (from the largest number to the smallest). Learners determine the position of 4/5-digits whole numbers on a number line, write these numbers in words and represent them on an abacus.
2.	**1.1** **Whole numbers**: Addition and Subtraction	**Number range for calculations** The learner must be able to do: addition and subtraction of whole numbers with at least 4/5-digit numbers	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 10 and 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

YEAR 1 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		Calculation techniques The learner must be able to: use 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** The learner must be able to:	are introduced in Year 1. One can still encourage learners to expand the numbers as they write them in columns. In Term 2, 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 + 400 + 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. • Expanded vertical method

YEAR 1 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		• recognise and use the commutative, associative and distributive properties with whole numbers • recognise 0 in terms of its additive property • recognise 1 in terms of its multiplicative property	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

YEAR 1 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			= 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. • 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.

YEAR 1 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
	2.2 **Number Sentences**	**Number sentences** • Write number sentences to describe problem situations • Solve and complete number sentences by inspection • use the commutative, associative, and distributive properties with whole numbers	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 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. 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

YEAR 1 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			• extend addition and subtraction to include facts for: - 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 **Using number sentences to consolidate learners' understanding of the additive properties of whole numbers** **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:**

<table>
<tr><th colspan="4">YEAR 1 TERM 3</th></tr>
<tr><th>WEEK</th><th>TOPIC</th><th>CONTENT</th><th>Techniques, activities, resources and process notes</th></tr>
<tr><td></td><td></td><td></td><td>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.</td></tr>
<tr><td>3.</td><td>3.2

Properties of 3-D objects</td><td>The learner must be able to:

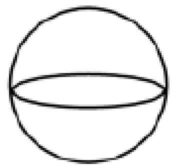
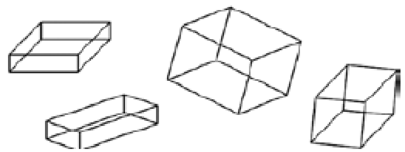
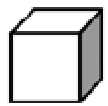
• recognise, visualize and name 3-D objects in the environment and geometric settings, focusing on:
- cubes
- rectangular prisms,
- spheres</td><td><u>Resources</u>

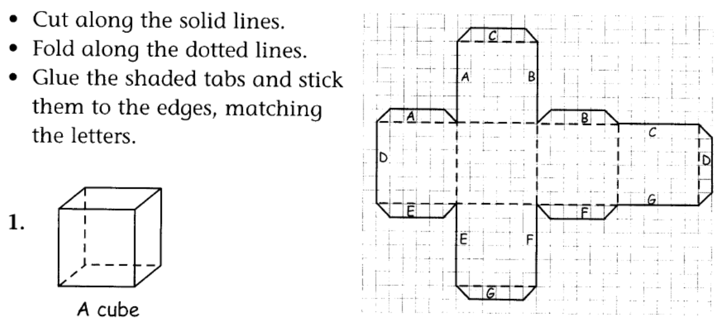
The students will have to collect items at home and bring to school, including

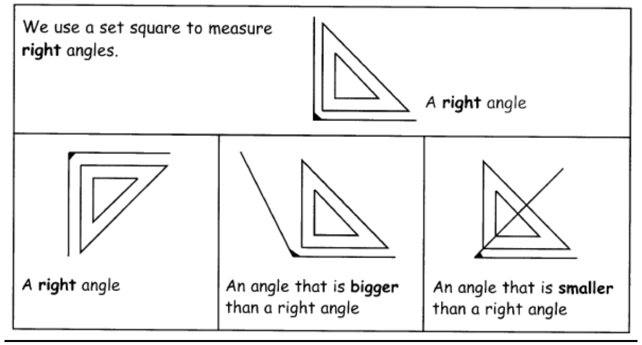
• Empty household containers of all shapes and sizes;
• Many containers of the same size;
• Grid and or centimetre grid paper, scissors, glue, etc.

Learners focus on the 3-D geometrical objects such as rectangular prisms and spheres.

3-D objects and their distinguishing characteristics that learners should identify and name.</td></tr>
</table>

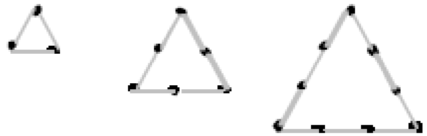
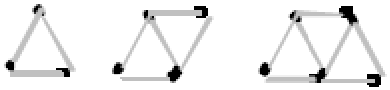
YEAR 1 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		Characteristics of objects The learner must be able to: • describe, sort and compare 3-D objects in terms of: - shapes of faces - flat and curved surfaces **Further activities** The learner must be able to: • make 3-D models using cut out polygons • use nets to make 3-D objects	There are two ways in which learners distinguish 3-D objects 1. Check whether they have flat or curved surfaces. Three dimensional objects can be grouped as follows: • Objects with a curved surface only: **Example:** a sphere  • Objects with only flat surfaces. **Example:** rectangular prisms and cubes. Rectangular prisms  Cube  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.

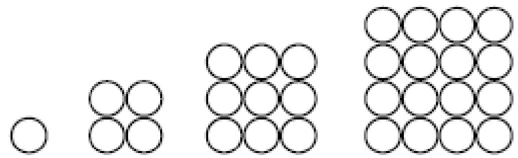
YEAR 1 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
	3.6 **Viewing of objects**	The learner must be able to: • match different views of everyday objects • identify everyday objects from different views	 Learners work with side views, plan views and top views of simple single objects such as a cup, hat, shoe, box, and apple. They also work with side views and plan views of a classroom, simple buildings and school fields.
4.	**3.1** **Properties of 2-D shapes**	The learner must be able to: • recognise, visualize and name 2-	**<u>Resources</u>** A ruler, piece of rope, a scissor, colourings, dotted and squared paper and magazines.

YEAR 1 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		D shapes in the environment and geometric settings - triangles, squares, rectangles - circles • describe, sort and compare 2-D shapes in terms of: - straight and curved sides - number of sides - angles in shapes, limited to ▪ right angles ▪ angles smaller than right angles ▪ angles greater than right angles	All this work is important for the understanding of space and form **Shapes and their distinguishing characteristics** Check whether the shapes have straight or curved sides. Look around your classroom and describe where you can see angles that are: a) bigger than a right angle b) smaller than a right angle 

YEAR 1 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
	3.3 **Symmetry**	**Further activities**: Draw 2-D shapes on grid paper The learner must be able to: • Recognise and draw line(s) of symmetry in 2-D shapes	**<u>Resources</u>** Magazines from which to cut out examples of shapes/pictures, paper, strings, squared paper and or dotty paper and rulers Drawings of 2-D shapes should include shapes in which there are more than one line of symmetry. Drawings of 2-D shapes should not be limited to the vertical lines of symmetry. Use everyday objects and shapes from nature to help learners recognise the lines of symmetry. **Example**: Draw and trace drawings of objects from nature into your book. Draw all the lines of symmetry. Teach this section practically, giving learners as much hands-on experience as possible. Allow the learners to bring objects and pictures from home to show to the class and to explain their symmetrical properties **Example**: Look in magazines for pictures of things from nature that is symmetrical. Cut them out and stick them into your exercise book. Draw the lines of symmetry.

YEAR 1 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
5.	**2.1** **Numeric and Geometric patterns** **(**Geometric patterns)	The learner must be able to: • investigate by looking for relationships or rules of patterns: - represented in physical or diagram form - of learner's own creation	In Year 1 learners, copy, investigate patterns made with numbers, objects or drawings The descriptions are only verbal. They also create their own patterns. Learners are introduced to a new way to represent patterns: the input output flow diagram. Learners show the same patterns in different ways: in a diagram, 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 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. What kinds of geometric patterns should learners work with? • Simple repeating patterns **Example:** Complete the pattern 

YEAR 1 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			• 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.  - 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, 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...

YEAR 1 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			Example  What should learners do? Copy and extend the pattern. This helps them to understand how the pattern is formed.
6. 7.	**4.6** **Perimeter, surface area and volume**	**Perimeter** The learner must be able to measure perimeter using rulers or measuring tapes and any other appropriate instrument for measuring perimeter **Calculation of area** The learner must be able to determine areas of regular shapes by counting squares on grids in order to develop an understanding of square units	**<u>Resources</u>** Practical measurement of 2-D shapes and 3-D objects by estimating, measuring, recording and ordering. The perimeter of a 2-D shape or 3-D object is the distance all the way around it. In Year 1 no formulae for perimeter are used. To find the distance around a shape or an object, use a piece of rope, roll the object on a ruler or measure and add the lengths of the sides of the shape or object.

YEAR 1 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		Measurement of volume The learner must be able to determine volume of objects by packing or filling them in order to develop an understanding of cubic units	**Area and volume are only measured informally.** Learners are not required to know or apply formulae for the perimeter, area or volume of any shape or objects. • Learners only measure perimeter informally by finding the distance around two-dimensional shapes using string. Learners show the string length or compare different perimeters by comparing string lengths. • 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.* They are also required to work from drawings in which side lengths are specified in *mm, cm.* Here they add the lengths. • Learners 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 of a grid square are longer than the vertical or horizontal distances between corners of a grid square. • Learners only investigate areas using tiling. 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.

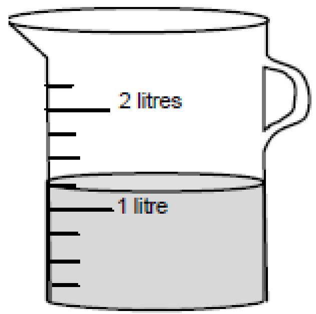
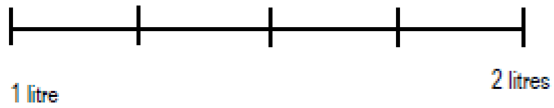
YEAR 1 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			Shapes should include: • regular shapes with straight sides where the sides are all the same length. • Learners count how many cubes or rectangular prisms are used to fill a container • The volume of 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. • 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
8.	**4.3** **Capacity/ Volume**	**Practical measuring** The learner must be able to do practical measuring of 3-D objects.	<u>**Resources**</u> You should set up a table for practical work in the classroom. The table should have resources such as water, fine sifted sand, maize meal, sugar or rice and containers of different shapes and sizes and measuring jugs, cups and spoons for learners to experiment with capacity.

YEAR 1 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		Measuring instruments: The learner must be able to use the following instruments correctly: • measuring spoons, measuring cups, measuring jugs and any other appropriate instrument for measuring volume/capacity **Units:** The learner must be able to use the following units correctly: • millilitres (*ml*) , litres (*l*)	Remember to include containers such as teaspoons, tablespoons, different cups and glasses. The learners, or group of learners will need empty 1-litre plastic bottles and marking pens in order to make their own measuring bottles Since apparatus is not always available in school, it is a good idea to show the learners how to make up their own system of measuring. **Practical work** The learners collect and use their own 1- litre container to do estimations. Estimation helps them to develop a better sense of capacity. Ask learners to bring a variety of cups and glasses from home to make the activity more real to their world. The answers will vary according to the sizes of the glasses they use in their group. Then note the following measurement facts and point them out to the learners how many glasses make up 1-litre of water. Learners learn to stand in front of the container level with the top level of the liquid when reading the amount of volume or capacity. Allow learners to practise reading different numbered gradation scales.

YEAR 1 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			The objective of this section is for the learners to grasp the connection between a litre and a millilitre 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. Learners work with new measuring instruments. 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

YEAR 1 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			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. 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

YEAR 1 TERM 3

WEEK	TOPIC	CONTENT	Techniques, activities, resources and process notes
			• 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 1 000*ml* ÷ 4 = 250*ml* The liquid is filled to 1 space above 1 litre i.e. 1 000*ml* + 250*ml* = 1 250*ml* 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.

YEAR 1 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			Compare capacities up to 4 digits in *ml*, *l* Learners should sequence containers marked in millilitres and / or litres. 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.
9. 10.	**FORMAL ASSESSMENT**	Although week 9 and 10 are allocated for assessment, the assessment can be done at any stage from week 1 to 10 **In this term Learners must be assessed on the following topics**: • Counting, ordering, comparing representing and place value • Addition and subtraction • Properties of 3-D objects • Viewing of objects • Properties of 2-D shapes • Symmetry • Numeric and Geometric patterns • Perimeter, surface area and volume • Capacity and Volume **Make use of the following forms of assessment** • Assignment 1	

YEAR 1 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		• Investigation • **Test** Scope is all the work done during the term	

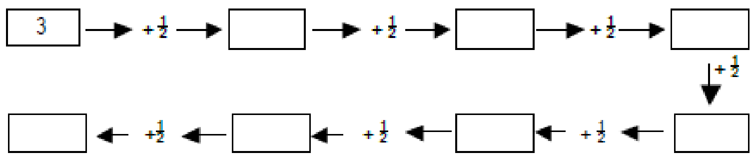
Year 1 Term 4

YEAR 1 TERM 4			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
	1.1 **Whole numbers** Mental Mathematics	**Mental Mathematics involving**: • addition and subtraction of: - units - multiples of 10 - multiples of 100 • multiplication of whole numbers to at least 10 x 10 • multiplication facts of: - units by multiples of 10 - units by multiples of 100	Refer to Year 1 Term 1 for techniques. Check the time allocation for progression in whole numbers.
1.	**1.1** **Whole numbers**: counting, ordering, comparing, representing and place value	The learner must be able to: • count forward and backwards in 100's between 0 and at least 1 000 • order, compare and represent numbers to at least 4/5-digit numbers. • write numbers shown by Dienes' blocks	**This Term the counting number interval change to 100.** Do a few counting forward and counting backwards sequences with learners until they feel confident to count on their own. Start with easy sequences, for example, adding or subtracting 1 with 5-digit numbers then move on to adding/subtracting 5, 10,100 and so on.

YEAR 1 TERM 4			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		• represent odd and even numbers to at least 100. • recognise the place value of digits in whole numbers to at least 4/5-digit numbers • round off to the nearest 10, 100	Learners have to be able to write up to 4/5-digit numbers in words, as well as expanded them. This will help them to understand the meaning of large numbers. It helps to break down the numbers in parts and simplifies the process. As often as possible provide contexts where large numbers are used. Also, let them research and share interesting statistics where numbers in this range are used. The Internet is a rich source of such statistics. Ensure that the information is relevant and up to date. In pairs, learners write and read each other 4/5-digit numbers.
	1.1 **Whole numbers**: addition and subtraction	The learner must be able to: • do addition and subtraction of whole numbers with at least 5-digit numbers • use a range of techniques to perform and check written and mental calculations with whole numbers. • solve problems involving whole numbers, including - financial contexts - measurement contexts	**Revise and consolidate** what have been done earlier in the year. See previous notes. In Term 4 learners should just do more examples.

YEAR 1 TERM 4			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
2.	**1.1** **Whole numbers**: Multiplication and division	The learner must be able to: • multiplication of at least whole 3-digit by 1-digit numbers • division of at least whole 3-digit by 1-digit numbers • use a range of techniques to perform and check written and mental calculations of whole numbers.	Extend the number range to 3 by 1 digit. Refer to Term 2 for clarification. The learner must be able to including - building up and breaking down numbers - using a number line
	2.2 **Number Sentences**	**Number sentences** The learner must be able to: • write number sentences to describe problem situations • solve and complete number sentences	**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 = □

YEAR 1 TERM 4			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			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

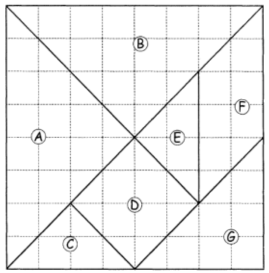
YEAR 1 TERM 4			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			they notice in their own words. They are expected to conclude: “When you multiply and divide by the same number, you get back to the number you started with”.
3. 4.	**1.2** **Common Fractions**	The learner must be able to: • count forward and backwards in fractions • compare and order common fractions with different denominators (halves; thirds, quarters; fifths. • describe and compare common fractions in diagram form • recognise, describe and use the equivalence of fractions • do addition of common fractions with the same denominators	**<u>Resources</u>** Number lines, number strips, fraction walls, objects, pictures of cake or pizza for each group, counters and fraction cards **Revise** – all the work of the first three bullets done in term 2. **Revise** - sharing and grouping by dividing learners into groups of four. Give each group a picture of a cake, pizza, chocolate etc. Ask learners to mark on the picture how they would divide the cake, pizza, chocolate up equally. Ask learners how much of the cake, pizza, chocolate each would get. Counting in fractions can happen: • as learners place down fraction pieces; • on the number line; or • in number chains like the one shown below. 

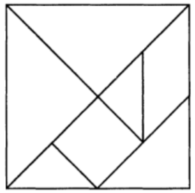
YEAR 1 TERM 4			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		Solving problems The learner must be able to solve problems in contexts involving fractions, including grouping and equal sharing	**Calculations with fractions:** Calculations with fractions in this term focus on • 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. $\frac{3}{5} + \frac{4}{5}$ can be done by counting out and counting on in fifths with apparatus or by colouring in diagrams or by "hopping" in fifths on a number line.
5.	**4.1** **Length**	The learner must be able to: • solve problems in contexts involving length • do conversions include converting	**<u>Work with millimetres and centimetres</u>** **Revise** using a ruler and reading off mm and cm. Remind learners that they must measuring from the zero mark on the ruler and that measuring in millimetres requires accurate and precise reading.

YEAR 1 TERM 4			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		between: - millimetres(mm) ↔ centimetre(cm) - centimetres (cm) ↔ metres (m) Conversions limited to whole numbers	**Solve problems relating to distance and length** Include rate and ratio problems **Conversions between units** *mm* ↔ *cm* *cm* ↔ *m* Converting between the units of measurement above provides a context for practising multiplying and dividing by 10 and 100. Conversions should be limited to whole numbers. 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. • 35*mm* = 3*cm* and 5*mm* or 312 *cm* • 526*cm* = 5*m* and 26*cm* • 2 500*m* = 2*m* and 500*cm*

YEAR 1 TERM 4			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
6.	**5.1** **Collect, organise and summarise data**	The learner must be able to: • collect data using tally marks and tables for recording • organise and summarise data: mode	Ensure that different topics (context involving human rights, social, political, environmental and economic issues) are chosen for data collection and analysis. Suitable topics to consider: favourite sports / favourite movies / favourite music / favourite TV programmes / foods or cool drinks/ favourite colours, models/makes of cars passing the school grounds, etc Learner should pose simple questions about own school and family environment. Learners draw own tally graphs to display and interpret ungrounded data.
7.	**5.2** **Representing Data**	The learner must be able to: • draw graphs to display and interpret data including: - pictographs (one-to-one correspondence between data and representation) - bar graphs	Guide learners on how to draw graphs by considering the following: 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?

