basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

CURRICULUM AND ASSESSMENT POLICY STATEMENT

(CAPS)

MATHEMATICS: SENIOR PHASE

FINAL DRAFT

TABLE OF CONTENTS

Chapter 1:

Curriculum and Assessment Policy Statement (CAPS) Mathematics - Senior Phase

(Background)

1.1. Background

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

To improve its implementation, the *National Curriculum Statement* was amended, with the amendments coming into effect in January 2011. A single comprehensive Curriculum and Assessment Policy document was developed for each subject to replace the old Subject Statements, Learning Programme Guidelines and Subject Assessment Guidelines in Grades R - 12.

The amended *National Curriculum Statement Grades R - 12: Curriculum and Assessment Policy (January 2011)* replaces the *National Curriculum Statement Grades R - 9 (2002)* and the *National Curriculum Statement Grades 10 - 12 (2004)*.

1.2. Overview

1.2.1. The *National Curriculum Statement Grades R – 12 (January 2011)* represents a policy statement for learning and teaching in South African schools and comprises the following:

(a) Curriculum and Assessment Policy documents for each approved school subject as listed in the policy document *National Senior Certificate: A qualification at Level 4 on the National Qualifications Framework (NQF);* and

(b) The policy document *National Senior Certificate: A qualification at Level 4 on the National Qualifications Framework (NQF).*

1.2.2. The *National Curriculum Statement Grades R – 12 (January 2011)* should be read in conjunction with the following documents:

(a) *An addendum to the policy document, the National Senior Certificate: A qualification at Level 4 on the National Qualifications Framework (NQF),*

regarding the National Protocol for Assessment Grade R – 12, published in the *Government Gazette, No. 29467* of 11 December 2006; and

(b) *An addendum to the policy document, the National Senior Certificate: A qualification at Level 4 on the National Qualifications Framework (NQF), regarding learners with special needs***,** published in the *Government Gazette, No.29466* of 11 December 2006.

1.2.3. The Subject Statements, Learning Programme Guidelines and Subject Assessment Guidelines for Grades R - 9 and Grades 10 - 12 are repealed and replaced by the *Curriculum and Assessment Policy documents for Grades R – 12 (January 2011)*.

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

1.3. General aims of the South African Curriculum

1.3.1. The *National Curriculum Statement Grades R - 12* gives expression to what is regarded to be knowledge, skills and values worth learning. It will ensure that learners acquire and apply knowledge and skills in ways that are meaningful to their own lives. In this regard, the curriculum promotes the idea of grounding knowledge in local contexts, while being sensitive to global imperatives.

1.3.2. The National Curriculum Statement Grades R - 12 serves the purposes of:

(a) 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;
(b) providing access to higher education;
(c) facilitating the transition of learners from education institutions to the workplace; and
(d) providing employers with a sufficient profile of a learner's competences.

1.3.3. The National Curriculum Statement Grades R - 12 is based on the following principles:

(a) **Social transformation**; ensuring that the educational imbalances of the past are redressed, and that equal educational opportunities are provided for all sections of our population;

(b) **Active and critical learning**; encouraging an active and critical approach to learning, rather than rote and uncritical learning of given truths;
(c) **High knowledge and high skills**; the minimum standards of knowledge and skills to be achieved at each grade are specified and sets high, achievable standards in all subjects;
(d) **Progression**; content and context of each grade shows progression from simple to complex;
(e) **Human rights, inclusivity, environmental and social justice**; infusing the principles and practices of social and environmental justice and human rights as defined in the Constitution of the Republic of South Africa. The National Curriculum Statement Grades 10 – 12 (General) is sensitive to issues of diversity such as poverty, inequality, race, gender, language, age, disability and other factors;
(f) **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
(g) **Credibility, quality and efficiency**; providing an education that is comparable in quality, breadth and depth to those of other countries.