YEAR 1 TERM 4			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
	5.3 **Analysing, Interpreting and Reporting Data**	The learner must be able to: • Read and interpret data represented in - words - pictographs - bar graphs • analyse data by answering questions.	• how to read the graph? In the first example of the year, you will need to guide learners on how to write complete short sentences that summarises the data. Read and interpret data presented in a variety of ways (including own representation and representations in the media – both words and graphs) to draw conclusions and make predictions sensitive to the role of: • context (e.g. rural or urban) • other human right issues. 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 • 1 pictograph • 1 bar graph Suitable topics to consider for the entire data cycle: • 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

YEAR 1 TERM 4			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			• kinds of toilets in SA homes • kinds of homes in SA 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
8.	**3.5** **Transformations**	The learner must be able to: • put 2-D shapes together to make different composite 2-D shapes including some shapes with line symmetry.	**Building composite shapes** Use tangrams to make composite 2-D shapes. Sometimes learners should be instructed to put together 2-D shapes to make composite shapes with a line of symmetry. 

YEAR 1 TERM 4			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		The learner must be able to: • pack out 2-D shapes to make tessellated patterns including some patterns with line symmetry. • refer to lines, 2-D shapes, 3-D objects and lines of symmetry when describing patterns - in nature - from modern everyday life - of our cultural heritage	 A **tangram** is a puzzle or game. Tangrams were used in China a long time ago. A tangram is a square divided into seven pieces: a parallelogram, a square, two large triangles, one medium sized triangle and two small triangles. The tangram pieces are called **tans**. The object of the game is to create different shapes using **all seven** tans. You can play alone or with a group of friends. Use this diagram to make your own tangram. **Tessellations** Learners use 2-D shapes to create tessellation patterns. Learners need to identify and describe tessellation patterns. 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

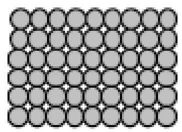
YEAR 1 TERM 4			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
	3.8 **Position and movement**	**Location and directions** The learner must be able to: • Locate position of objects, drawings or symbols on a grid with alpha-numeric grid references • Locate positions of objects on a map by using alpha-numeric grid references	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. Cells in a grid are often labelled with a letter and a number e.g. D4; A3; E7. This is called alpha-numeric referencing. The skills described below can be developed 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?"

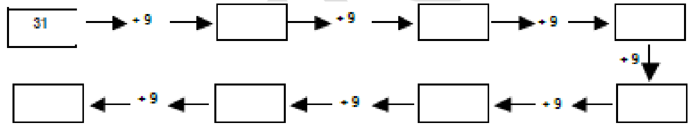
YEAR 1 TERM 4			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
9. 10.	**FORMAL ASSESSMENT**	Although week 9 and 10 are allocated for assessment, the assessment can be done at any stage from week 2 to 10 **In this term Learners must be assessed on the following topics:** • Counting, ordering, comparing representing and place value • Addition and subtraction • Multiplication and division • Common fractions • Length • Data handling **Make use of the following forms of assessment** • Assignment 1 • Assignment 2 • **Test** Scope is all the work done during the term	

Year 2 Term 1

YEAR 2 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
	1.1 **Whole numbers** 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 11 x 11 • Multiplication facts of: - units by multiples of 10 - units by multiples of 100 - units by multiples of 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. 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 11 x 11 • Calculation techniques - estimation

YEAR 2 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			- doubling and halving, - using multiplication to do division, - multiplying by 10, 100 and 1 000 - multiplying by multiples 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 4/5-digit number - using the inverse relationship between addition and subtraction **Recommended resources** • a number line (structured and empty) • a number grid • place value cards (flash cards) • counting beads
1.	**1.1** **Whole numbers**: counting, ordering, comparing, representing and place value	**Number range for counting, ordering, comparing, representing and place value of digits** The learner must be able to: • count forward and backwards in whole	In Term 1, learners should **revise** and consolidate work done in Year 1. • Count forward and backwards between 0 and at least 1 000 • Order, compare and represent numbers to at least 4-digit numbers. • Recognise the place value of digits in whole numbers to at least 4-digit numbers.

YEAR 2 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		number intervals up to at least 1 000 • order, compare and represent numbers to at least 4-digit numbers • represent odd and even numbers to at least 1 000. • recognise the place value of digits in whole numbers to at least 4-digit numbers. • round off to the nearest, 10, 100 and 1 000	• Round off to the nearest 10 and 100 and 1000 **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 Year 1 section on Numbers • arrays or diagrams of arrays e.g.  • other diagrams for counting e.g.

YEAR 2 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			 • Counting should not always start on the first multiple. Nor should it always start on any other multiple. E.g. counting in 2's can start from 5 or 27 or 348. **Place value** (number range 0 to 1 000) 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 1 000) Here learners should be given a range of exercises, e.g.

YEAR 2 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			• 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 4 340 and 4 350. • Indicate which of two numbers is greater or smaller e.g. 5 431 or 5 413. • Replace * with <, = or > e.g. 2 889 * 2 898, 4 109 * 5 190 All the work developed here can be practised throughout the year in the mental Mathematics programme.
2.	**2.2** **Number sentences**	The learner must be able to: • write number sentences to describe problem situations • solve and complete number sentences by - trial and improvement	This is a continuation of the work done on number sentences in Year 1. In Year 2 extend, solve and complete number sentences by trial and improvement. Writing number sentences can be seen as a way of preparing learners to write algebraic equations. (Only introductory) In this term learners are given practice in writing number sentences to describe

YEAR 2 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			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. 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 2000 + □ + 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 umber</th></tr><tr><td>a) 3</td><td>18</td></tr></table>

YEAR 2 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			(see below)

b) 5	66
c) 2	12
d) 11	30

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 + ☐

Example:

How much is 14 x 18 less than 15 x 18?

a) 1

b) 18

c) 14

YEAR 2 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			d) 15 **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 = □

YEAR 2 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			262 + 237 = □ therefore 499 – 237 = □
3.	**1.1** **Whole numbers**: addition and subtraction	The learner must be able to do addition and subtraction of whole numbers 4/5 digits **Calculation techniques** The learner must be able to: Use a range of techniques to perform and check written and mental calculations of whole numbers. including:	Start by revising the work done in Year 1. **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. Including: estimation, building up and breaking down numbers, adding and subtracting in columns, rounding off and compensating, using a number line, using addition and subtraction as inverse operations and using a calculator • When adding or subtracting 4/5-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.

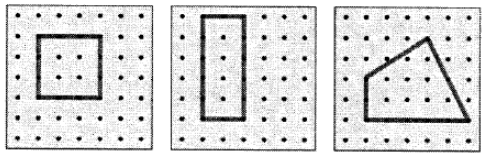
YEAR 2 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		Solving problems The learner must be able to: • Solve problems involving whole numbers, including - financial contexts - measurement contexts	**Example:** 45 678 + 2 345 Rounding off both numbers to 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. **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 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 as follows: R163 + R7= R170, then R170 + R30 = R200. Veli gets R37 change.

YEAR 2 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			Example: Calculate: 56 423 + 7 581 + 21 479 • **Column method for adding** 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 4/5-digit numbers are added. 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 • **The vertical column method to add.** 1 1 1 1 56 423 + 21 479 + 7 581 85 483 • **Expanded vertical column method to subtract**

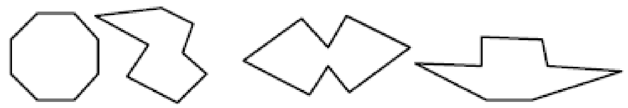
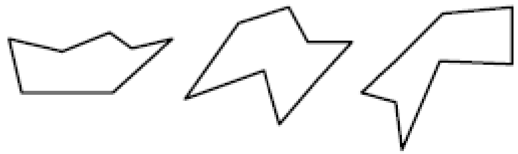
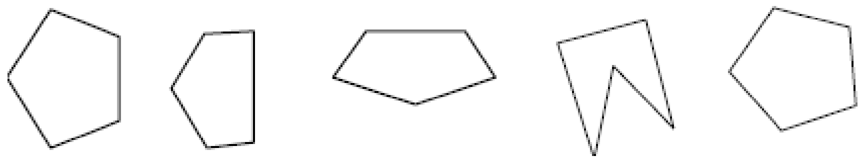
YEAR 2 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			Example: Calculate: 98 743 – 45 684 *600 130 13* 98 743 = 90 000 + 8 000 + 700 + 40 + 3 – 45 684 = 40 000 + 5 000 + 600 + 80 + 4 Total = 50 000 + 3 000 + 0 + 50 + 9 Therefore 50 000 + 3 000 + 0 + 50 + 9 = 53 059 • **The vertical column method to subtract** *6 13 13* 9 8 7 4 3 – 4 5 6 8 4 5 3 0 5 9 **Problems** Summation, increase and decrease, comparison by difference; comparison by ratio **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

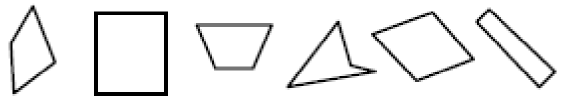
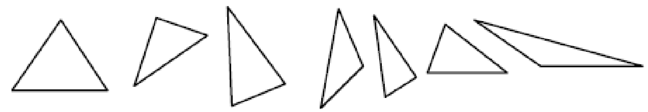
YEAR 2 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			working with very large numbers. Learners should be taught how to use calculators including how to clear an incorrectly entered number. Learners should always estimate answers before doing a calculation 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.
4.	**1.1** **Whole numbers**: multiplication and division	The learner must be able to: • do multiplication of at least whole -2-digit by 2-digit numbers • do division of at least whole 2-digit by 2-digit numbers **Calculation techniques** The learner must be able to use a range of techniques to perform and check written and mental calculations of whole numbers.	In Year 2, learners multiply 2-digit by 2-digit numbers. 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 100. 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.

YEAR 2 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			The teacher makes use of a wide range of technics to perform and check written and metal calculations of whole numbers. Including: estimation, building up and breaking down numbers, long division, 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, using a calculator.
5.	**4.4**		
6.	**Time**	The learner must be able to: • read, tell and write time in 12-hour and 24-hour formats on both analogue and digital instruments in - hours - minutes - seconds • use instruments such as clocks, watches and stopwatches • solve problems in contexts involving time • calculate intervals of time, where time is given in:	**What is different to Year 1?** 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 12-hour and 24-hour formats and to work with analogue and digital instruments. This is practiced regularly. Once learners have been taught to tell the time, it can be practiced during the mental Mathematics section of the lesson, and frequently at other times during the day. Learners continue to read calendars

YEAR 2 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		- seconds and/or minutes - minutes and/or hours - hours and/or days - days, weeks and/or months - years and/or decades	**Calculations and problem-solving related to time** Decades are introduced. Calculations should be limited to whole numbers and fractions. Know some ways in which time was measured and represented in the past
7.	**3.1** **Properties of 2-D shapes**	The learner must be able to: • Recognise, visualize and name 2-D shapes in the environment and geometric setting, focusing on - triangles, squares, rectangles, other quadrilaterals, pentagons,	**<u>Resources</u>:** Geoboards are very useful for learners to explore the sides and angles of polygons Search on the internet for instructions on how to make a geoboard  **Revise** the work done in Year 1 **Range of 2-D shapes** Pentagons, hexagons, heptagons and octagons are new shapes. Learners were not taught to count the number of sides of straight-sided 2-D shapes (polygons)

YEAR 2 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		hexagons, heptagons, octagon - circles The learner must be able to: • 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 ▪ acute ▪ right ▪ obtuse ▪ straight • draw 2-D shapes on grid paper	**Characteristics of 2-D shapes** • Learners should name angles according to their sizes but still do not work with protractors. Nor do they measure angles in degrees. Learners should first learn characteristics of each shape, before discussing comparisons between shapes. In Year 1, 2-D shapes were characterised by whether the shapes have straight or curved sides. However, in Year 2 the characteristics are extended to number of sides and angles. Shapes can be grouped by 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 should be able to identify polygons according to their number of sides. They must be able to identify any octagon, heptagon, hexagon or pentagon.

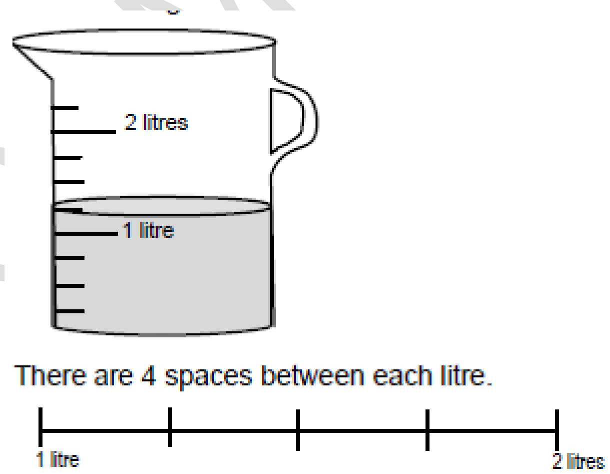
YEAR 2 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			Examples of octagons  **Examples** of heptagons/ septagons  **Examples** of hexagons  **Examples** of pentagons 

YEAR 2 TERM 1			
WEEK	TOPIC	CONTENT	Techniques, activities, resources and process notes
			Learners need to know that all closed shapes with 4 straight sides are called quadrilaterals. **Examples** of quadrilaterals.  Learners should identify and name squares and rectangles. For other quadrilaterals 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.  **Angles** Learners measure angles informally. They do not use protractors or discuss angles in terms of degrees. Learners identify the following angles by comparing them with right angles and straight angles:

YEAR 2 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			• 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 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.
8.	**4.3** **Capacity/ Volume**	**Measuring instruments:** The learner must be able to use the following instruments correctly: • measuring spoons, measuring cups, measuring jugs and any other appropriate instrument for measuring volume/capacity	**What is capacity? What is volume?** **Practical activities.** **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 250*ml*.

YEAR 2 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		Units: The learner must be able to use the following units correctly: • millilitres (*ml*) , litres (*l*)	In Year 2 learners work with the same units of capacity that they worked with in Year 1. 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

YEAR 2 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			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 unnumbered 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 unnumbered gradation lines mean. 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

YEAR 2 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			Example: Here the numbered gradation lines on the jug shows 1 litre measurement readings. Think of the gradations as a number line.  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

YEAR 2 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		Problem solving involving capacity/volume include: The learner must be able to: • solve problems in contexts involving capacity/volume	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. **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.1,5litres 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** Record capacities as • litres only e.g. 5 litres • millilitres only e.g. 250*ml* • litres and millilitres together e.g. 2 litres and 80 millilitres • litres and fractional parts of litres e.g. $2\frac{3}{4}$litres

YEAR 2 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			Calculations (including conversions) and problem-solving Measurement provides a context in which to practise skills acquired in Numbers, Operations and Relationships. 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 **Convert** between units: *ml* ↔ *l* Converting between litres and millilitres provides a context for practising multiplication and division 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. 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
9.	**FORMAL**	Although week 9 and 10 are allocated for assessment, the assessment can be done at any stage from week 1 to 10	

YEAR 2 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
10.	**ASSESSMENT**	**In this term Learners must be assessed on the following topics**: • Counting, ordering, comparing representing and place value • Number sentences • Addition and subtraction • Multiplication and division • Time • Properties of 2-D shapes • Capacity and Volume **Make use of the following forms of assessment** • Assignment 1 • Assignment 2 • **Test** Scope is all the work done during the term	

Year 2 Term 2

YEAR 2 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
	1.1 **Whole numbers** Mental Mathematics	**Mental Mathematics involving**: • Addition and subtraction of: - units - multiples of 10 - multiples of 100 - multiples of 1 000 • Multiplication of whole numbers to at least 11 x 11 • Multiplication facts of: - units by multiples of 10 - units by multiples of 100 - units by multiples of 1 000	Refer to Year 2 Term 1 for techniques. Check the time allocation for progression in whole numbers.
1.	**1.1** **Whole numbers**: counting, ordering, comparing,	**Number range for counting, ordering, comparing, representing and place value of digits**	Extend the number range to 4/5-digit numbers. Counting forward and backwards is increased to between 0 and at least 5 000. Refer to Term 1 for clarification.

YEAR 2 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
	representing and place value	The learner must be able to: • Count forward and backwards in whole number intervals up to at least 5 000 • Order, compare and represent numbers to at least 4/5-digit numbers • Represent odd and even numbers to at least 1 000. • Recognise the place value of digits in whole numbers to at least 4/5-digit numbers. • Round off to the nearest, 10, 100 and 1 000	All the work learnt here should be practised throughout the year in Mental Mathematics.
2.	**1.1** **Whole numbers**: Addition and subtraction	The learner must be able to: • do addition and subtraction of whole numbers of at least 5/6 digits **Calculation techniques** The learner must be able to: Use a range of techniques to perform and	What is different to Term 1? • In Term 2, learners add and subtract numbers with up to 5/6 digits.

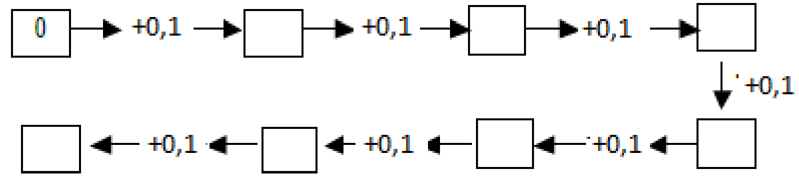
YEAR 2 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		check written and mental calculations of whole numbers including: • estimation • building up and breaking down numbers • rounding off and compensating • using a number line • adding and subtraction in columns • using addition and subtraction as inverse operations • using a calculator	
3.	**1.2** **Common fractions**	The learner must be able to: • count forward and backwards in fractions • compare and order common fractions to at least tenths • calculate fractions by addition and subtraction of common fractions with the same denominators.	What is different to Year 1? • Ninths, tenths. 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 In Term 2 learners should revise and consolidate what they learned about fractions in Year 1. Learners should develop the concept of fractions in a variety of ways. Problem

YEAR 2 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		• do calculations of fractions of whole numbers which result in whole numbers • Recognise, describe and use the equivalence of fractions	solving contexts can help learners to understand many ways of thinking about fractions. A variety of problems should be given to learners. 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.

YEAR 2 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			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). 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). **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

YEAR 2 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			comfortable with equivalence, it is easy for them to compare and order fractions. **Calculations with fractions:** 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. $6\frac{3}{5} - 2\frac{4}{5} = 4 + \frac{3}{5} - \frac{4}{5} = 3 + \frac{5}{5} + \frac{3}{5} - \frac{4}{5} = 3\frac{4}{5}$ In Year 2 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 extension of this question would be to find $\frac{3}{4}$ of 18. Here learners first

YEAR 2 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			calculate $\frac{1}{4}$ of 18 and use multiplication 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 Year 1.
4.	**1.3** **Decimal Fractions**	The learner must be able to: • compare and order decimal fractions to at least one decimal place • determine the place value of digits to at least one decimal place • add and subtract decimal fractions with at least one decimal place	Dividing whole numbers by 10, 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. **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.

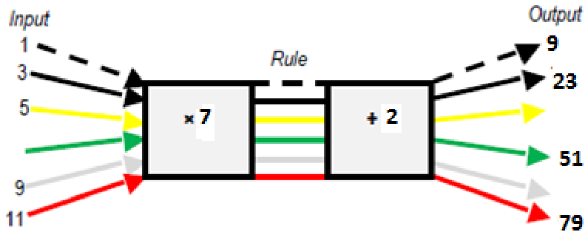
YEAR 2 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			 Exercises like the one above can be checked using calculators and learners can explain any differences between their answers and those shown by the calculator. **Equivalence between common fractions and decimal fraction forms** Learners are expected to be able to convert common fractions into its decimal fraction form. **Calculating using decimals** Learners add and subtract decimal fractions. 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. Dividing whole numbers by 10, helps to build learners' understanding of the place value of the digits in decimal fractions. Calculators can be useful tools for

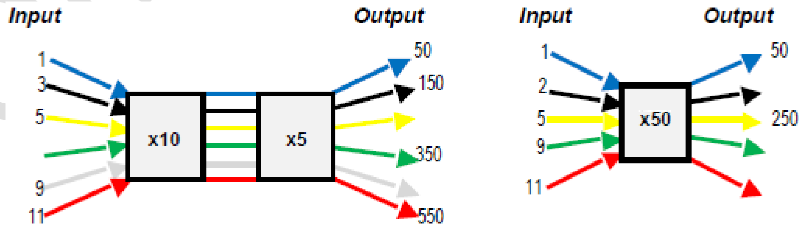
<table>
<tr><th colspan="4">YEAR 2 TERM 2</th></tr>
<tr><th>WEEK</th><th>TOPIC</th><th>CONTENT</th><th>Techniques, activities, resources and process notes</th></tr>
<tr><td></td><td></td><td></td><td>learners to learn about patterns when multiplying or dividing decimal fractions by 10.</td></tr>
<tr><td>5.</td><td>2.1

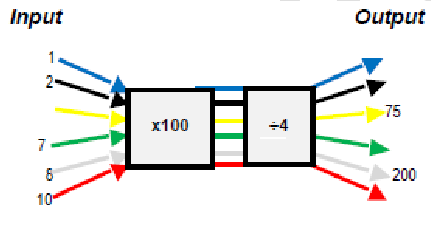
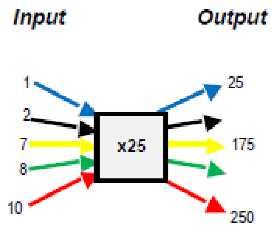
Numeric and geometric patterns</td><td>The learner must be able to:
investigate and extend numeric and geometric patterns looking for relationships of patterns:
- represented in physical or diagram form
- of learner’s own creation
- involving a constant difference
describe observed relationships or rules in learner’s own words
determine input values, output values of the patterns and relationships using
- flow diagrams
- tables
determine equivalence of different</td><td>Revise the work done in Year 1 and extend patterns given in input and output diagrams to involve two operations (the second input produces the second output)

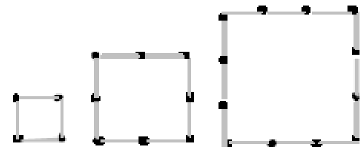
Tables are a useful way to record patterns. In Year 1it is useful to sometimes include the rule in a table.

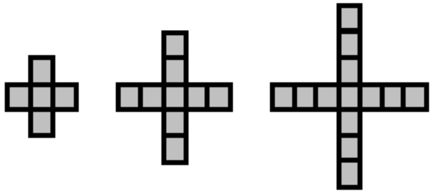
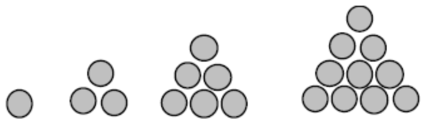
<table><tr><td></td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td></tr><tr><td>x 6</td><td>6</td><td>12</td><td>18</td><td></td><td>30</td><td></td><td></td><td></td><td></td><td>60</td></tr></table></td></tr>
</table>

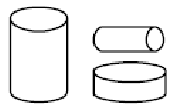
YEAR 2 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		descriptions of the same relationship or rule presented - verbally - in a flow diagram - in a table - by a number sentence	**Using flow diagrams help learners to understand and use the fact that multiplication 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 **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. **Using flow diagrams to help learners think about and use techniques for**

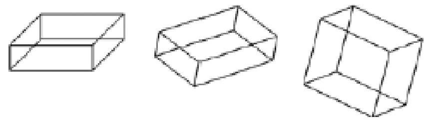
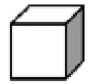
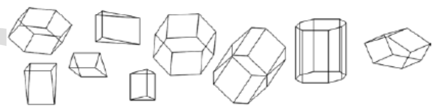
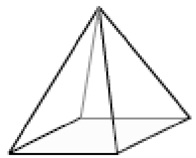
YEAR 2 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			multiplying by multiples of 10 Learners complete a flow diagram like the one below. They then explain using their own words what they notice when they compare the flow diagrams. They then discuss a short way to multiply by. 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 **Example**  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**

YEAR 2 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
	2.1 **Geometric patterns**	The learner must be able to: • investigate and extend geometric patterns looking for relationships or rules of patterns - represented in physical or diagram form	 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. In Geometric Patterns in Year 2 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 Year 1 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.

YEAR 2 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			 • 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 Year 2 will be patterns with a constant difference. They are more likely to get patterns with a constant ratio when working with number sequences. The pattern below is also a pattern with a constant difference: four squares are added each time.

YEAR 2 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			 Patterns with neither a constant difference nor a constant ratio Example:  What should learners do? • Copy and extend the pattern
6.	**3.2** **Properties of 3-D objects**	The learner must be able to: • recognise, visualize and name 3-D objects in the environment and geometric settings, focusing on:	Learners distinguish between rectangles and squares, using the lengths of the sides, so they distinguish between cubes and rectangular prisms using the shapes of their faces.

YEAR 2 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		- rectangular prisms and other prisms - cubes - cylinders - cones - pyramids - similarities and differences between cubes and rectangular prisms **Characteristics of objects** The learner must be able to describe, sort and compare characteristics of 3-D objects in terms of: • shape of faces • number of faces • flat and curved surfaces	**3-D objects and their distinguishing** characteristics that learners should identify and name. Learners count the number of faces on 3-D objects and use this as part of their descriptions of objects Objects and their distinguishing characteristics There are three ways in which learners distinguish 3-D objects 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:

YEAR 2 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			rectangular prisms **cubes**   **other prisms**  **pyramids**: square-based pyramids  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

YEAR 2 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		Further activities The learner must be able to: • make 3-D models using cut out polygons • cut open boxes to trace and describe their nets	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 of3-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 prism. Describe the surfaces of objects when shown drawing of 3-Dobjects, match the 2-D shapes that have the same shape as the faces of 3-Dobjects, match nets of rectangular prisms to the appropriate drawing of rectangular prisms and compare 3-D objects from drawings.

YEAR 2 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
	Optional **3.6** **Viewing objects**	**Optional** **Position and views** The learner must be able to: • link the position of viewer to views of: - single everyday objects - collections of everyday objects or everyday scenes	**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
7.	**3.7** **Construction of Geometric figures**	**Measuring angles** The learner must be able to: • use a protractor accurately to measure and classify angles: - $< 90^o$ (acute angles) - Right-angles - $> 90^o$ (obtuse angles) - Straight angles	**Measuring angles** Measure angles with a protractor • Learners have to be shown how to place the protractor on the arm of the angle to be measured. • Learners also have to learn how to read the size of angles on a protractor.

YEAR 2 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
8.	**1.1** **Whole numbers**: division **2.2** **Number sentences**	**Calculation techniques** The learner must be able to: The learner must be able to: • solve problems involving whole numbers, including - financial contexts - measurement contexts **Number sentences** • Write number sentences to describe problem situations • Solve and complete number sentences by - trial and improvement	The teacher uses a range of techniques to perform and check written and mental calculations of whole numbers. - Including: - estimation, - building up and breaking down numbers, - long division, - rounding off - and compensating doubling and halving, - using a number line, - using multiplication and division as inverse operations, - using a calculator. **Revise** what is done on number sentences. 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 =□

YEAR 2 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			b) 38 ÷ 6 x 6 =☐ c) 7 997 ÷6 x 6 =☐ 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”.

YEAR 2 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
9. 10.	**FORMAL ASSESSMENT**	Although week 9 and 10 are allocated for assessment, the assessment can be done at any stage from week 1 to 10 **In this term Learners must be assessed on the following topics**: • Counting, ordering, comparing representing and place value • Addition and subtraction • Common fraction • Decimal fractions • Numeric and geometric patterns • Properties of 3-D objects • Viewing of objects • Construction of geometric figures • Division **Make use of the following forms of assessment** • Assignment • Project • Examination Scope is all the work done during the term	

Year 2 Term 3

YEAR 2 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
	1.1 **Whole numbers** Mental Mathematics	**Mental Mathematics involving**: • addition and subtraction of: - units - multiples of 10 - multiples of 100 - multiples of 1 000 • multiplication of whole numbers to at least 11 x 11 • multiplication facts of: - units by multiples of 10 - units by multiples of 100 - units by multiples of 1 000	Refer to Year 2 Term 1 for techniques. Check the time allocation for progression in whole numbers.
1.	**1.1** **Whole numbers**: counting, ordering, comparing,	**Number range for counting, ordering, comparing, representing and place value of digits**	Extend the number range to 5 -digit numbers. Counting forward and backwards is increased to between 0 and at least 10 000. Refer to Term 1 for clarification.

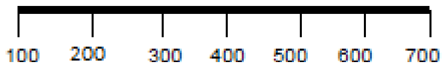
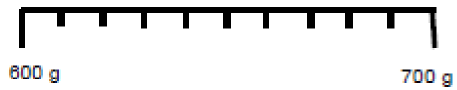
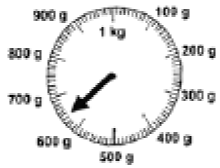
YEAR 2 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
	representing and place value	The learner must be able to: • count forward and backwards in whole number intervals up to at least 10 000 • order, compare and represent numbers to at least 5-digit numbers • represent odd and even numbers to at least 1 000. • recognise the place value of digits in whole numbers to at least 5-digit numbers. • round off to the nearest, 10, 100 and 1 000	All the work learnt here should be practised throughout the year in Mental Mathematics.
2. 3.	**4.1** **Length**	The learner must be able to: • do practical measuring of 2-D shapes and 3-D objects by - estimating - measuring - recording - comparing and ordering	**Revise** all the work done in Year 1 **Compare and order lengths up to 6 digits in *mm, cm, m, km*** 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

YEAR 2 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		• use the following measuring instruments: - rulers, meter sticks, tape measures, trundle wheels • correctly use the following units: - millimetres (*mm*), centimetres - (*cm*), metres (*m*),kilometres (*km*) • do calculations and problem-solving involving length - solve problems in contexts involving length - conversions include converting between any of the following units: ▪ millimetres (*mm*) ↔ centimetre (*cm*) ▪ centimetres (*cm*) ↔ metres (*m*) ▪ metre (*m*) ↔ kilometres (*km*) Conversions limited to whole numbers	**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 10, 100 and 1 000 • Addition and subtraction up to 6-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* ↔ *cm* *cm* ↔ *m* *m* ↔ *km* Converting between the units of measurement above provides a context for

YEAR 2 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			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. 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. • 35*cm* = 3*cm* and 5*mm* or 312 *cm* • 526*cm* = 5*m* and 26*cm* • 2 500*m* = 2*m* and 500*cm* • 4 12 *km* = 4 500*m*
4.	**4.2** **Mass**	**Practical measuring** The learner must be able to do practical measuring of 3-D objects.	**Revise** the work done in Year 1. In Year 2 learners work with the same units of mass as they did in Year 1. They also work with the same measuring instruments. Learners need to: • consolidate their sense of how much 1*kg* is • consolidate their sense of how much 1*g* 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:

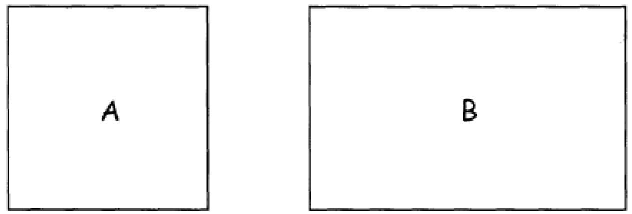
YEAR 2 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		Measuring instruments: The learner must be able to use the following instruments correctly: • bathroom scales, kitchen scales and any other appropriate instrument for measuring mass **Units:** The learner must be able to use the following units correctly: • grams (*g*) and kilograms (*kg*);	• a cow • a baby • flour for baking a cake by estimating, measuring, recording, comparing and ordering 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

YEAR 2 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			• 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. • 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 100*g* intervals: 100*g*; 200*g*; 300*g*; 400*g*; 500*g*; 600*g*; 700*g*; It is sometimes useful to convert a circular dial into a number line for learners

YEAR 2 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			   There are 10 spaces between each 100*g*. Each 100*g* interval has been divided into 10 smaller spaces. This means that each un-numbered interval shows $100g \div 10 = 10g$ **Compare masses** with up to 6-digits in grams and kilograms. If learners have not done this in previous years, 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. 2,5*kg* 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.

YEAR 2 TERM 3			
WEEK	TOPIC	CONTENT	Techniques, activities, resources and process notes
		Calculations and problem-solving involving mass include: The learner must be able to: • solve problems in contexts involving mass • convert between - grams (*g*) ↔ kilograms (*kg*) • Conversions should include common fraction	**Calculations (including conversions) and problem-solving** Measurement provides a context in which to practise skills acquired Numbers, Operations and Relationships. **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 10, 100. • 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 **Convert between units:** *g* ↔ *kg* Converting between the units of measurement provides a context for practising multiplying and dividing by 1 000. When learners do division a remainder may result e.g. 115 ÷ 25 = 4 remainder

YEAR 2 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			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. 4 250*g* = 4*kg* and 250*g* Conversions should be limited to whole numbers and fractions given only as halves / quarters / fifths. Conversions can also include converting the decimal half to the common fraction form of half. **Recording mass** Learners should record masses as • kilograms only e.g. 5*kg* • grams only e.g. 250*g* • 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 Year 3.
5.	**3.1** **Properties of 2-D Shapes**	The learner must be able to: • Recognise, visualize and name 2-D shapes in the environment and	**Revise** the work done in Term 1 **Shapes and their distinguishing characteristics** Look at these two quadrilaterals.

YEAR 2 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		geometric setting, focusing on: - similarities and differences between squares and rectangles	(Make sure when you use this example that the diagrams are drawn to scale).  a) What is the name of each quadrilateral? b) Measure the lengths of the sides of quadrilaterals A and B. c) Use the corner of a page to check whether the corners of quadrilaterals A and B from right angles. d) In what way are A and B the same? e) In what way are A and B different?
	3.3 **Symmetry**	Further activities: Draw 2-D shapes on grid paper The learner must be able to: • Recognise, draw and describe line(s) of symmetry in 2-D shapes	While doing this activity, the teacher must revise and consolidate the following: Recognising, visualising and naming 2-D shapes in the environment and geometric setting and focusing on: - triangles, - squares, - rectangles, - other quadrilaterals, pentagons, hexagons, heptagons, octagons circles

YEAR 2 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			Symmetry **Revise** the work done in Year 1.
6.	**4.5** **Temperatures**	The learner must be able to: • do practical measuring of temperature by - estimating - measuring - recording - comparing and ordering • use the following measuring instruments: - thermometers • use the following units correctly: - degrees Celsius • do Calculations and problem-solving related to temperature include:	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 $0^{o}C$ • The boiling point of pure water is $100^{o}C$ • The average normal human body temperature is $37^{o}C$ • daily environmental temperatures **Recording and reporting on temperature measurements** Learners should record and report on whole number temperature measurements

YEAR 2 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		- problems in contexts related to temperatures - calculating temperature differences limited to positive whole numbers	read on thermometers. They can also record and report temperatures by using decimal fraction notation e.g. 36,7^{o}C **Calculations and problem-solving related to temperature** Calculations and problem-solving involving temperatures should be limited to positive whole numbers and decimal fractions.
7. 8.	**5.1** **Collecting and Organising data** **5.2**	The learner must be able to: • collect and organise data - collect data using tally marks and tables for recording - order data from smallest group to largest group • organise and summarise data - median - mode The learner must be able to represent data	**Revise** the work done in Year 1 What is new in Year 2 • Ordering data sets • analysing data not only according to categories but also taking into account contexts and sources of data • analysing 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 should ensure that different topics are chosen for data collection and analysis.

YEAR 2 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
	Representing data	The learner must be able to draw a variety of graphs to display and interpret data including: • pictographs (many-to-one correspondence) • bar graphs	**Revise** the work done in Year 1 What is new in Year 2 • pictographs (many-to-one correspondence)
	5.3 **Analysing, Interpreting** **And Reporting data**	The learner must be able to interpret data by: • critically reading and interpreting data represented in - words - pictographs - bar graphs - double bar graphs - pie charts • analysing data by answering questions related to: - data categories	**Revise** the work done in Year 1 What is new in Year 2 • pie charts • data categories • data sources and contexts • central tendencies – (mode and median) **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

YEAR 2 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		- data sources and contexts - central tendencies – (mode and median) The learner must be able to report data by summarising data verbally	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 summarise 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; 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, collecting, organising, representing, analysing and interpreting data and reporting on the data. Choose a different topic to Term 1.