1.3.4. The National Curriculum Statement Grades R - 12 aims to produce learners that are able to:

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

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

1.4. Time Allocation

1.4.1. Foundation Phase

(a) The instructional time for subjects in the Foundation Phase is as indicated in the table below:

Subject	Time allocation per week (hours)
i. Home Language	**6**
ii. First Additional Language	**4 (5)**
iii. Mathematics	**7**
iv. Life Skills • Beginning Knowledge • Arts and Craft • Physical Education • Health Education	**6** 1 (2) 2 2 1

(b) Instructional time for Grades R, 1 and 2 is 23 hours. For Grade 3, First Additional Language is allocated 5 hours and Beginning Knowledge is allocated 2 hours as indicated by the hours in brackets in the table above.

1.4.2. Intermediate Phase

(a) The table below shows the subjects and instructional times in the Intermediate Phase.

Subject	Time allocation per week (hours)
i. Home Language	**6**
ii. First Additional Language	**5**
iii. Mathematics	**6**
iv. Science and Technology	**3.5**
v. Social Sciences	**3**
vi. Life Skills • Creative Arts • Physical Education • Religion Studies	**4** 1.5 1.5 1

1.4.3. Senior Phase

The instructional time in the Senior Phase is as follows:

Subject	Time allocation per week (hours)
i. Home Language	5
ii. First Additional Language	4
iii. Mathematics	4.5
iv. Natural Sciences	3
v. Social Sciences	3
vi. Technology	2
vii. Economic Management Sciences	2
viii. Life Orientation	2
ix. Arts and Culture	2

1.4.4. Grades 10-12

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

Subject	Time allocation per week (hours)
i. Home Language	4.5
ii. First Additional Language	4.5
iii. Mathematics	4.5
iv. Life Orientation	2
v. Three Electives	12 (3x4h)

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

Chapter 2:

Curriculum and Assessment Policy Statement (CAPS)
Mathematics - Senior Phase

(Overview)

2.1. What is Mathematics?

Mathematics is a language that makes use of symbols and notations for describing numerical, geometric and graphical relationships. It is a human activity that involves observing, representing and investigating patterns and qualitative 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. Specific Aims

The teaching and learning of Mathematics aims to develop the following in the learner:

- 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; and
- 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), and
    - further study in Mathematics.

2.3. Overview of content topics

2.3.1. What content knowledge will be learnt by a Senior Phase Mathematics learner?

Mathematics in the Senior Phase covers five main content areas. Each content area contributes towards the acquisition of the skills specific skills. The table below shows the general content areas of each topic as well as the specific content for grade 7 to 9. The skills which Senior Phase learners are required to demonstrate are also included in the next table below.

MATHEMATICS CONTENT KNOWLEDGE		
Content Area	**General content focus**	**Senior Phase specific content focus**
1. Numbers, Operations and Relationships	**Development of number sense that includes:** • the meaning of different kinds of numbers; • relationship between different kinds of numbers; • the relative size of different numbers; • representation of numbers in various ways; and • the effect of operating with numbers.	• Representation of numbers in a variety of ways and moving flexibly between representations; • Solving a variety of problems, using an increased range of numbers and the ability to perform multiple operations correctly and fluently; • Recognition of irrational numbers such as pi (π) and the square roots of non-perfect squares; and • Use of rational approximations of pi (π), square roots and cube roots.
2. Patterns, Functions and Algebra	**Algebra is the language for investigating and communicating most of Mathematics and can be extended to the study of functions and other relationships between variables. A central part of this content area is for the learner to achieve efficient manipulative skills in the use of algebra. It also focuses on the:** • description of patterns and relationships through the use of symbolic expressions, graphs and tables; and • identification and analysis of regularities and change in patterns, and relationships that enable learners to make predictions and solve problems.	• Investigation of numerical and geometric patterns to establish the relationships between variables; and • Expressing rules governing patterns in algebraic language or symbols. • Analysis of situations in a variety of contexts in order to make sense of them; and • Representation and description of situations in algebraic language, formulae, expressions and graphs.
3. Space and Shape (Geometry)	**The study of Space and Shape improves understanding and appreciation of the pattern, precision, achievement and beauty in natural and cultural forms. It focuses on the properties, relationships, orientations, positions and transformations of two-dimensional shapes and three-dimensional objects.**	• Two-dimensional (2-D) shapes and three-dimensional (3-D) objects are referred to as geometric figures and solids. • In the Senior Phase the learner draws and constructs a wide range of geometric figures and solids using appropriate geometric instruments. • The learner should develop an appreciation for the use of constructions to investigate the properties of geometric figures and solids. • Classification and description of geometric figures and solids should be extended to include similarity and congruence.
4. Measurement	**Measurement focuses on the selection and use of appropriate units, instruments and formulae to quantify characteristics of events, shapes, objects and the environment. It relates directly to the learner's scientific, technological and economic worlds, enabling the learner to:** • make sensible estimates; and • be alert to the reasonableness of measurements and results.	In this phase the learner should: • expand knowledge of measurement through investigative activities; and • derive rules for calculating measurements relating to geometric figures and solids.
5. Data handling	**Through the study of data handling, the learner develops the skills to collect, organise, display, analyse and interpret this information. The study of chance enables the learner to develop skills and techniques for making informed choices, and coping with randomness and uncertainty.**	• Posing of questions for investigation. • Gathering, summarising and representing data in order to interpret and make predictions about situations. • Probability of outcomes, includes both single and compound events and their relative frequency in simple experiments.

2.3.2. Weighting of content areas

The weighting of mathematics content areas serves two primary purposes: *firstly* the weighting gives guidance on the amount of time needed to adequately address the content within each content area; *secondly* the weighting gives guidance on the spread of content in the examination (especially end of the year summative assessment).

WEIGHTING OF CONTENT AREAS			
Content Area	Grade 7	Grade 8	Grade 9
Number, Operations and Relations	25%	20%	15%
Patterns, Functions and Algebra	25%	30%	30%
Space and Shape (Geometry)	25%	25%	30%
Measurement	10%	10%	10%
Data handling (Statistics)	15%	15%	15%
	100%	100%	100%

2.3.3. Overview of content areas and topics to show progression

The primary purpose of the overview of content topics is to show progression in terms of content and skills from grade R to 12. The transition between the phases was considered to minimise the content gaps and ensure smooth content flow (where necessary). In trying to ensure seamlessness in Mathematics content, few changes became unavoidable. This is mainly the case in the grades that start a new phase (excluding grade R) and those that are the exit points in the phase.

The following critical aspects should be noted to avoid possible confusion in the contents of the overview:
Certain content topics and skills are similar in two or three successive grades. This does NOT always mean that similar content should be taught in the affected grades. In instances where content is similar in two or more successive grades in the Content Overview, progression of content is indicated in the content outline (Chapter 3). The overview (Chapter 2) should therefore be read in conjunction with the content outline (Chapter 3).

1. NUMBERS, OPERATIONS AND RELATIONSHIPS

CONTENT	GRADE 7	GRADE 8	GRADE 9
1.1. Exponents	**7.1.1.1. Ordering and comparing numbers in exponential form:** • Squares and square roots of natural numbers (to at least 12^2) • Cubes and cube roots natural numbers (to at least 5^3) **7.1.1.2. Mental calculations involving squares and cubes of natural numbers (to at least 10^2 and 5^3)** **7.1.1.3. Problem solving**	**8.1.1.1. Ordering and comparing numbers in exponential form:** • Squares and square roots of natural numbers (to at least 20^2) • Cubes and cube roots natural numbers including cube roots of negative perfect cubes e.g. $\sqrt[3]{-8}$ • Scientific notation of large numbers **8.1.1.2. Mental calculations involving square roots and cube roots of natural numbers.** **8.1.1.3. Problem solving**	**9.1.1.1. Calculations involving** • Laws of exponents • Scientific notation of very small numbers **9.1.1.3. Problem solving**
1.2. Integers	**7.1.2.1. Counting forwards and backwards (any interval)** **7.1.2.2. Ordering and comparing** **7.1.2.3. Addition and subtraction** **7.1.2.4. Multiple operations** **7.1.2.6. Problem-solving involving addition, subtraction, multiplication and division.**	**8.1.2.2. Ordering and comparing** **8.1.2.3. Addition, subtraction, multiplication and division.** **8.1.2.4. Multiple operations** **8.1.2.5. Additive inverses** **8.1.2.6. Problem-solving involving addition, subtraction, multiplication and division.**	**9.1.2.4. Revision of multiple operations.** **9.1.2.5. Additive and multiplicative inverses** **9.1.2.6. Problem-solving involving addition, subtraction, multiplication and division.**
1.3. Fractions	**7.1.3.1. Common Fractions** • Equivalent forms • Ordering and comparison • Addition, subtraction, multiplication **7.1.3.2. Problem-solving involving common fractions,** **7.1.3.3. Decimals** • Count forwards and backwards (any interval) • Ordering and comparison(three decimal places) • Addition, subtraction and multiplication (two decimal places) • Division of positive decimals (three decimal places) by whole numbers • Rounding off (one decimal place)	**8.1.3.1. Common Fractions** • Equivalent forms • Ordering and comparison • Addition, subtraction, multiplication and division **8.1.3.2. Problem-solving involving common fractions,** **8.1.3.3. Decimals** • Ordering and comparison (three decimal places) • Addition, subtraction, multiplication and division (three decimal places) • Division of positive decimals (three decimal places) by decimals (two decimal places) • Rounding off (two decimal place)	**9.1.3.1. Problem-solving involving common fractions,** **9.1.3.2. Problem-solving involving decimal fractions** **9.1.3.3. Problem-solving involving percentages**