YEAR 2 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			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

YEAR 2 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
9. 10.	**FORMAL ASSESSMENT**	Although week 9 and 10 are allocated for assessment, the assessment can be done at any stage from week 1 to 10 **In this term Learners must be assessed on the following topics**: • Counting, ordering, comparing representing and place value • Length • Mass • Properties of 2-D shapes • Symmetry • Temperatures • Data handling **Make use of the following forms of assessment** • Assignment • Investigation • Test Scope is all the work done during the term	

Year 2 Term 4

YEAR 2 TERM 4			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
	1.1 **Whole numbers** Mental Mathematics	**Mental Mathematics involving**: • addition and subtraction of: - units - multiples of 10 - multiples of 100 - multiples of 1 000 • multiplication of whole numbers to at least 11 x 11 • multiplication facts of: - units by multiples of 10 - units by multiples of 100 - units by multiples of 1 000	Refer to Year 2 Term 1 for techniques. Check the time allocation for progression in whole numbers.
1.	**1.1** **Whole numbers**: counting, ordering, comparing, representing and	**Number range for counting, ordering, comparing, representing and place value of digits** The learner must be able to:	Extend the number range to at least 5/6-digit numbers. Counting forward and backwards is increased to between 0 and at least 10 000. Refer to Term 1 for clarification. All the work learnt here should be practised throughout the year in Mental

YEAR 2 TERM 4			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
	place value	• count forward and backwards in whole number intervals up to at least 10 000 • order, compare and represent numbers to at least 5/6-digit numbers • represent odd and even numbers to at least 1 000. • recognise the place value of digits in whole numbers to at least 5/6-digit numbers. • round off to the nearest, 10, 100 and 1 000	Mathematics.
2.	**1.1** **Whole numbers**: Addition and subtraction	The learner must be able to do addition and subtraction of whole numbers of at least 6 digits **Calculation techniques** The learner must be able to use a range of	Extend the number range to 6-digit numbers. Refer to Term 1 for clarification. The teacher makes use of a variety of technics including: • estimation

YEAR 2 TERM 4			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		techniques to perform and check written and mental calculations of whole numbers. **Solving problems** The learner must be able to: • solve problems involving whole numbers, including - financial contexts - measurement contexts • solve problems involving whole numbers.	• building up and breaking down numbers • adding and subtracting in columns • rounding off and compensating • using a number line • using addition and subtraction as inverse operations • using a calculator
3.	**1.1** **Whole numbers**:	The learner must be able to:	Extend the number range to 3-digit by 2-digit numbers. Refer to Term 1 for

YEAR 2 TERM 4			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
	multiplication **2.2** **Number sentences**	• multiplication of at least whole 3-digit by 2-digit numbers **Calculation techniques** The learner must be able to use a range of techniques to perform and check written and mental calculations of whole numbers. **Number sentences** The learner must be able to: • write number sentences to describe problem situations • solve and complete number sentences by inspection	clarification. The teacher makes use of a variety of technics including: • estimation • building up and breaking down numbers • long division • rounding off and compensating • doubling and halving • using a number line • using multiplication and division as inverse operations • using a calculator

YEAR 2 TERM 4			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
4. 5.	**4.6** **Perimeter, Surface Area and volume**	**Perimeter** The learner must be able to Measure perimeter using rulers or measuring tapes and any other appropriate instrument for measuring perimeter **Calculation of area** The learner must be able to ddetermine areas of regular and irregular shapes by counting squares on grids in order to develop an understanding of square units **Measurement of volume** The learner must be able to determine volume/capacity of objects by packing or filling them in order to develop an understanding of cubic units	Revise the work done in Year 1. Extend the range of units to kilometre (km) when measuring perimeter. Shapes should include: • irregular shapes with straight sides where the sides are not all the same length. • shapes with curved sides
6.	**3.8** **Position and**	The learner must be able to: • locate position of objects, drawings or	Cells in a grid are often labelled with a letter and a number e.g. D4; A3; E7. This is called alpha-numeric referencing.

YEAR 2 TERM 4			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
	movement	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	In Year 2 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 Year 2 they give directions to move between positions on a grid or map. In Geography 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 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
7.	**3.5** **Transformation**	The learner must be able to 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 The learner must be able to:	**Use transformations to create composite shapes** Learners use a 2-D shape as a template which they trace and move by reflection and translation 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 "reflection and translation" **Use transformations to make tessellations** Learners use 2-D shapes to make tessellation patterns. These tiling patterns

YEAR 2 TERM 4			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		• 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 • describe patterns • refer to lines, 2-D shapes, 3-D objects, lines of symmetry, rotations, when describing patterns - in nature - from modern everyday life	can be made by packing out the tiles. Learners are required to make the patterns by translating and 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.

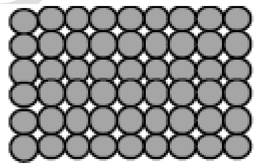
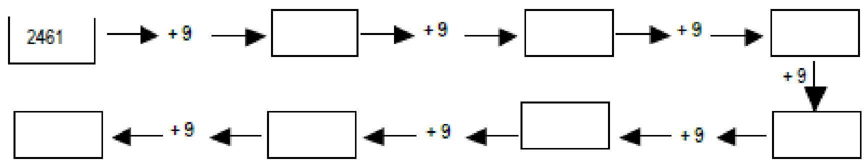
YEAR 2 TERM 4			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
8.	**1.2** **Common fractions**	The learner must be able to solve problems in context involving: The learner must be able to: • do addition and subtraction of mixed numbers with the same denominator • solve problems in contexts involving common fractions, including grouping and sharing • do introductory calculations with percentages as fractions The learner must be able to recognise and	**Revise** all the work done in Term 2 • Addition and subtraction of mixed numbers **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. $6\frac{3}{5} - 2\frac{4}{5} = 4 + \frac{3}{5} - \frac{4}{5} = 3 + \frac{5}{5} + \frac{3}{5} - \frac{4}{5} = 3\frac{4}{5}$ **Percentages are a new topic for Year 2 learners.** Learners 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**

YEAR 2 TERM 4			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		use equivalent forms of common fractions.	Learners 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.
9. 10.	**FORMAL ASSESSMENT**	Although week 9 and 10 are allocated for assessment, the assessment can be done at any stage from week 1 to 10 **In this term Learners must be assessed on the following topics**: • Counting, ordering, comparing representing and place value • Addition and subtraction • Multiplication • Perimeter surface area and volume • Position and movement • Transformations • Common fractions **Make use of the following forms of assessment** Examination Scope is all the work done during the term	

Year 3 Term 1

YEAR 3 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
	1.1 **Whole numbers** Mental Mathematics	**Mental Mathematics involving**: • Addition and subtraction of: - units - multiples of 10 - multiples of 100 - multiples of 1000 - multiples of 10000 • 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	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 Year 2. 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

YEAR 3 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			▪ multiples of times tables (multiplication of whole numbers to at least 12 x 12) • 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 any5-digit number **Recommended resources** • a number line (structured and empty) • a number grid • place value cards (flash cards) • counting beads
1.	**1.1** **Whole numbers**: counting, ordering,	**Number range for counting, ordering, comparing, representing and place**	Revise the work done in Year 2 **Counting**

YEAR 3 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
	comparing, representing and place value	**value of digits** The learner must be able to: • Order, compare and represent numbers to at least 6/7-digit numbers • Recognising the place value of digits in whole numbers up to 6/7-digit numbers • Round off to the nearest 10, 100, 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. • 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 25's can start from 27 or 113 ,

YEAR 3 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			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.	**1.1** **Whole numbers**: addition and subtraction	**Number range for calculations** The learner must be able to do: • addition and subtraction of whole numbers of at least 6/7 digits • multiple operations on whole numbers with or without brackets **Calculation techniques** The learner must be able to use a range of	Learners should get a lot of practice adding and subtracting large numbers. Problem situations can become more complex. Start with addition and subtraction of 6-digit numbers and extend it to at least 8-digit numbers with or without using calculators. 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. 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

YEAR 3 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		techniques to perform and check written and mental calculations of whole numbers. • Solve problems involving whole numbers. -	them. The teacher makes use of a variety of technics including: • estimation • building up and breaking down numbers • rounding off and compensating • using a number line • using addition and subtraction as inverse operations • using a calculator **Calculations with whole numbers** • Learners should do calculations and solve problems in contexts • Learners should become more confident in and more independent at mathematics, if they have some of the following techniques: - to check their solutions themselves, e.g. using inverse operations; using calculators - to judge the reasonableness of their solutions
3.	**1.1**		
4.	**Whole numbers**	**Number range for multiples and factors**	Multiples and factors

YEAR 3 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
	Multiples and factors	The learner must be able to: • determine multiples of 2-digit numbers • determine factors of 2-digit whole numbers	• Practice with finding multiples and factors of whole numbers are especially important when learners do calculations with fractions. They use this knowledge to find the LCM when one denominator is a multiple of another, and also when they simplify fractions or have to find equivalent fractions. • Factorisation of whole numbers lays the foundation for factorisation of algebraic expressions. **Examples**: a) The multiples of 6 are 6, 12, 18, 24,... or M6 = {6; 12; 18; 24;...} LCM of 6 and 18 is 18 b) The multiples of 6 are 6, 12, 18, 24,..., 42,.. or M6 = {6; 12; 18; 24;..,42,..} The multiples of 7 are 7, 14, 21, 28,..., 42,.. or M7 = {6; 14; 21; 28;..,42,..} LCM of 6 and 7 is 42 c) The factors of 24 are 1, 2, 3, 4, 6, 12 and 24 by inspection and, the prime factors of 24 are 2 and 3 d) The factors of 140 are 1, 2, 5, 7, 10, 14, 28, 35, 70 and 140 e) Determine the HCF of 120; 300 and 900 Learners do this by finding the prime factors of the numbers first. $120 = 5 \times 3 \times 2^3$. Initially learners may write this as: $5 \times 3 \times 2 \times 2 \times 2$ $300 = 5^2 \times 3 \times 2^2$ $900 = 5^2 \times 3^2 \times 2^3$

YEAR 3 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			HCF = 5 x 3 x 2^2 = 60 (Multiply the common **prime** factors of the three numbers)
5.	**1.1** **Whole numbers**: Multiplication	The learner must be able to do multiplication of at least whole 3-digit by 2-digit numbers **Calculation techniques** The learner must be able to 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	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

YEAR 3 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		• using multiplication and division as inverse operations • using a calculator to do multiple operations on whole numbers with or without brackets	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.
6.	**1.1** **Whole numbers**: Division	The learner must be able to do division of at least whole 3-digit by 2-digitnumbers **Calculation techniques** The learner must be able to use a range of techniques to perform and check written and mental calculations of whole numbers including: • estimation • building up and breaking down numbers • long division • rounding off and compensating • doubling and halving	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 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.

YEAR 3 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		• using a number line • using addition and subtraction as inverse operations • using multiplication and division as inverse operations - using a calculator	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** 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. Learners fill in other multiples as they need to use them e.g. **Clue board**

YEAR 3 TERM 1

WEEK	TOPIC	CONTENT	Techniques, activities, resources and process notes
			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 Learner's uses multiply and then subtract to calculate by approximation. Multiply to get an approximate answer. Subtract to find the difference

Multiply to get an approximate answer	Subtract to find the difference
20 x 17 = 340	442 – 340 = 102
6 x 17 = 102	102 – 102 = 0

Learners should check their calculations by multiplying:

26 x 17 = (26 x 10) + (26 x 7)

= 260 + 182

= 422

<table>
<tr><th colspan="4">YEAR 3 TERM 1</th></tr>
<tr><th>WEEK</th><th>TOPIC</th><th>CONTENT</th><th>Techniques, activities, resources and process notes</th></tr>
<tr>
<td>7.</td>
<td>2.1

Numeric and geometric patterns</td>
<td>The learner must be able to:

investigate and extend numeric and geometric patterns looking for relationships or rules of patterns

- represented in physical or diagram form
- of learner’s own creation
- involving a constant difference.
- represented in tables
describe the general rules for the observed relationships

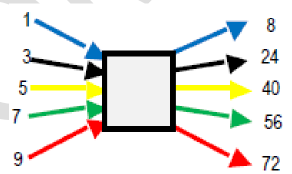
Input and output values

The learner must be able to determine input values, output values and rules for the patterns and relationship using:

flow diagrams
tables

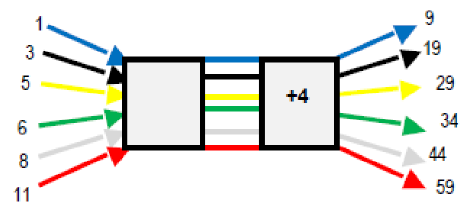
</td>
<td>Revise what is done in Year 2.
The focus in Year 3 is to determine a rule when given input and output

Example

Determine the rule


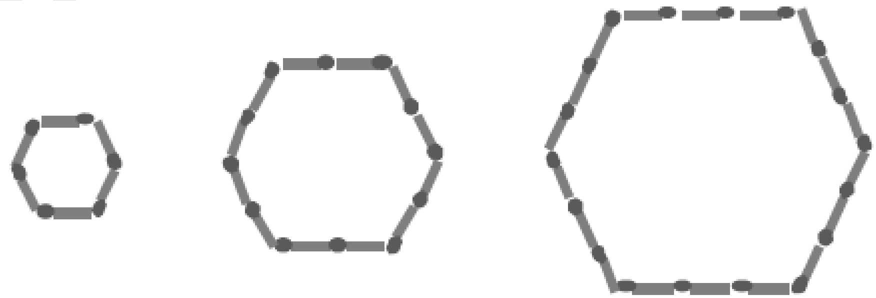
Work with examples which have a two stage rule e.g. multiply and then add, where one stage is left out

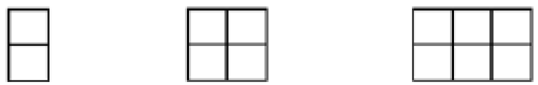
Example

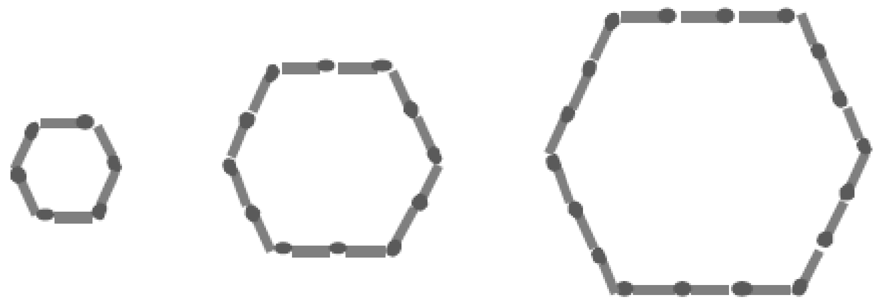
Determine the rule


</td>
</tr>
</table>

YEAR 3 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		Equivalent forms The learner must be able to determine equivalence of different descriptions of the same relationship or rule presented • verbally • in a flow diagram • in a table • by a number sentence	**Geometric 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, in Shape and Space they are only required to describe the patterns using the language of geometry and to make copies of the patterns. 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. 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

YEAR 3 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			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.  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

YEAR 3 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			second pattern two matches are added each time. Both patterns are **patterns with a constant difference.** Most geometric patterns learners see 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

YEAR 3 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			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 **Example:** Extending the pattern:  Describing the pattern in own words “It is a pattern of hexagons”

<table>
<tr><th colspan="4">YEAR 3 TERM 1</th></tr>
<tr><th>WEEK</th><th>TOPIC</th><th>CONTENT</th><th>Techniques, activities, resources and process notes</th></tr>
<tr><td></td><td></td><td></td><td>“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”

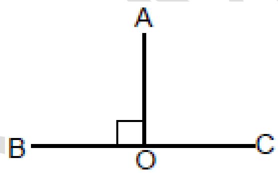
Recording the number pattern in a table
When learners fill in a table like the one below, they can begin to see that the number of matches used for each hexagon is 6 multiplied by the position number of the hexagon in the sequence. They will see that the rule is hexagon position number multiplied by 6.

Learners can then be asked to predict how many matches will be used for hexagons not built e.g. 10th, 100th, 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></tr>
<tr><td>8.</td><td>3.4

Geometry of straight lines</td><td></td><td>Line segment is a set of points with a definite starting-point and an end-point.

• Line is a set of points with no definite starting-point and end-point.</td></tr>
</table>

YEAR 3 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		Angle relationships The learner must be able to: • Recognise and describe pairs of angles formed by: - perpendicular lines - intersecting lines - parallel lines cut by a transversal **Solving problems** The learner must be able to: • Solve geometric problems using the relationships between pairs of angles described above	If vertical line AO meets or intersects with horizontal line BC at right angle, then AO is perpendicular to BC. **Example:**  This is written as AO⊥BC **Angle relationships learners should know:** • If the sum of the angles on a straight line is 180° • If lines are perpendicular, then adjacent supplementary angles are each equal to 90°. • If lines intersect, then vertically opposite angles are equal. • if parallel lines are cut by a transversal, then corresponding angles are equal **Solving problems** • Learners can solve geometric problems to find unknown angles using the angle relationships above, as well as other known properties of triangles and quadrilaterals.

YEAR 3 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
9. 10.	**FORMAL ASSESSMENT**	Although week 9 and 10 are allocated for assessment, the assessment can be done at any stage from week 1 to 10 **In this term Learners must be assessed on the following topics**: • Counting, ordering, comparing representing and place value • Addition and subtraction • Multiples and factors • Multiplication • Division • Numeric and geometric patterns • Geometry of straight lines **Make use of the following forms of assessment** • Assignment 1 • Assignment 2 • Test Scope is all the work done during the term	

Year 3 Term 2

YEAR 3 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
	1.1 **Whole numbers** Mental Mathematics	**Mental Mathematics involving**: • addition and subtraction of: - units - multiples of 10 - multiples of 100 - multiples of 1000 - multiples of 10000 • 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	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 Year 1. 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 12 x 12)

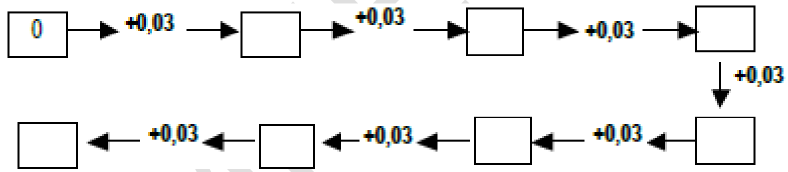
YEAR 3 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			• calculation techniques - doubling and halving, - using multiplication to do division, - multiplying by 10, 100 and 1 000 - multiplying by multiples or 10, 100 and 1 000 - dividing by 10, 100 and 1 000 - building up and breaking down numbers, - rounding off to the nearest 10, 100 and1 000 and compensating - adding and subtracting of units, multiples of 10, 100 and 1 000 to/from any 5-digit number
1. 2.	**1.2** **Common fractions**	The learner must be able to: • compare and order common fractions including tenths and hundredths • extend to thousandths • addition and subtraction of common fractions in which one denominator is a multiple of another • addition and subtraction of mixed numbers	**Revise** the work on common fractions done in Year 2. Learners 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 • Learners work with equivalence between - common fraction and decimal fraction forms of the same number

YEAR 3 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		• fractions of whole numbers The learner must be able to: • solve problems in contexts involving common fractions, including grouping and sharing • find percentages of whole numbers • Recognise and use equivalent forms of common fractions with 1-digit or 2-digit denominators (fractions in which one denominator is a multiple of another) • Recognise equivalence between common fractions • Recognise equivalence between common fraction, decimal fraction and percentage forms of the same number	- common fraction and percentage forms of the same number - decimal fraction and percentage forms of the same number **Calculations with fractions** • Learners should do context free calculations and solve problems in contexts. • Learners must know how to simplify fractions and convert between mixed numbers and fraction forms. Learners should know from working with equivalence, when a fraction is equal to or greater than 1. • LCMs have to be found when adding and subtracting fractions of different denominators. Here learners use knowledge of common multiples to find the LCM i.e. what numbers can both denominators be divided into. • To simplify fractions, learners use knowledge of common factors i.e. what can divide equally into the numerator and denominator of a fraction. Emphasize that when simplifying, the fractions must remain equivalent. **Example** $\frac{3}{4} \times \frac{2}{5} = \frac{6}{20} = \frac{3}{10}$ **Or**

YEAR 3 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			$\frac{3}{4} \times \frac{2}{5} = \frac{3}{10}$ • Learners should recognise that finding a 'fraction of a whole number' or 'finding a fraction of a fraction' means multiplying the fraction and the whole number or the fraction with the fraction. • When learners find fractions of whole numbers, the examples can be chosen to result either in whole numbers or fractions or both. • Learners should also use the convention of writing the whole number as a fraction over when multiplying. Examples a) Calculate by making use of calculators $\frac{4}{5}\ of\ 20$ Answer $\frac{4}{5}\ of\ 20 = \frac{4}{5} \times \frac{20}{1} = \frac{4}{1} \times \frac{4}{1} = 16\ \ OR\ \frac{4}{5}\ of\ 20 = \frac{4}{5} \times \frac{20}{1} = \frac{80}{5} = 16$

YEAR 3 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			b) Calculate by making use of calculators $\frac{2}{3}\ of\ \frac{5}{6}$ Answer $\frac{2}{3}\ of\ \frac{5}{6} = \frac{2}{3} \times \frac{5}{6} = \frac{1}{3} \times \frac{5}{3} = \frac{5}{9}\ \ OR\ \frac{2}{3} \times \frac{5}{6} = \frac{10}{18} = \frac{5}{9}$ **Calculation using percentages** • Learners should do context free calculations and solve problems in contexts. • When doing calculations using percentages, learners have to use the equivalent common fraction form, which is a fraction with denominator 100. • Learners should become familiar with the equivalent fraction and decimal forms of common percentages like: a) $25\%\ or\ \frac{1}{4}\ or\ 0{,}25$ b) $50\%\ or\ \frac{1}{2}\ or\ 0{,}5$ c) $60\%\ or\ \frac{3}{5}\ or\ 0{,}6$ • To calculate percentage of part of a whole, or percentage increase or decrease, learners have to learn the strategy of multiplying by $\frac{100}{1}$.It is useful for learners to learn to use calculators for some of these calculations where the fractions are not easily simplified.