	7.1.3.4. Percentages • Ordering and comparison • Determining percentages • **Problem-solving involving percentages** **7.1.3.5. Equivalent forms:** • common fractions and decimal fractions • common fractions and percentages • decimal fractions and percentages **7.1.3.6. Problem solving using a range of strategies including:** • estimating • calculating to at least two decimal places • using and converting between appropriate S.I units	**8.1.3.4. Percentages** • Ordering and comparison • Determining percentages • **Problem-solving involving percentages** **8.1.3.5. Equivalent forms:** • common fractions and decimal fractions • common fractions and percentages • decimal fractions and percentages **8.1.3.6. Problem solving using a range of strategies including:** • estimating • calculating to at least two decimal places • using and converting between appropriate S.I units	
1.4. Multiples and Factors	**7.1.4.1. Factors** **7.1.4.2. Highest Common Factor (HCF)** **7.1.4.3. Prime factors (three digit number)**	**8.1.4.1. Factors** **8.1.4.2. Highest Common Factor (HCF)** **8.1.4.3. Prime factorization to determine the square root** **8.1.4.4. Multiples** **8.1.4.5. Lowest Common Multiple (LCM)**	
1.5. Properties of numbers	**Commutative; associative; distributive properties with positive rational numbers and zero**	**Commutative; associative; distributive properties with rational numbers**	**Properties of rational numbers**
1.6. Financial Mathematics	**7.1.6.1. Solving problems in context involving:** • Profit and loss • Budgets • Accounts • Loans • Simple interest	**8.1.6.1. Solving problems in context involving:** • Profit and loss • Budgets • Accounts • Loans • Simple interest • Higher purchase • Exchange rates	**9.1.6.1. Solving problems in context involving:** • Profit and loss • Budgets • Accounts • Loans • Simple interest • Higher purchase • Exchange rates • Commission • Rentals • Compound interest • Banking
1.7. Ratio and rate	**7.1.7.1. Solve real life problems involving ratio and rate including time, distance and speed**	**8.1.7.1. Solve real life problems involving ratio and rate including time, distance and speed**	**9.1.7.1. Solve real life problems involving** • ratio and rate including time, distance and speed. • direct and indirect proportion