YEAR 3 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			• When using calculators, learners can also use the equivalent decimal fraction form for percentages to do the calculations. **Examples**: a) Calculate $60\%\ of\ R105$ Amount $= \frac{3}{5} \times R105\ = R63$ b) What percentage is $40c\ of\ R3{,}20$ Percentage $= \frac{40}{320} \times \frac{100}{1}\ = \frac{100}{8} = 12{,}5\%$ c) Calculate the percentage increase if the price of a bus ticket of R60 is increased to R84. Amount increased R24 Therefore, percentage increase $\frac{24}{60} \times \frac{100}{1}\ = 40\%$ d) Calculate the percentage decrease if the price of petrol goes down from $20\ cents$ a litre to $18\ cents$ a litre. Amount decreased $=\ 2\ cents$ Therefore, the percentage decrease $= \frac{2}{20} \times \frac{100}{1} = 10\%$
3.	**1.3**		
4.	**Decimal fraction**	The learner must be able to: • compare and order decimal fractions to at least two decimal places	**Ordering, counting and comparing decimal fractions** • Counting should not only be thought of as verbal counting. Learners can count in decimal intervals using:

<table>
<tr><th colspan="4">YEAR 3 TERM 2</th></tr>
<tr><th>WEEK</th><th>TOPIC</th><th>CONTENT</th><th>Techniques, activities, resources and process notes</th></tr>
<tr><td></td><td></td><td>
• determine place value of digits to at least two decimal places
• add and subtract decimal fractions with at least two decimal places
• multiply decimal fractions by 10 and 100
• recognise equivalence between common fraction and decimal fraction forms of the same number
• Recognise equivalence between common fraction, decimal fraction and percentage forms of the same number
• solve problems in context involving decimal fractions
</td><td>
- structured, semi-structured or empty number lines
- chain diagrams for counting


• Learners should be given a range of exercises such as:
- arrange given numbers from the smallest to the biggest: or biggest to smallest
- fill in missing numbers in:
▪ a sequence
▪ on a number grid
▪ on a number line
▪ fill in <, = or >
Example: 0,4 * 0.04
• Counting exercises in chain diagrams can be checked using calculators and learners can explain any differences between their answers and those shown by the calculator
Calculating with decimal fractions
• Learners should do context free calculations and solve problems in contexts.
</td></tr>
</table>

YEAR 3 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			• Learners should estimate their answers before calculating, especially with multiplication by decimal fractions. They should be able to judge the reasonableness of answers relating to how many decimal places and also check their own answers. • Multiplication by decimal fractions should start with familiar numbers that learners can calculate by inspection, so that learners get a sense of how decimal places are affected by multiplication. **Examples**: a) 3 x 2 = 6 0,3 x 2 = 0,6 0,3 x 0,2 = 0,06 0,3 x 0,02 = 0,006 b) 15 x 3 = 45 1,5 x 3 = 4,5 0,15 x 3 = 0,45 Equivalence between common fractions and decimal fractions • Learners are not expected to be able to convert any common fraction into its decimal form, merely to see the relationship between tenths, hundredths and

YEAR 3 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			Equivalence between common fractions and decimal fractions. • Learners are not expected to be able to convert any common fraction into its decimal form, merely to see the relationship between tenths and hundredths in their decimal forms. • Learners 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, 20, 25 learners can convert these to hundredths using what they know about equivalence. • It is useful to use calculators to help learners convert between common fractions and decimal fractions (here learners will use what they know about the relationship between fractions and division). • Similarly, calculators can be useful tools for learners to learn about patterns when multiplying decimals by 10 and 100
5.	**1.1** **Whole numbers** All four main mathematical operations	**Number range for calculations** The learner must be able to do: • addition and subtraction of whole numbers of at least 6- 8 digits • multiplication of up to 4-digit by 3-digit whole numbers	All concepts developed here can be practised throughout the year. 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. However, learners have to learn rules such as BODMAS to indicate the order of operations.

YEAR 3 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		• division of up to 4-digit by 3-digit whole numbers • multiple operations on whole numbers with or without brackets **Calculation techniques** The learner must be able to use a range of techniques to perform and check written and mental calculations of whole numbers. **Properties of whole numbers** The learner must be able to:	The teacher makes use a range of techniques to perform and check written calculations of whole numbers including: • estimation • building up and breaking down numbers • long division • 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 • using a calculator **Properties of whole numbers**

YEAR 3 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		• recognise 0 in terms of its additive property • recognise 1 in terms of its multiplicative property **Solving problems** The learner must be able to solve problems involving whole numbers. • grouping and equal sharing with remainders	• The properties of numbers provide a foundation for operations with numbers. • When learners are introduced to new numbers, such as integers for example, they can again explore how the properties of numbers work for the new set of numbers. • Learners also have to apply the properties of numbers in algebra, when they work with variables in place of numbers. - Addition and subtraction as inverse operations - Multiplication and division as inverse operations - 0 is the identity element for addition: $t + 0 = t$ - 1 is the identity element for multiplication: $t \times 1 = t$ **Calculations with whole numbers** • Learners should do context free calculations and solve problems in contexts • Learners should become more confident in and more independent at mathematics, if they have techniques - to check their solutions themselves, e.g. using inverse operations; using calculators

YEAR 3 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			- to judge the reasonableness of their solutions e.g. estimate by rounding off; estimate by doubling or halving; • Adding, subtracting and multiplying in columns, and long division, should only be used to practice number facts and calculation techniques, and hence should be done with familiar and smaller number ranges. For big and unwieldy calculations, learners should be encouraged to use a calculator.
6.	**1.1**		
7	**Whole numbers** Finance	**Solving problems** The learner must be able to: • Solve problems that involve whole numbers, percentages and decimal fractions in financial contexts such as: - profit, loss, discount - budgets - accounts • Solve problems involving whole numbers. - grouping and equal sharing with remainders	Work with the following financial documents: • documents relating to personal and/or household finance, including: - household bills (e.g. electricity, water, telephone, cell phone) - shopping documents (e.g. till slips, account statements) - banking documents* (e.g. bank statements and fee structures) - household budgets* • documents relating to workplace and small business finance, including: - payslips; budgets*; quotations; invoices; receipts; banking documents* **Financial contexts** • Solving problems in contexts should take account of the number ranges learners are familiar with. • Once learners have done sufficient calculations for simple interest through repeated calculations, they could use given formulae for these calculations.

YEAR 3 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			Identify and perform calculations involving income, expenditure, profit and loss values, including: Fixed, variable and occasional *income* values and fixed, variable, occasional, high-priority and low-priority *expenditure* values from the following sources: **Personal income:** • salaries, wages and commission • gifts and pocket money • bursaries • savings **Personal expenditure:** • living expenses (e.g. *food, clothing, entertainment*) • accounts (e.g. *electricity and water*) • telephone • fees (e.g. *school fees and bank fees*) • insurance (e.g. *car, household and medical aid*) • personal taxes • loan repayments (e.g. *store accounts*) • savings **Business and/or workplace income:** **Business and/or workplace**

YEAR 3 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			• income from sales and/or services rendered • donations and/or grants **expenditure:** • salaries, wages and commission • running expenses (e.g. *services, telephone, rent*) **Income for larger organisations** (e.g. taxes for a government). **Expenditure for larger organisations** (e.g. municipality). **Manage finances by**: analysing and preparing income-and-expenditure statements and budgets, with an awareness of the difference between these two documents, for: • an individual and/or household • a trip (e.g. holiday) • personal projects (e.g. dinner party; significant purchases such as a cell phone, television or furniture) • a small business (e.g. spaza shop), including: - a comparison of income/expenditure/profit values over two years *(analysis only)* - budgets showing a comparison of projected versus actual income, expenditure and profit/loss values *(analysis only)* • large projects and/or events (e.g. fund-raising event or a wedding) Interpret banking documents (e.g. *bank statements and fees brochures*) and

YEAR 3 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			understand the following terminology in the documents: • opening and closing balance • debit • credit • bank charge or transaction fee • debit order • ATM • electronic transfer • payment • deposit • withdrawal Determine bank charges for different types of accounts using given fee tables Investigate the advantages and disadvantages of the different types of accounts regarding access to money, bank charges and rates. Investigate the implications of late payments on a credit card account. **Possible assessment:** Assignment: *Which bank?* • Visit two banks and collect pricing information on a similar type of savings account at each bank • Compare the costs associated with these accounts at the two banks • Decide which bank would be the better option for a particular customer.

YEAR 3 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			Solving problems • Solving problems in contexts should take account of the number ranges learners are familiar with. • Contexts involving ratio and rate, should include speed, distance and time problems. In financial contexts, learners are **not** expected to use formulae for calculating simple interest.
7.	**3.2** **Properties of 3-D objects**	**Classifying 3-D objects** The learner must be able to: • Name and compare polyhedra in terms of - shape and number of faces - number of vertices - number of edges	What is different to Year 2? • Learners count the number of edges of 3-D objects • Learners count the number of vertices of objects. Most of this work consolidates what has been done in Year 2. **Polyhedra** Examples of sorting or grouping categories: • cubes (only square faces) • rectangular prisms (only rectangular faces) • triangular prisms (only triangular and rectangular faces) • pyramids (square and triangular faces)

YEAR 3 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			Other polyhedra that learners should know **Tetrahedron or triangular pyramid** - **other pyramids** When looking at 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 • Learners use nets to build objects • Learners match nets with drawings of objects • Learners build skeleton objects using drinking straws **Building models of 3-D objects** **Using nets** • Using nets are useful contexts for exploring or consolidating properties of

YEAR 3 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		Building 3-D models The learner must be able to use nets to create models of geometric solids, including: • cubes • prisms • pyramids	polyhedra. • Learners should recognise the nets of different solids. • Learners should draw sketches of the nets using their knowledge of shape and number of faces of the solids, before drawing and cutting out the nets to build models. • Creating models of 3-D objects is based on the number and shape of faces of the solids, and do not require measuring of internal angles of polygons. • Learners have to work out the relative position of the faces of the nets, and use trial and error to match up the edges and vertices, in order to build the 3D object. In Year 3 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.

YEAR 3 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
	3.6 **Viewing of objects**	**Position and views** The learner must be able to Link the position of viewer to views of single or composite objects, or collections of objects, can include both every day and geometric objects	

YEAR 3 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
8. 9.	**FORMAL ASSESSMENT**	Although week 9 and 10 are allocated for assessment, the assessment can be done at any stage from week 1 to 10 **In this term Learners must be assessed on the following topics**: • Common fractions • Decimal fractions • All four basic operations • Finance • Properties of 3-D objects • Viewing of objects **Make use of the following** forms **of assessment** • Assignment • Project • Examination Scope is all the work done during the term	

Year 3 Term 3

YEAR 3 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
	1.1 **Whole numbers** Mental Mathematics	**Mental Mathematics involving**: The learner must be able to do: • addition and subtraction of: - units - multiples of 10 - multiples of 100 - multiples of 1000 - multiples of 10000 • 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	The mental Mathematics programme should be developed systematically over the year. See term 1 notes, but notice the increased number range
1.	**1.1** **Whole numbers**:	**Number range for counting, ordering,**	**Only for counting: Revise** the work done in Year 2.

YEAR 3 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
	Counting, ordering, comparing, representing and place value **4.1** **Length**	**comparing, representing and place value of digits** The learner must be able to: • Order, compare and represent numbers to at least 7/8-digit numbers • Recognising the place value of digits in whole numbers up to 7/8-digit numbers • Round off to the nearest 1 000, 10 000 and 100 000. The learner must be able to:	Refer to Term 1 for clarification on ordering and comparing. Extend the number range to 7/8-digit numbers. All the work learnt here should be practised throughout the year in Mental Mathematics. **Revise** the work done in Year 2 **What is different in Year 3? 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. • Measure 2-D shapes - estimating - measuring - recording - comparing and ordering The learner must be able to: • effectively use the following measuring instruments:

YEAR 3 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		• solve problems in contexts involving length • do conversions including 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	- rulers, meter sticks, tape measures, trundle wheels The learner must be able to: • effectively use the following units: - millimetres(*mm*), centimetres(*cm*), metres(*m*), kilometres(*km*) Compare and order length up to 9 digits in *mm, cm, m and km*. **Revise** the work done in Year 2

<table>
<tr><th colspan="4">YEAR 3 TERM 3</th></tr>
<tr><th>WEEK</th><th>TOPIC</th><th>CONTENT</th><th>Techniques, activities, resources and process notes</th></tr>
<tr><td></td><td>4.2
Mass</td><td>Calculations and problem-solving involving mass include:
The learner must be able to:

Conversions should include common fractions and decimal fractions to 2 decimal places</td><td>What is different in Year 3? Decimals are introduced.
Practical measuring
The learner must be able to do practical measuring of 3-D objects by:
• estimating
• measuring
• recording
• comparing and ordering

Measuring instruments:
The learner must be able to use the following instruments correctly:
• bathroom scales, kitchen scales and any other appropriate instrument for measuring mass

Units:
The learner must be able to use the following units correctly:
• grams (g) and kilograms (kg);</td></tr>
</table>

YEAR 3 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			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 using 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 subtraction **Convert** between units: Conversions should be given in the following forms: whole numbers,

YEAR 3 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			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 3*kg* and 245*g* as in previous years. On the whole though examples should be chosen to avoid this problem.
2. 3.	**1.5** **Integers**	The learner must be able to: • count forward and backwards in integers for any interval • Recognise, order and compare integers The learner must be able to: • add and subtract with integers • multiply and divide with integers • Recognise and use commutative and associative properties of addition and multiplication for integers • Recognise and use additive and multiplicative inverses for integers	Integers are new numbers introduced in Year 3. **Counting, ordering and comparing integers** • Counting should not only be thought of as verbal counting. Learners can count using: - structured, semi-structured or empty number lines - chain diagrams for counting • Learners should be given a range of exercises such as: - arrange given numbers from the smallest to the biggest: or biggest to smallest - fill in missing numbers in ▪ a sequence ▪ on a number grid ▪ on a number line

YEAR 3 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			▪ fill in <, = or >**Example:** – 425 * – 450 **Calculations using integers** • Start calculations with integers using small number ranges. • Develop an understanding that subtracting an integer is the same as adding its additive inverse. .
4. 5.	**1.4** **Exponents**	The learner must be able to: • determine squares to at least 12^2 and their square roots • determine cubes to at least 6^3 and cube roots • compare and represent whole numbers in exponential form: $a^b = a \times a \times a \times \ldots$ for b number of factors • Recognise and use the appropriate laws of operations with numbers involving exponents and square and cube roots • perform calculations involving all four	**Comparing and representing numbers in exponential form** • Learners need to understand that in the exponential form a^b , the number is read as '***a* to the power *b***', where ***a*** is called the base and ***b*** is called the exponent or index. "**b**" indicates the number of factors that are multiplied. **Example:** *a)* $a^3 = a \times a \times a;$ *b)* $a^5 = a \times a \times a \times a \times a$ • Learners can represent any number in exponential form, without needing to compute the value. **Example:**

YEAR 3 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		operations using numbers in exponential form, limited to exponents up to 5, and square and cube roots	50 x 50 x 50 x 50 x 50 x 50 x 50 = 50^7 • Make sure learners understand that square roots and cube roots are the inverse operations of squaring and cubing numbers. **Examples:** 3^2= 9 therefore $\sqrt{9}$ = 3 • Make sure learners understand that any number raised to the power 1 is equal to the number. **Example** $m^1 = m$ • Learners need to know the rule for raising a number to the power 0. • To avoid common misconceptions, emphasize the following with examples: - 12^0 = 1 and not 12 x 0 = 0 - 12^2= 12 x 12 and not 12 x 2 - 1^3means 1 x 1 x 1 and not 1 x 3 - 100^1 = 100 - $\sqrt{81}$ = 9 because 9^2= 81 - $\sqrt[3]{27}$ = 3 because 3^3= 27 - The square of 9 = 81, whereas the square root of 9 = 3 • Learners should use their knowledge of representing numbers in exponential form when simplifying and expanding algebraic expressions

YEAR 3 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			and solving algebraic equations. **Calculations using numbers in exponential form** • Knowing the rules of operations for calculations involving exponents, is important. **Example:** a) $(7 - 4)^3 = 3^3$ AND NOT $7^3 - 4^3$ b) $\sqrt{16+9} = \sqrt{25}$, AND NOT $\sqrt{16} + \sqrt{9}$
6.	**2.2** **Number sentences** (Algebraic Language)	The learner must able to: • write number sentences to describe problem situations • solve and complete number sentences by - inspection - trial and improvement • check solution by substitution • Recognise and interpret rules or relationships represented in symbolic form • identify variables and constants in given	**Revise** the work done in Year 2. Learners are given practice in writing number sentences to describe problem situations. Learners have the opportunity to practise a mixture of all problem types. 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 to prepare them for this format which is commonly used in tests. Check answers by substitution Learners can be challenged to use what they know about equivalence and

YEAR 3 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		formulae and / or equations	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
7.	**3.7**		
8.	**Construction of geometric figures**	**Measuring angles** The learner must be able to: • accurately use a protractor to measure and classify angles: - < 90° (acute angles) - Right-angles - > 90° (obtuse angles) - Straight angles - > 180° (reflex angles) **Constructions**	**Revise** the work done in Year 2. **Constructions** • Constructions provide a useful context to explore or consolidate knowledge of angles and shapes. • **Revise** construction of circles using compass

YEAR 3 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		The learner must be able to: • accurately construct geometric figures appropriately using compass, ruler and protractor, including: - angles, to one degree of accuracy - circles - parallel lines - perpendicular lines - bisecting lines and angles - perpendicular lines at a given point or from a given point - triangles - quadrilaterals • Construct angles of 30°, 45°, 60° and their multiples without using a protractor	• Initially, learners have to be given careful instructions about how to do the constructions of angles, perpendicular and parallel lines. • When constructing triangles learners should draw on known properties and construction of circles. • Construction of special angles without protractors are done by: - bisecting a right angle to get 45° - drawing an equilateral triangle to get 60° - bisecting the angles of an equilateral triangle to get 30° **Triangles** • Constructions serve as a useful context for exploring properties of triangles. • Properties of triangles learners should know: - the sum of the interior angles of triangles = 180° - an equilateral triangle has all sides equal and all interior angles = 60° - an isosceles triangle has at least two equal sides and its base angles are equal

YEAR 3 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			- a right-angled triangle has one angle that is a right-angle - the side opposite the right-angle in a right-angled triangle, is called the hypotenuse - in a right-angled triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides (Theorem of Pythagoras).
9. 10.	**FORMAL ASSESSMENT**	Although week 9 and 10 are allocated for assessment, the assessment can be done at any stage from week 1 to 10 **In this term Learners must be assessed on the following topics**: • Counting, ordering, comparing representing and place value • Length • Mass • Integers • Exponents • Number sentences • Construction of geometric figures **Make use of the following forms of assessment** • Assignment 1	

YEAR 3 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		• Investigation • Test Scope is all the work done during the term	

Year 3 Term 4

YEAR 3 TERM 4			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
	1.1 **Whole numbers** Mental Mathematics	**Mental Mathematics involving**: The learner must be able to do: • addition and subtraction of: - units - multiples of 10 - multiples of 100 - multiples of 1000 - multiples of 10000 • 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	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
1.	**1.1** **Whole numbers**: counting, ordering,	**Number range for counting, ordering, comparing, representing and place value**	Refer to Term 1 for clarification on ordering and comparing. Extend the number range to at least 8-digit numbers.