2. PATTERNS, FUNCTIONS AND ALGEBRA

CONTENT	GRADE 7	GRADE 8	GRADE 9
2.1. Numeric & Geometric patterns	**7.2.1.1. Investigating and extending numeric and geometric patterns looking for relationships or rules including patterns:** • represented in physical or diagrammatic form • not limited to sequences involving constant difference or ratio • found in natural and cultural contexts • of learner's own creation • represented in tables **7.2.1.2. Explaining and justifying observed relationships or rules in learner's own words**	**8.2.1.1. Investigation and extension of numeric and geometric patterns looking for relationships or rules including patterns:** • represented in physical or diagrammatic form • not limited to sequences involving constant difference or ratio • found in natural and cultural contexts • of learner's own creation • represented in tables • represented algebraically **8.2.1.2. Explaining and justifying observed relationships or rules in learner's own words or in algebra**	**9.2.1.1. Investigation and extension of numeric and geometric patterns looking for relationships or rules including patterns:** • represented in physical or diagrammatic form • not limited to sequences involving constant difference or ratio • found in natural and cultural contexts • of learner's own creation • represented in tables • represented algebraically **9.2.1.2. Explaining and justifying rules generated**
2.2. Input and Output values	**7.2.2.1. Determining input and/or output values using:** • Verbal description • Flow diagrams • Tables	**8.2.2.1. Determining input and/or output values using:** • Verbal description • Flow diagrams • Tables • Formulae • Equations	**9.2.2.1. Determining input and/or output values using:** • Verbal description • Flow diagrams • Tables • Formulae • Equations
2.3. Algebraic Expressions	**7.2.3.1. Determining, analyzing and interpreting the equivalence of different descriptions of the same relationship or rule presented:** • verbally • in flow diagrams • in tables • by a number sentence	**8.2.3.1. Determining, analyzing and interpreting the equivalence of different descriptions of the same relationship or rule presented:** • verbally • in flow diagrams • in tables • equations **8.2.3.2. Using commutative, associative and distributive laws to:** • classify terms as like and unlike terms • multiply monomial by a monomial, binomial, by a monomial, trinomial by a monomial • divide monomial by a monomial, binomial, by a monomial, trinomial by a monomial • simplify algebraic expressions given in bracket notation, involving one or two sets of brackets and two kinds of operations.	**9.2.3.1. Determining, analyzing and interpreting the equivalence of different descriptions of the same relationship or rule presented:** • verbally • in flow diagrams • in tables • equations • by graphs on a Cartesian Plane **9.2.3.2. Determining the product of two binomials using distributive law and manipulative skills develop in grade 8.**

			9.2.3.3. Simplifying algebraic expressions by: • using laws of exponents • using factorization **9.2.3.4. Factorization:** • common factor • difference of two squares • trinomials of the form: $x^2 + bx + c$ and $ax^2 + bx + c$ if a is a common factor.
2.4. Algebraic quations	**7.2.4.1. Solving number sentences by inspection** **7.2.4.2. Determining, analyzing and interpreting the equivalence of different descriptions of the same relationship or rule presented by equations**	**8.2.4.1. Solving equations by:** • inspection • algebraic processes (additive and multiplicative inverses) **8.2.4.2. Determining, analyzing and interpreting the equivalence of different descriptions of the same relationship or rule presented by equations**	**9.2.4.1. Solving equations by:** • inspection • algebraic processes (additive and multiplicative inverses; factorization) **9.2.4.2. Determining, analyzing and interpreting the equivalence of different descriptions of the same relationship or rule presented by equations** **9.2.4.3. Solving equations by:** • using laws of exponents • using factorization
2.5. Graphs	**7.2.5.1. Describing a situation by interpreting a graph of a situation** **7.2.5.2. Drawing a graph from a description of a situation** **7.2.5.3. Use ordered number pairs to draw graphs**	**8.2.5.1. Describing a situation by interpreting a graph of a situation with special focus on the following trends and features:** • Linear or non-linear • Increasing or decreasing • Maximum or minimum • Discreet or continuous **8.2.5.2. Drawing of a graph from description of a situation with special focus on trends and features listed above.** **8.2.5.3. Use ordered number pairs to draw graphs on the Cartesian plane in the 1st quadrant**	**9.2.5.3. Draw graphs on the Cartesian plane from given equations.** **9.2.5.4. Determine equations from given graphs**