YEAR 3 TERM 4			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
	comparing, representing and place value **4.3** **Capacity/ Volume**,	**of digits** The learner must be able to: • Order, compare and represent numbers to at least 8-digit numbers • Recognising the place value of digits in whole numbers up to 8-digit numbers • Round off to the nearest 1 000, 10 000, 100 000 - - **Practical measuring** The learner must be able to do practical measuring of 3-D objects by: • estimating • measuring • recording • comparing and ordering	All the work learnt here should be practised throughout the year in Mental Mathematics. **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 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* What is different to Year 2? • Decimals are introduced. • Kilolitres are introduced.

YEAR 3 TERM 4			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		Measuring instruments: The learner must be able to use the following instruments correctly: • measuring spoons, measuring cups, measuring jugs and any other appropriate instrument for measuring volume/capacity **Units:** The learner must be able to use the following units correctly: • millilitres (*ml*) , litres (*l*)	Learners continue work with litres and millilitres, but now they also work with kilolitres. Learners work with the same measuring instruments as in previous years 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.

YEAR 3 TERM 4			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			Measuring capacity and reading capacity measuring instruments **Revise** the work done in Year 2 **Compare capacities** with up to 9 digits in millilitres and litres **Revise** the work done in Year 2 **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. 20*l* • litres only e.g. 5*l* • millilitres only e.g. 250*ml* • fractional parts of kilolitres or litre, written either as common or decimal fractions e.g. $2\frac{3}{4}$ litres or 2,75 litres

YEAR 3 TERM 4			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
	4.4 **Time** **4.5** **Temperature**	**Read time and time instruments** Revise work done in year 1 to 2 The learner must be able to solve problems in contexts involving time The learner must be able to: • solve problems in contexts related to temperatures • calculate temperature differences limited to positive and negative whole numbers	**Time** **Revise** work done in Year 1 and 2 **Temperature** **Revise** the work done in Year 2 **Calculations and problem-solving related to temperature** Calculations and problem-solving related to temperatures should include integers and decimal fractions.
2.	**1.1** **Whole numbers:** multiplication and	The learner must be able to do the following with calculator:	This is further practice of multiplication and division of 4-digit by 3-digit numbers done in Term1. Refer to those notes.

YEAR 3 TERM 4			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
	division	• Multiplication and division of at least 4-digit by 3-digit whole numbers • Multiple operations on whole numbers with or without brackets **Calculation techniques** The learner must be able to use a range of techniques to perform and check written and mental calculations of whole numbers including: • estimation • building up and breaking down numbers • long division • 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 • using a calculator	

YEAR 3 TERM 4			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
3.	**4.6** **Perimeter, Surface area and volume** Area and perimeter	**Perimeter** The learner must be able to measure perimeter using rulers or measuring tapes and any other appropriate instrument for measuring perimeter **Calculation of area** The learner must be able to: • determine areas of regular and irregular shapes by counting squares on grids • develop rules for calculating the area of squares and rectangles • apply rules for calculating the areas of squares, rectangles and triangles.	Learners will apply the given formulas to calculate perimeter, area or volume of any shape or object. **Perimeter** In Year 3 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 Year 3 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 Year 3 area measurements continue to be informal. Learners should examine the areas of • regular shapes where the sides are all the same length with straight

YEAR 3 TERM 4			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		Investigate The learner must be able to investigate the: • relationship between perimeter and area of rectangles, squares and triangles. • relationship between surface area and volume of rectangular prisms	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 Year 1. In Year 3 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

YEAR 3 TERM 4			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			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. 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.
4.	**4.6** **Perimeter, Surface area and volume** Surface area and volume	The learner must be able to: • develop an understanding of why the volume of: - rectangular prisms is given by length multiplied by width multiplied by height - triangular prisms is given by the surface area of the base multiplied by the height The learner must be able to investigate the relationship between surface area and volume of rectangular prisms	**Volume** In Year 3 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

YEAR 3 TERM 4			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			- containers filled with cubes / rectangular prisms so that they are able to state the volume in terms of the number of cubes / rectangular prisms. • **Formulae** learners are not required to know the formulas: - the surface area of a prism = the sum of the area of all its faces - the volume of a rectangular prism = *l* x *b* x *h*
5.	**3.1** **Properties of 2-D shapes**	**Range of shapes** The learner must be able to recognise, visualize and name 2-D shapes in the environment and geometric settings, focusing on similarities and differences between rectangles and parallelograms **Characteristics of shapes** The learner must be able to identify 2-D shapes in terms of: - number of sides - lengths of sides	Revise work done in Year 2 • Reflex and revolution are new angles • Parallelograms are new shapes. This is the case when distinguishing between rectangles and parallelograms 2-D shapes and their distinguishing features. Learners should identify and name types of quadrilaterals and triangles • Revise the work done in Year 2

YEAR 3 TERM 4			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		- sizes of angles ▪ acute ▪ right ▪ obtuse ▪ straight ▪ reflex ▪ revolution **Classifying 2-D shapes** The learner must be able to: • Identify triangles: - equilateral triangles - isosceles triangles - right-angled triangles • Identify shapes: - parallelogram - rectangle - square - rhombus - trapezium	**Triangles** • Learners should be able to identify between an equilateral triangle (all the sides are equal), an isosceles triangle (at least two equal sides) and a right-angled triangle (one right-angle).

YEAR 3 TERM 4			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		- kite **Further activities** • Draw 2-D shapes on grid paper	
6.	**3.3** **Symmetry** **3.5** **Transformations**	The learner must be able to: • Recognise, draw and describe line(s) of symmetry in 2-D shapes The learner must be able to use transformations to make composite shapes • make composite 2-D shapes including shapes with line symmetry by tracing and moving a 2-Dshape in one or more of the	**Revise** the work done in Years 1 and 2 **Use transformations to create composite shapes** Learners use a 2-D shape as a template which they trace and move by reflection, translation and rotation 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 “reflection,

YEAR 3 TERM 4			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		following ways: - by rotation The learner must be able to 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 The learner must be able to 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	translation and rotation" **Use transformations to make tessellations** Learners use 2-D shapes to make tessellation patterns. These tiling patterns can be made by packing out the tiles. Learners are required to make the patterns by translating, reflecting and rotating 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

YEAR 3 TERM 4			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			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.
7.	**2.4** **Graphs**	**Interpreting graphs** The learner must be able to: • analyse and interpret global graphs of problem situations, with special focus on the following trends and features: - linear or non-linear - constant increasing and decreasing **Drawing graphs** • draw global graphs from given descriptions of a problem situation.	In Year 3, the focus is on drawing, analysing and interpreting global graphs only. That is, learners do not have to plot points to draw graphs and they focus on the features of the global relationship shown in the graph. **Examples** of contexts for global graphs include: • the relationship between time and distance travelled • the relationship between temperature and time over which it is measured • the relationship between rainfall and time over which it is measured, etc.

YEAR 3 TERM 4			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
8.	**5.1** **Collect, organise and summarise data**	The learner must be able to: • collect data - using tally marks and tables for recording - using simple questionnaires (yes/no type response) • order data from smallest group to largest group • organise (including grouping where appropriate)and record data using - tally marks - tables • group data into intervals • summarise and distinguishing between ungrouped numerical data by determining: - mean - median - mode	**Revise** the work done in Years 1 and 2 Teachers should ensure that different topics are chosen for data collection What is new. • group data into intervals • the mean of a data set • data range

YEAR 3 TERM 4			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
	5.2 **Representing**	**The learner must be able to:** draw a variety of graphs by hand/technology to display and interpret data (grouped and ungrouped) including: • bar graphs and double bar graphs • pie charts	**Revise** the work done in Years 1 and 2 What is new: • pie charts **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

YEAR 3 TERM 4			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			• temperatures for a month • comparing national data from Statistics South Africa (Stats SA) 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
	5.3 **Analysing, Interpreting and Reporting data**	The learner must be able to critically read and interpret data represented in • words • pictographs • bar graphs • double bar graphs • pie charts The learner must be able to: analyse data by answering questions related to: • data categories, including data intervals	**Revise** the work done in Years 1 and 2. What is new**:** 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 • The mean of the data set Suitable topics include: • populations of the provinces of SA

YEAR 3 TERM 4			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		• data sources and contexts • central tendencies – (mode, mean and median)	• 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 Year 1 – 4 or age group 14 –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

YEAR 3 TERM 4			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			example. Learners can summarise 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.) Learners can write reports on data in short paragraphs. Teachers will need to guide learners on how to write a complete paragraph that summarises the data.

YEAR 3 TERM 4			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
9. 10.	**FORMAL ASSESSMENT**	Although week 9 and 10 are allocated for assessment, the assessment can be done at any stage from week 1 to 10 **In this term Learners must be assessed on the following topics**: • Counting, ordering, comparing representing and place value • Capacity and volume • Time • Temperature • Multiplication and division • Area and perimeter • Surface area and volume • Properties of 2-D shapes • Symmetry • Transformations • Graphs • Data handling **Make use of the following forms of assessment** Examination Scope is all the work done during the term	

Year 4 Term 1

YEAR 4 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
	1.1 **Whole numbers** Mental Mathematics	**Mental Mathematics** Revise work done in Year 3	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 Year 3. The mental Mathematics should systematically develop three aspects of learners' • number knowledge • number facts - number bonds: addition and subtraction facts of: ▪ units

YEAR 4 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			▪ multiples of 10 ▪ multiples of ▪ times tables (multiplication of whole numbers to at least 12 x 12) • 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 and1 000 and compensating - adding and subtracting of units, multiples of 10, 100 and 1 000 to/from any 5-digit number **Recommended resources** • a number line (structured and empty) • a number grid • place value cards (flash cards) • counting beads

YEAR 4 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
1.	**1.1**		
2.	**Whole numbers** All four operations	**Calculations using whole numbers** The learner must be able to do: • addition and subtraction of whole numbers • multiplication whole numbers • division of whole numbers • multiple operations on whole numbers with or without brackets	All concepts developed here can be practised throughout the year. Learners should be given a range of exercises. Perform calculations using all four operations on whole numbers, estimating and using calculators where appropriate **Calculation techniques** The learner must be able to use a range of strategies to perform and check written and mental calculations of whole numbers including: • estimation • building up and breaking down numbers • long division • 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 • using a calculator

YEAR 4 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		Properties of whole numbers The learner must be able to: • recognise 0 in terms of its additive property • recognise 1 in terms of its multiplicative property • recognise the division property of 0, whereby any number divided by 0 is undefined	**Properties of whole numbers** • The properties of whole numbers should be the starting point for work with whole numbers. The properties of numbers should provide the motivation for why and how operations with numbers work. • When learners are introduced to new numbers, such as integers for example, they can again explore how the properties of numbers work for the new set of numbers. • Learners also have to apply the properties of numbers in algebra, when they work with variables in place of numbers.
3. 4.	**1.1** **Whole numbers** Multiples and factors	**Multiples and factors** The learner must be able to: • Multiples of up to 3-digit whole numbers • Factors of up to 3-digit whole numbers • Find the LCM of numbers up to 3-digit whole numbers, by inspection or factorisation	**Multiples and factors** • Practice with finding multiples and factors of whole numbers are especially important when learners do calculations with fractions. They use this knowledge to find the LCM when one denominator is a multiple of another, and also when they simplify fractions or have to find equivalent fractions. • Factorising whole numbers lays the foundation for factorisation of

YEAR 4 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			algebraic expressions. **Examples** a) The multiples of 6 are 6, 12, 18, 24,... or M6 = {6; 12; 18; 24;...} b) LCM of 6 and 18 is 18 LCM of 6 and 7 is 42 c) The factors of 24 are 1, 2, 3, 4, 6, 12 and 24 by inspection. d) The factors of 140 are 1, 2, 5, 7, 10, 14, 28, 35, 70 and 140
5.	**1.5**		
6.	**Integers**	**Counting, ordering and comparing integers** The learner must be able to: • count forward and backwards in integers for any interval • recognise, order and compare integers **Calculations with integers** The learner must be able to: • add and subtract with integers	**Revise** the work done in Year 3. What is new: • Addition and subtraction operations with integers • All four operations with squares, cubes, square and cube roots of integers Finding the squares, cubes, square roots and cube roots of integers are also opportunities to check that learners know the rules for resultant signs when add and subtract integers.

YEAR 4 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		• perform calculations involving addition and subtraction with integers • perform calculations involving all four operations with numbers that involve the squares, cubes, square roots and cube roots of integers • recognise and use additive inverses for integers	• Therefore, make sure that learners understand why you cannot find the square root of a negative integer, and that the square of a negative integer is always positive. • Learners should recognise and use the properties for operations with whole numbers on the set of integers. • These properties should serve as motivation for the operations they can perform with integers. • Learners should see that the commutative property for addition and multiplication holds for integers.
7. 8.	**1.4** **Exponents**	**Mental Calculations** The learner must be able to determine: • Squares to at least 12^2 and their square roots • Cubes to at least 6^3 and their cube roots **Comparing and representing numbers in exponential form**	**Revise** the work done in Year 3. **Laws of exponents** • The laws of exponents should be introduced through a range of numeric examples first, then variables can be used. In other words, the numbers are replaced with letters, but the rules work the same. • The following laws of exponents should be introduced, where ***m***

YEAR 4 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		• Revise compare and represent whole numbers in exponential form • Compare and represent integers in exponential form • Compare and represent numbers in scientific notation, limited to positive exponents The learner must be able to: **Calculations using numbers in exponential form** • Establish general laws of exponents, limited to: - natural number exponents - a^mx a^n= a^{m+n} - a^m÷ a^n= a^{m-n}, if $m>n$ • Recognise and use the appropriate laws of operations using numbers involving exponents and square and cube roots • Perform calculations involving all four	and ***n*** are natural numbers and ***a*** and ***t*** are not equal to ***0***: $\boldsymbol{a^m}$ x $\boldsymbol{a^n}$ = $\boldsymbol{a^{m+n}}$ **Example** a) 2^3 x 2^4 = 2^{3+4} = 2^7 b) $x^3 \times x^4 = x^{3+4} = x^7$ $\boldsymbol{a^m}$ ÷ $\boldsymbol{a^n}$ = $\boldsymbol{a^{m-n}}$ ***if m >n*** **Example:** a) 3^5 ÷ 3^2 = 3^3 = 27 b) $x^5 \div x^3 = x^2$ • Make sure learners understand these laws reading from both sides of the equal sign i.e. if the LHS = RHS, then the RHS = LHS. • The law $\boldsymbol{a}^0$ = 1 can be derived by using the law of exponents for division in a few examples. $\boldsymbol{a}^4$ ÷ $\boldsymbol{a}^4$ =*a* x *a* x *a* x *a* • *a* x *a* x *a* x *a* = 1 therefore a^{4-4} = $\boldsymbol{a}^0$ = 1 • Learners should be able to use the laws of exponents in calculations and for solving simple exponential equations as well as expanding or simplifying algebraic expressions. • Look out for the following **common misconceptions** where:

YEAR 4 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		operations with numbers that involve the squares, cubes, square roots and cube roots of integers • Calculate the squares, cubes, square roots and cube roots of rational numbers	- learners multiply unlike bases and add the exponent. **Example:** $x^m \times y^n = (xy)^{m+n}$ - learners multiply like bases and add the exponents **Example:** $2^5 \times 2^7 = 4^{12}$ instead of the correct answer 2^{12}. **Calculations using numbers in exponential form** • Knowing the rules of operations for calculations involving exponents are important, e.g. a) $(7 – 4)^3 = 3^3$ **and NOT** $7^3 – 4^3$ b) $\sqrt{16} + 9 = \sqrt{25}$ **and NOT** the $\sqrt{16} + \sqrt{9}$ • Learners can also do simple calculations where the numerator and denominator of a fraction are written in exponential form, e.g.

YEAR 4 TERM 1			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			$\frac{2^3}{2^2} = \frac{2 \times 2 \times 2}{2 \times 2} = \frac{8}{4} = 2$
9. 10.	**FORMAL ASSESSMENT**	Although week 9 and 10 are allocated for assessment, the assessment can be done at any stage from week 1 to 10 **In this term Learners must be assessed on the following topics**: • Counting, ordering, comparing representing and place value • Addition and subtraction • Multiples and factors • Whole numbers with all four basic operations • Integers • Exponents **Make use of the following forms of assessment** • Assignment 1 • Assignment 2 • **Test** Scope is all the work done during the term	

Year 4 Term 2

YEAR 4 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
	1.1 **Whole numbers** **Mental Mathematics**	**Mental Mathematics** Revise work done in Year 3	
1.	**1.2** **Common Fractions**	**Calculations with fractions** The learner must be able to: • add and subtract common fractions, including mixed numbers • find fractions of whole numbers • multiply common fractions, including mixed numbers	**Division** • A useful way of making learners comfortable with division by fractions is to start with examples of division by whole numbers. • Learners have to understand that dividing by a number is the same as multiplying by the reciprocal of the number i.e. the reciprocal of *n* is $\frac{1}{n}$ • **Examples**: a) 10 ÷ 5 is the same as 10 x $\frac{1}{5}$

YEAR 4 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		• divide whole numbers and common fractions by common fractions	b) $10 \div \frac{1}{5} = 10 \times 5 = 50$ This can also be explained by using diagram models for fractions and asking, how many times does $\frac{1}{5}$ fit into 10? We know that 5 fifths fit into 1 whole, so (5 x 10) fifths will fit into 10 wholes. Hence, $10 \div \frac{1}{5} = 50$ c) 20 ÷ 4 is the same as $20 \times \frac{1}{4}$ d) $20 \div \frac{1}{4} = 20 \times 4 = 80$ This can also be explained by using diagram models for fractions and asking, how many times does $\frac{1}{4}$ fit into 20? We know that 4 quarters fit into 1 whole, so (4 x 20) quarters will fit into 20 wholes. Hence, $20 \div \frac{1}{4} = 80$ e) Once learners have done a few of the above examples, they can use the technique of multiplying by the reciprocal to divide fractions by fractions: $\frac{3}{4} \div \frac{1}{2} = \frac{3}{4} \times \frac{2}{1} = \frac{6}{4} = \frac{3}{2} = 1\frac{1}{2}$ Note: Learners can make use calculators.
2.	**1.2** **Common Fractions**	**Calculation techniques** The learner must be able to:	**Calculation using percentages** • Learners should continue to do context free calculations and solve problems in contexts.

YEAR 4 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		• convert mixed numbers to common fractions in order to perform calculations with them	• When doing calculations using percentages, learners have to use the equivalent common fraction form, which is a fraction with denominator 100. • Learners should become familiar with the equivalent fraction and decimal forms of common percentages e.g. 25% is equivalent to $\frac{1}{4}$ or 0, 25; 50% is equivalent to $\frac{1}{2}$ or 0,5; 60% is equivalent to $\frac{3}{5}$ or 0,6. • To calculate percentage of part of a whole, or percentage increase or decrease, learners have to learn the strategy of multiplying by $\frac{1}{100}$. • **Examples:** a) Calculate of 60% of R105 Amount = $\frac{60}{100}$ x R105 = R63 b) What percentage is 40c of R3,20 ? Percentage = $\frac{40}{320}$ x $\frac{100}{1}$ = $\frac{100}{8}$ = 12,5% c) Calculate the percentage increase if the price of a bus ticket of R60 is increased to R84.

YEAR 4 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		Solving problems The learner must be able to solve problems in contexts involving common reactions and mixed numbers, including grouping, sharing and finding fractions of whole numbers **Percentages** The learner must be able to: • find percentages of whole numbers • calculate the percentage of part of a whole • calculate percentage increase or decrease • calculate amounts if given percentage increase or decrease • **solve problems** in contexts involving percentages	Amount increased = R24. Therefore, percentage increase = $\frac{24}{60}$ x $\frac{100}{1}$ = 40% d) Calculate the percentage decrease if the price of petrol goes down from 20 cents a litre to 18 cents a litre. Amount decreased = 2 cents. Therefore, percentage decrease = $\frac{2}{20}$ x $\frac{100}{1}$ = 10% e) Calculate how much a car will cost if its original price of R150 000 is reduced by 15% Calculation involves finding 15% of R150 000 and then subtracting that amount from the original price. i.e. $\frac{15}{100}$ x R$\frac{150\ 000}{1}$ = R22 500 Hence new price of car = R150 000 – R22 500 = R127 500 Or $\frac{85}{100}$ x R$\frac{150\ 000}{1}$ = R127 500

<table>
<tr><th colspan="4">YEAR 4 TERM 2</th></tr>
<tr><th>WEEK</th><th>TOPIC</th><th>CONTENT</th><th>Techniques, activities, resources and process notes</th></tr>
<tr><td>3.</td><td rowspan="2">2.2

Number Sentences

Algebraic expressions

Number Sentences

Algebraic equations</td><td rowspan="2">Algebraic language

The learner must be able to:
recognise and interpret rules or relationships represented in symbolic form
identify variables and constants in given formulae and / or equations
Equations

The learner must be able to:
write equations to describe problem situations
- analyse and interpret equations that describe a given situation
- solve equations by inspection</td><td rowspan="2">Revise the work done in Year 3
The use of symbolic language helps to develop an understanding of variables.
Learners have opportunities to write and solve equations when they write general rules to describe relationships between numbers in number patterns, and when they find input or output values for given rules in flow diagrams, tables and formulae.

See further examples given for functions and relationships.

The number sentences that learners can solve are extended to include number sentences with integers, square numbers and cubic numbers.</td></tr>
<tr><td>4.</td></tr>
</table>

<table>
<tr><th colspan="4">YEAR 4 TERM 2</th></tr>
<tr><th>WEEK</th><th>TOPIC</th><th>CONTENT</th><th>Techniques, activities, resources and process notes</th></tr>
<tr><td>5.</td><td>3.1
Properties of 2-D shapes</td><td>Range of shapes
The learner must be able to recognize, visualize and name 2-D shapes in the environment and geometric setting, focusing on similarities and differences between rectangles and parallelograms

Further activities
The learner must be able to draw circles, patterns in circles and patterns with circles using a pair of pair of compasses</td><td>Special emphasis on circles with examples relating to the everyday environment.</td></tr>
<tr><td>6.</td><td>2.3
Graphs</td><td>The learner must be able to:
• use tables or ordered pairs to plot points and draw graphs on the Cartesian plane</td><td>This year the focus is on plotting points to draw linear graphs.
Examples of drawing graphs by plotting points
Complete the table of ordered pairs below for the equation: y = x + 3
<table>
<tr><td>x</td><td>–4</td><td>–3</td><td>–2</td><td>–1</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr>
<tr><td>y</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table></td></tr>
</table>

<table>
<tr><th colspan="4">YEAR 4 TERM 2</th></tr>
<tr><th>WEEK</th><th>TOPIC</th><th>CONTENT</th><th>Techniques, activities, resources and process notes</th></tr>
<tr><td></td><td></td><td></td><td>Complete the table of ordered pairs below.
<table><tr><td>x</td><td>–4</td><td>–3</td><td>–2</td><td>–1</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>y</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>
Now, plot the above co-ordinate points on the Cartesian plane. Join points to form a graph.</td></tr>
<tr><td>7.</td><td>1.1
Whole numbers
Finance</td><td>Solving problems
The learner must be able to:
• solve problems that involve whole numbers, percentages and decimal fractions in financial contexts such as:
- profit, loss, discount and VAT
- budgets
- accounts

• Solve problems involving whole numbers, including</td><td>Financial contexts
• Solving problems in contexts should take account of the number ranges learners are familiar with.
• Once learners have done sufficient calculations for simple interest through repeated calculations, they could use given formulae for these calculations.

Revise the work done in Year 3
Extend calculations to problems involving VAT.

Additional comments:
Two methods are promoted for this type of calculation:</td></tr>
</table>

YEAR 4 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
8		- grouping and equal sharing with remainders	• dividing the “VAT inclusive” value by 1,14 • identifying the “VAT inclusive” value as being 114% and working out the “value excluding VAT” as 100%. Use other practical examples of financial documents to explain topic further: • Read information directly from an electricity bill (e.g. date; name of account holder; electricity consumption for the month; etc. • Show how the “Total Due” on the electricity bill has been calculated by adding together all items listed on the bill. • Show how the VAT value listed on the electricity bill has been calculated when told that VAT is 14% of the value excluding VAT (that is, calculating a percentage of an amount • Classify items on an income and expenditure statement as fixed, • variable and occasional income and expenditure. • Show how total Income, expenditure and profit/loss values on an income and expenditure statement or budget have been determined. **Possible assessment:** Assignment: Understanding UIF Analyse a payslip and show how the values on the payslip have been determined, including the UIF.

YEAR 4 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			Perform the following calculations involving ratios: • convert between different forms of a ratio • (e.g. If the scale of a plan is 1:100, then 1 cm measured on the plan is equal to 1 m (100 cm) in actual length) • determine missing numbers in a ratio • (e.g. If cement, sand and stone is to be mixed in the ratio 1:2:2 to make high-strength concrete, how many wheelbarrows of sand and stone should be mixed with 50 wheelbarrows of cement?) • In order to make sense of situations and calculations involving: - mixing quantities - proportion - rates (e.g. Electricity tariffs; speed) - percentage calculations - conversions - scale - expressions of probability - any other scenarios involving the topics of Finance, Measurement, Maps, plans and other representations of the physical world, Data handling and Probability, in which ratios have application

YEAR 4 TERM 2			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			Calculate the following types of rates: • cost rates (e.g. price of chicken in Rand/kg) • consumption rates (e.g. petrol consumption rate of a car in litres/km) • distance, time and speed rates (e.g. average speed of a car in km/h)
9 - 10	**FORMAL ASSESSMENT**	Although week 9 and 10 are allocated for assessment, the assessment can be done at any stage from week 1 to 10 **In this term Learners must be assessed on the following topics**: • Common fractions • Number sentences • Properties of 2-D shapes • Graphs • Finance **Make use of the following forms of assessment** • Assignment • Project • Examination Scope is all the work done during the term	

Year 4 Term 3

YEAR 4 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
	1.1 **Whole numbers** Mental Mathematics	**Mental Mathematics** Revise work done in Year 3	
1.	**5.1** **Collect, organise and summarise data**	**Collecting and organising data** The learner must be able to: • pose questions relating to social, economic, and environmental issues in own environment • select appropriate sources for the collection of data (including peers, family, newspapers, books, magazines) • distinguish between samples and populations and suggest appropriate samples for investigation	**Revise** the work done in Years 1, 2 and 3

YEAR 4 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
	5.2 **Representing data**	• design and use simple questionnaires to answer questions: - with yes/no type responses - with multiple choice responses **Organise and summarise data** The learner must be able to: • organise (including grouping where appropriate) and record data using - tally marks - tables **Representing data** The learner must be able to draw a variety of graphs by hand/technology to display and interpret data including**:** • bar graphs and double bar graphs	**Revise** the work done in Years 1, 2 and 3 **Revise** the work done in Years 1, 2 and 3 What is new:

YEAR 4 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
	5.3 **Analysing, interpreting and Reporting data**	• pie charts **Interpret data** The learner must be able to: • critically read and interpret data represented in: - words - bar graphs - double bar graphs - pie charts **Analyse data** The learner must be able to: • critically analyse data by answering questions related to: - data categories, including data intervals - central tendencies (mean, mode,	• scales used on graphs • samples and populations • choosing appropriate summary statistics for the data: -mean - median, -mode - range

YEAR 4 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		median) - scales used on graphs - samples and populations The learner must be able to: • group data into intervals • summarise data include: - choosing appropriate summary statistics for the data: - mean - median - mode	**Developing critical analysis skills** • Learners should 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.

YEAR 4 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
2.	**1.3** **Decimal fraction**	**Ordering and comparing decimal fractions** The learner must be able to: • compare and order decimal fractions to at least two decimal places • place value of digits to at least two decimal places • rounding off decimal fractions to at least 1 decimal place **Calculations with decimal fractions** The learner must be able to: • Add and subtract decimal fractions with at least two decimal places • Multiply decimal fractions by 10 and 10 **Percentages** The learner must be able to: • find percentages of whole numbers • calculate the percentage of part of a whole • calculate percentage increase or decrease • calculate amounts if given percentage increase or decrease • solve problems in contexts involving percentage	Revise all the work done in Year 3 Dividing whole numbers by 10, 100, 1 000, etc. can help to build learners' understanding of place value with decimals. This is also useful to do on the calculator – learners can discuss the patterns they see when dividing. Revise all the work done in Year 3

<table>
<tr><th colspan="4">YEAR 4 TERM 3</th></tr>
<tr><th>WEEK</th><th>TOPIC</th><th>CONTENT</th><th>Techniques, activities, resources and process notes</th></tr>
<tr>
<td>3.</td>
<td>2.1

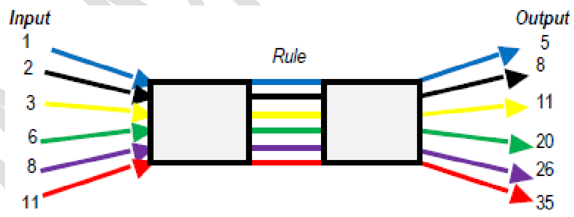
Numeric and geometric patterns</td>
<td>Investigate and extend patterns

The learner must be able to:

• investigate and extend numeric and geometric patterns looking for relationships between numbers, including patterns:
- represented in physical or diagram form
- of learner’s own creation
▪ represented in tables
▪ represented in physical or diagram form
▪ of learner’s own creation</td>
<td>Revise the work done in Year 3.

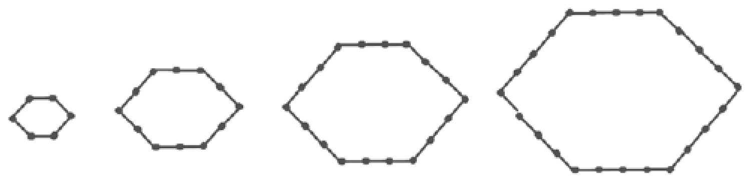
The focus is to find the rule involving 2 operations.

Example



Learners can do similar examples using a table format.

<table>
<tr><th>Input</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></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></tr>
</table>
</td>
</tr>
</table>

YEAR 4 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		Input and output values The learner must be able to: • determine input values, output values or rules for patterns and relationships using: - flow diagrams - tables - formulae **Equivalent forms** The learner must be able to: • Determine, interpret and justify equivalence of different descriptions of the same relationship or rule presented: - verbally - in flow diagrams - in tables - by graphs on a Cartesian plane	**Example** Consider this pattern for building hexagons with matchsticks. How many match sticks will be used to build the 10th hexagon?  The rule for the pattern is contained in the structure (construction) of the successive hexagonal shapes: (1) add 1 on matchstick per side (2) there are 6 sides, so (3) add on 6 matchsticks per hexagon as you proceed from a given hexagon to the next one.

YEAR 4 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			For the 2nd hexagon, you have 2 x 6 matches; for the 3rd hexagon you have 3 x 6 matches; Using this pattern for building hexagons, the 10th hexagon will have10 x 6 matches.
4.	**4.6** **Perimeter, Surface area and volume** Area and perimeter	**Area and perimeter** The learner must be able to: • calculate the perimeter of regular and irregular polygons • use appropriate formulae to calculate perimeter and area of: - squares - rectangles - triangles - circles **Calculations and solving problems** The learner must be able to:	**Formulae** learners should be provided to learners: • perimeter of a square = 4*s* • perimeter of a rectangle = 2(*l* + *b*) or 2*l* + 2*b* • area of a square = l^2 • area of a rectangle = *l* x *b* • area of a triangle = $\frac{1}{2}(b \times h)$ • diameter of a circle: $d = 2r$ • circumference of circle: $c = \pi d$ or $2\pi r$ • area of a circle: $A = \pi r^2$

YEAR 4 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		• solve problems involving perimeter and area of polygons to at least 1 decimal place	
5. 6.	**3.2** **Properties of 3-D objects**	The learner must be able to: • classify 3-D objects in terms of properties and definitions of polyhedra - shape - number of faces, - number of vertices - number of edges • recognise and describe the properties of: - spheres - cylinders The learner must be able to build 3-D models:	Revise the work done in Year 1 to 3

YEAR 4 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
	4.6 **Perimeter, Surface area and volume** Surface area and volume	• use nets to create models of geometric solids, including: - cubes - prisms - pyramids - cylinders **Surface area and volume** The learner must be able to: • describe the interrelationship between surface area and volume of the objects mentioned above **Calculations and solving problems** The learner must be able to: • solve problems involving surface area, volume and capacity	

YEAR 4 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
7. 8.	**1.1** **Whole numbers** **Finance**	**Solving problems** The learner must be able to: • solve problems that involve whole numbers, percentages and decimal fractions in financial contexts such as: - profit, loss, discount and VAT - budgets - accounts - loans - simple interest - exchange rates	**Revise** all the work done in Year 3 and 4 **Financial contexts** • Solving problems in contexts should take account of the number ranges learners are familiar with. • Once learners have done sufficient calculations for simple interest through repeated calculations, they could use given formulae for these calculations. Loan documentation*, including: • agreements stating loan conditions (e.g. term of the loan, interest rate) • statements from banks and other loan institutions showing changes in a loan agreement (e.g. interest rate and monthly repayment changes) Investigate the effect of changes in the monthly repayment amount on the real cost of a loan. Investigate the effect of changes in the monthly investment amount on the value of the final investment.

YEAR 4 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
			Work with exchange rates presented in foreign exchange tables found in newspapers for different currencies. In order to: Estimate+ the value of a currency in relation to other currencies. Recognise the meaning of the terms “strong” and “weak” with regard to the relationship between different currencies. Develop an understanding of the “buying power” of a currency in a particular country (that is, the value of the currency in relation to the cost of living in that country). **Possible assessment:** Assignment: Planning a holiday in another country Plan a trip to another country (e.g. Botswana or Zimbabwe), taking into consideration the cost of the trip (including transport and accommodation), currency that will need to be exchanged for the trip, maps and other travel resources, distance chart, etc.
9. 10.	**FORMAL ASSESSMENT**	Although week 9 and 10 are allocated for assessment, the assessment can be done at any stage from week 1 to 10 **In this term Learners must be assessed on the following topics**: • Data handling • Decimal fractions • Numeric and geometric patterns • Area and perimeter	

YEAR 4 TERM 3			
WEEK	**TOPIC**	**CONTENT**	**Techniques, activities, resources and process notes**
		• Properties of 3-D objects • Surface area and volume • Finance **Make use of the following forms of assessment** • Assignment • Investigation • Test Scope is all the work done during the term	

Year 4 Term 4

YEAR 4 TERM 4			
WEEK	**TOPIC**	**CONTENT** **Revision and consolidation**	**Techniques, activities, resources and process notes**
	1.1 **Whole numbers** **Mental Mathematics**	**Mental Mathematics** Revise work done in Year 3	
1.	**Revision and consolidation**	Revise and consolidate all the work done in Term 1	
2.	**Revision and consolidation**	Revise and consolidate all the work done in Term 2 except graphs and finance	
3.	**Revision and consolidation**	Revise and consolidate all the work done in Term 3 except finance	

YEAR 4 TERM 4			
WEEK	**TOPIC**	**CONTENT** **Revision and consolidation**	**Techniques, activities, resources and process notes**
4.	**Revision and consolidation**	Revise and consolidate graphs and finance	
5.	**Moderation**	Activity 1 External moderation of school based assessment = 75% of qualification Activity 2 Final written assessment = 25% of qualification	
6.			
7.			
8.			
9.			
10.			
Assessment:			

SECTION 4

ASSESSMENT

4.1 Introduction

This section on assessment *standardises* the recording and reporting processes for the Technical Occupational Curriculum and Assessment Policy Statement that is offered in schools that offer this learning programme. It also provides a policy framework for the management of school-based assessment and school assessment records.

It is critically required of teachers to offer all measures of differentiated assessment as outlined in Chapter 9 of the National Protocol for Assessment. Especially learners in special schools who follow the Technical Occupational Curriculum over a period of four years have diverse learning styles and support needs. Since a learner or learners may be functioning on different levels, the assessment / recording / reporting system must make provision to reflect the level(s) of each leaner. Each learner, regardless of his/her number of years in the school, must have access to the standard of assessment best suited to his/her needs. The learner's *abilities* determine what will be expected of him/her and the *pacing* of instruction must accommodate each individual learner within a framework of high expectations (See Chapter 9 of the National Protocol for Assessment).

Learners are also eligible for Accommodations and Concessions as outlined in the Standard Operating Procedures for the Assessment of Learners who Experience Barriers to Assessment from Grade R to 12 (2017).

All decisions related to differentiated assessment are made through completing the protocols as outlined in the Policy on Screening, Identification, Assessment and Support (2014) and recorded and tracked through the Individual Support Plans of learners.

4.2 Assessment Principles

4.2.1 Definition

Assessment is a continuous planned process of identifying, gathering and interpreting information about the performance of learners, using various forms of assessment. It involves four steps: generating and collecting evidence of achievement; evaluating this evidence; recording the findings and using this information to understand and thereby assist the learner's development in order to improve the process of learning and teaching. Assessment should be both informal (Assessment for Learning) and formal (Assessment of Learning). In both cases regular feedback should be provided to learners to enhance the learning experience.

Assessment is a process that measures individual learners' attainment of knowledge (content and concepts) and skills by collecting, analysing and interpreting the data and information obtained from this process to:

- Enable the teacher to judge a learner's progress in a reliable way;
- Inform learners of their strengths, weaknesses and progress; and
- Assist teachers, parents and other stakeholders in making decisions about the learning process and the progress of learners.

Assessment should be mapped against the content, skills, intended aims and topics specified in the learning programme. In both informal and formal assessments, it is important to ensure that in the course of a school year:

- All of the topics and content are covered;
- The full range of skills is included; and
- A variety of different forms of assessment are used.

4.2.2 Informal Assessment or Daily Assessment

Assessment for learning has the purpose of continuously collecting information on a learner's achievement that can be used to improve their learning. Informal assessment is a daily monitoring of learners' progress. This is done through observations, discussions, practical demonstrations, learner-teacher conferences, informal classroom interactions, etc. Informal assessment may be as simple as stopping during the lesson to observe learners or to discuss with learners how learning is progressing. Informal assessment should be used to provide feedback to the learners and to inform planning for teaching but need not be recorded. It should not be seen as separate from learning activities taking place in the classroom. Learners or teachers can assess their performance in the tasks. Self-assessment and peer assessment actively involves learners in assessment. This is important as it allows learners to learn from and reflect on their own performance. The results of the informal daily assessment tasks are not formally recorded unless the teacher wishes to do so. **The results of daily, informal assessment tasks are not taken into account for progression, promotion and certification purposes.**

Informal, on-going assessments should be used to scaffold the acquisition of knowledge and skills and should be the stepping stones leading up to the formal tasks in the Programmes of Assessment.

4.2.3 Formal Assessment

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

a. Why use a Formal Assessment task?

"Formal Assessment Task (assessment of learning)" – is a systematic way of assessment used by teachers to determine how well learners are progressing in a level and in a particular subject.

b. What is a Formal Assessment Task?

It is a set of questions and or instructions that learners need to respond to. A task may consist of a range of activities. A formal task must be valid, fair and reliable and must cover sufficient knowledge and or skills to report on the learners' progress.

Teachers must ensure that assessment criteria are very clear to the learners before the assessment process commences. This involves explaining to the learners which knowledge and skills are being assessed and the required length of responses. Feedback should be provided to the learners after assessment and could take the form of whole-class discussion or teacher-learner interaction. Examples of formal assessments include projects, oral presentations, simulations, performances, tests, examinations, practical demonstrations, etc. The **forms of assessment** used should be appropriate to the age and the developmental level of the learners as well as the context of the subject or skills being assessed. The assessment tasks should be carefully designed to cover the topic, content and or skills of the subject. The design of these tasks should therefore ensure that a variety of skills are assessed.

Practical Assessment Tasks allow for learners to be assessed on a regular basis during the school year and also allow for the assessment of skills that cannot be assessed in a written format, e.g. test or examination.

Assessment in the General Certificate of Education: Technical Occupational (GCE: TO)

Assessment in the GCE: TO is underpinned by the objectives of the National Qualifications Framework (NQF). These objectives are to:

- Create an integrated national framework for learning achievements.
- Facilitate access to and progression within education, training and career paths.
- Enhance the quality of education and training.
- Redress unfair discrimination and past imbalances and thereby accelerate employment opportunities.
- Contribute to the holistic development of the learner by addressing:
  - Social adjustment and responsibility;
  - Moral accountability and ethical work orientation;
  - Economic participation; and
  - Nation-building.

The principles that drive these objectives are:

- ***Integration***

  To adopt a unified approach to education and training that will strengthen the human resources development capacity of the nation.

- ***Relevance***

  To be dynamic and responsive to national development needs.

- ***Credibility***

  To demonstrate national and international values and acquired competencies and skills so as to ensure the recognition of the qualification to be attained.

- ***Coherence***

  To work within a consistent framework of principles and certification.

- ***Flexibility***

  To allow for creativity and resourcefulness when achieving skills to cater for different learning styles and use a range of assessment methods, instruments and techniques.

- ***Participation***

To enable stakeholders to participate in setting standards and co-ordinating the achievement of the qualification.

- ***Access***

To address barriers to learning at each level to facilitate learners' progress.

- ***Progression***

To ensure that the qualification framework permits individuals to move through the levels of the national qualification via different, appropriate combinations of the components of the delivery system.

- ***Portability***

To enable learners to transfer parts of a qualification from one learning institution and/or employer to another institution or employer.

- ***Articulation***

To allow for vertical and horizontal mobility in the education system when pre-requisites for accreditation have been successfully completed.

- ***Recognition of Prior Learning***

To grant credits for a unit of learning following an assessment or if a learner possesses the capabilities specified in each skills area.

- ***Validity of assessments***

To ensure assessment covers a broad range of knowledge, skills, values and attitudes (SKVAs) needed to demonstrate applied competency. This is achieved through:

  - Clearly stating the skill to be assessed;
  - Selecting the appropriate or suitable evidence;
  - Matching the evidence with a compatible or appropriate method of assessment; and
  - Selecting and constructing an instrument(s) of assessment.

- ***Reliability***

To assure assessment practices are consistent so that the same result or judgment is arrived at if the assessment is replicated in the same context. This demands consistency in the interpretation of evidence; therefore, careful monitoring of assessment is vital.

- ***Fairness and transparency***

To verify that no assessment process or method(s) hinders or unfairly advantages any learner. The following could constitute unfairness in assessment:

  - Inequality of opportunities, resources or teaching and learning approaches;
  - Bias based on ethnicity, race, gender, age, disability or social class;
  - Lack of clarity regarding topic, content or skill being assessed; and
  - Comparison of learner's work with that of other learners, based on learning styles and language.

- ***Practicability and cost-effectiveness***

To integrate assessment practices within the teaching and learning process and strive for cost and time-effective assessment.

4.3 Managing Assessment

Assessor Requirements

Assessors must be subject specialists with adequate formal assessment experience. If the teacher conducting the assessments has not been declared a competent assessor, an assessor who has been declared competent may be appointed to oversee the assessment process to ensure the quality and integrity of assessments for the qualification.

Types of Assessment

Assessment benefits the learner and the teacher. It informs learners about their progress and helps teachers make informed decisions at different stages of the learning process. Depending on the intended purpose, different types of assessment can be used.

- **Baseline assessment:** At the beginning of a level or learning experience, baseline assessment establishes the knowledge, skills, values and attitudes (SKVAs) that learners bring to the classroom. This knowledge assists teachers to plan learning programmes and learning activities.

- **Diagnostic assessment:** This assessment diagnoses the nature and causes of barriers to learning experienced by specific learners. It is followed by guidance, appropriate support and intervention strategies. This type of assessment is useful to make referrals for learners requiring specialist help.

- **Formative assessment (Informal Assessment):** This assessment monitors and supports teaching and learning. It determines learners' strengths and weaknesses and provides feedback on progress. It determines if a learner is ready for summative assessment.

- **Summative assessment (Formal Assessment)** This type of assessment gives an overall picture of student progress at a given time. It determines whether the student is sufficiently competent to progress to the next level.

Planning Assessment

An assessment plan should cover three main processes:

- **Collecting evidence:** The assessment plan indicates which learning programme topics, content and skills will be assessed, what assessment method or activity will be used and when this assessment will be conducted.

- **Recording:** The process of recording refers to the assessment instruments or tools with which the assessment will be captured or recorded. Therefore, appropriate assessment instruments must be developed or adapted.

- **Reporting:** All the evidence is put together in a report to deliver a decision for the subject.

Methods of Assessment

Methods of assessment refer to who carries out the assessment and includes teacher assessment, self-assessment, peer assessment and group assessment.

TEACHER ASSESSMENT	The Teacher assesses learners' performance against given criteria in different contexts, such as individual work, group work, etc.
SELF-ASSESSMENT	Learners assess their own performance against given criteria in different contexts, such as individual work, group work, etc.
PEER ASSESSMENT	Learners assess another student or group of learners' performance against given criteria in different contexts, such as individual work, group work, etc.

GROUP ASSESSMENT	Learners assess the individual performance of other learners within a group or the overall performance of a group of learners against given criteria.

Task lists and **checklists** show the learners what needs to be done. They consist of short statements describing the expected performance in a particular task. The statements on the checklist can be ticked off when the learner has adequately achieved the criterion. Checklists and task lists are useful in peer or group assessment activities.

Rubrics are a hierarchy (graded levels) of criteria with benchmarks that describe the minimum level of acceptable performance or achievement for each criterion. It is a different way of assessment and cannot be compared to tests. Each criterion described in the rubric must be assessed separately. Mainly, two types of rubrics, namely holistic and analytical, are used.

Competence Descriptions

All assessment should award marks to evaluate specific assessment tasks. However, marks should be awarded against rubrics and not simply be a total of ticks for right answers. Rubrics should explain the competence level descriptors for the skills, knowledge, values and attitudes (SKVAs) a learner must demonstrate to achieve each level of the rating scale. When teachers or assessors prepare an assessment task or question, they must ensure that the task or question addresses an aspect of a topic or skill. The relevant content must be used to create the rubric to assess the task or question. The descriptions must clearly indicate the minimum level of attainment for each category on the rating scale.

Strategies for Collecting Evidence

A number of different assessment instruments may be used to collect and record evidence. Examples of instruments that can be (adapted and) used in the classroom include:

Record sheets: The teacher observes learners working in a group. These observations are recorded in a summary table at the end of each task. The teacher can design a record sheet to observe learners' interactive and problem-solving skills, attitudes towards group work and involvement in a group activity.

Checklists: Checklists should have clear categories to ensure that the objectives are effectively met. The categories should describe how the activities are evaluated and against what criteria they are evaluated. Space for comments is essential.

School Assessment Programme

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

The programme of assessment should be recorded in the Teacher's planning file (Portfolio of Assessment) for each subject.

The following should at least be included in the Teacher's File:

- A contents page;
- The formal schedule of assessment;
- The requirements for each assessment task;
- The tools used for each assessment task;
- Recording instrument(s) for each assessment task; and
- A mark sheet and report for each assessment task.

The learner's Evidence of Performance must at least include:

- A contents page;
- The assessment tasks according to the assessment programme as indicated below;
- The assessment tools or instruments for the task; and
- A record of the marks (and comments) achieved for each task.

Where tasks cannot be contained as evidence in the Portfolio of Evidence (PoE), its exact location must be recorded and it must be readily available for moderation purposes.

Assessment across the four years

Year 1 to 3

Year 1 to 3	**Formal School-Based Assessments**			**End-of-Year Assessment**
	Term 1	Term 2	Term 3	Term 4
	• Assignment 35% • Assignment 35% • Test 30%	• Assignment 35% • Project 35% • Examination 30%	• Assignment 35% • Investigation 35% • Test 30%	• Examination 25%
Term Report	100%	100%	100%	25%
End of Year	SBA 75%			25%

Year 4

Year 4	**Formal School-Based Assessments**			**End-of-Year Assessment**
	Term 1	Term 2	Term 3	Term 4
	• Assignment 35% • Assignment 35% • Test 30%	• Assignment 35% • Project 35% • Examination 30%	• Assignment 35% • Investigation 35% • Test 30%	• External Examination 25%
Term Report	100%	100%	100%	25%
End of Year	SBA 75%			25%

Recording and Reporting

Recording is a process in which the teacher documents the level of a learner's performance in a specific assessment task. It indicates learner progress towards the achievement of the knowledge and skill. Records of learner performance should provide evidence of the learner's progression. Records of learner performance should also be used to verify the progress made by teachers and learners in the teaching and learning process. Reporting is a process of communicating learner performance to learners, parents, schools, and other stakeholders. Learner performance can be reported in a number of ways. These include report cards, parents' meetings, school visitation days, parent-teacher conferences, phone calls, letters, class or school newsletters, etc.

Good record keeping is essential in all assessment, particularly in continuous assessment. A record book or file must be kept up to date by each teacher. It should contain:

- Learners' names;
- Dates of assessment;
- Name and description of the assessment activity;
- The results of assessment activities, according to Subject; and
- Comments for support purposes.

Teachers report in percentages against the subject. The various achievement levels and their corresponding percentage bands are as shown in the table below. Recording is a process in which the teacher documents the level of a learner's performance. Teachers record the actual raw marks against the task using a record sheet. Records of learner performance should also be used to verify the progress made by teachers and learners in the teaching and learning process. Records should be used to monitor learning and to plan ahead.

Note: The seven-point scale should have clear descriptions that give detailed information for each level. Teachers will record actual marks against the task by using a record sheet; and report percentages against the subject on the learners' report cards.

Codes and percentages for reporting

Rating code	Description of competence	Percentage	Nature of support provided to learners
7	Outstanding achievement	80 – 100	Independent
6	Meritorious achievement	70 – 79	Independent, verbal cues needed
5	Substantial achievement	60 – 69	Minimum support
4	Adequate achievement	50 – 59	Moderate support
3	Moderate achievement	40 – 49	Maximum support (Physical / Verbal)
2	Elementary achievement	30 – 39	Goals to be revisited – Change of direction required.
1	Not achieved	0 – 29	Little / no interest shown in the activity despite maximum support

All records must be accessible, easy to interpret, securely kept, confidential and helpful in the teaching and reporting process. The school assessment policy determines the details of how record books must be completed. Schools are required to provide quarterly feedback to parents on the Programme of Assessment, using a formal reporting tool, such as a report card. The schedule and the report card should indicate the overall level of performance of a learner.

NOTE:

Criterion referencing is best used to describe learner's performance in a skill. Teachers must make use of suitable analytical rubrics when assessing a learner's competence for a specific skill using practical demonstrations.

Progression and Promotion:

Learners will progress with age cohort in this Phase (Year 1-4). Where a learner does not meet the minimum requirements to be promoted to the next year then a learner may spend one extra year in the phase (Year 1-4) to strengthen their ability to achieve the qualification.

4.4 Moderation of Assessment

Moderation refers to the process that ensures that the assessment tasks are fair, valid and reliable. Moderation must be implemented at school, district, and provincial levels as required. Comprehensive and appropriate moderation practices must be in place for the quality assurance of all subject assessments. The Formal School Based Assessment and the practical assessment tasks must be moderated by the relevant subject specialists at the district and, if required, provincial levels in consultation with the moderators at school.

Moderation serves five purposes:

1. It must ascertain whether subject content and skills have been sufficiently covered.
2. The moderator must ensure that the correct balance of cognitive demands are reflected in the assessments.
3. The assessments and marking are of an acceptable standard and consistency.
4. The moderator must make judgements about the comparability of learner performance across schools; whilst recognising that teachers teach in different ways.
5. The subject specialist/moderator must identify areas in which a teacher may need development and support and must ensure that this support is provided.

4.4.1 Internal moderation

Assessment must be moderated according to the internal moderation policy of the School, Provincial and National Departments. Moderation is a continuous process. The moderator's involvement starts with the planning of assessment methods and instruments and follows with continuous collaboration with and support to the assessors. Internal moderation creates common understanding of topics and skills and maintains these across the learning programmes.

4.4.2 External moderation

External moderation is conducted by the Districts and or Provincial offices, Department of Basic Education, Umalusi and, where relevant, the QCTO. The external moderator:

- Monitors and evaluates the standard of all summative assessments;
- Maintains standards by exercising appropriate influence and control over assessors;
- Ensures proper procedures are followed;

- Ensures summative integrated assessments are correctly administered;
- Observes a minimum sample of 12 summative assessments in total;
- Gives written feedback to the relevant quality assuror; and
- Moderates in case of a dispute between an assessor and a student.

Policy on inclusive education requires that assessment procedures for students who experience barriers to learning be customised and supported to enable these students to achieve their maximum potential.

Moderation is therefore an on-going process and not a once-off end-of-year event.

4.5 General

This document should be read in conjunction with:

- White Paper 6 on Special Needs Education: Building an Inclusive Education and Training System (2001);
- *National Policy Pertaining to the Programme and Promotion Requirements of the National Curriculum Statement Grades R – 12*; and (NPPPPR) (2011);
- *National Protocol for Assessment Grades R – 12. (NPA) (2011);*
- *Guidelines for Responding to Diversity in the Classroom through the Curriculum and Assessment Policy Statements* (2011);
- *Guidelines to Ensure Quality Education and Support in Special Schools and Special School Resource Centres* (2013);
- *Policy on Screening, Identification, Assessment and Support* (2014);
- *Guidelines for Full-service/Inclusive Schools* (2010); and
- *Standard Operating Procedures for Assessment of Learners who Experience Barriers to Assessment* (2016).