3. SPACE AND SHAPE (GEOMETRY)

CONTENT	GRADE 7	GRADE 8	GRADE 9
3.1. Geometric figures and solids	**7.3.1.1. Recognition, visualization and naming of geometric figures and solids in nature and cultural forms:** • polyhedra • quadrilaterals • **7.3.1.2. Use nets to make models of geometric solids**	**8.3.1.1. Recognition, visualization and naming of geometric figures and solids in nature and cultural forms:** • polyhedra • quadrilaterals • platonic solids **8.3.1.2. Use nets to make models of geometric solids**	**9.3.1.1. Recognition, visualization and naming of geometric figures and solids in nature and cultural forms:** • regular and irregular polygons • regular and irregular polyhedra • spheres • cylinders
3.2. Properties of geometric figures and solids	**7.3.2.1. Faces, vertices and edges** **7.3.2.2. Sides and angles of polygons** **7.3.2.3. Parallel and perpendicular sides**	**8.3.2.1. Sides, angles and diagonals and their interrelationships**	**9.3.2.1. Congruence and straight line geometry** **9.3.2.2. Transformations**
3.3. Transformation Geometry	**7.3.3.1. Investigation of properties of geometric figures using:** • rotation • reflections • translations • symmetry **7.3.3.2. Properties of similar and congruent figures**	**8.3.3.1. Investigation of properties of geometric figures using:** • rotation • reflections • translations • symmetry **8.3.3.2. Using proportion to describe the effect of enlargement and reduction on properties of geometric figures** **8.3.3.3. Properties of similar and congruent figures**	**9.3.3.1.** Investigation, description and justification of properties of geometric figures and solids using: • rotation • reflections • translations • congruence • similarity **9.3.3.2. Test for similarity and congruence of triangles**
3.4. Position and movement	**7.3.4.1. Location of position on coordinate system and maps using:** • Horizontal and vertical change • Compass directions	**8.3.4.1. Location of position on coordinate system, Cartesian Plane in the 1st quadrant and maps and describing how to move between position using:** • Horizontal and vertical change • Ordered pairs • Compass directions	**9.3.4.1. Descriptions of positions and movement between positions using:** • Ordered grids • Cartesian plane (4 quadrants) • Compass directions in degrees • Angle of elevation • Angle of depression
3.5. Geometry of straight lines		**8.3.5.1. Descriptions in terms of angle relationships of:** • parallel lines cut by a transversal • perpendicular lines • intersecting lines • triangles	**9.3.5.1. Problem solving and justification of relationships in geometric figures by using:** • parallel lines cut by a transversal • perpendicular lines • intersecting lines • triangles
3.6. Constructions of geometric figures	**7.3.6.1. Accurate constructions of geometric figures using pair compasses, ruler and protractor to:**	**8.3.6.1. Accurate constructions of geometric figures using pair compasses, ruler and protractor to:**	**9.3.6.1. Drawing and/or constructions of geometric figures and making models of solids to:**

	• investigate properties • design nets • use designed nets to make models	• investigate properties • design nets • use designed nets to make models	• investigate properties • compare properties • model situations in the environment
			9.3.6.2. **Position and movement between positions using:** • ordered grids • compass directions in degrees • angles of elevation and depression

4. MEASUREMENT

CONTENT	GRADE 7	GRADE 8	GRADE 9
4.1. Perimeter, surface area and volume	7.4.1.1. **Describing interrelationship between surface area and volume of geometric figures.** 7.4.1.2. **Conversions between SI units of measurement.** 7.4.1.3. **Calculations of volume and capacity of cubes, rectangular and triangular – based prisms** 7.4.1.4. **Problem solving involving:'** • perimeter and area of polygons • volume and capacity of cubes, rectangular and triangular – based prisms	8.4.1.1. **Conversions between:** • $mm^2 \leftrightarrow cm^2 \leftrightarrow m^2 \leftrightarrow km^2$ • $mm^3 \leftrightarrow cm^3 \leftrightarrow m^3$ • $ml(cm^3) \leftrightarrow l \leftrightarrow kl$ 8.4.1.2. **Calculations of volume and surface area of triangular and rectangular – based prisms and cylinders.** 8.4.1.3. **Problem solving involving:'** • perimeter and area of polygons and circles • volume and surface area of triangular and rectangular – based prisms and cylinders.	9.4.1.1. **Calculations by determining the effect on area and volume of multiplying one or more dimensions of 2-D and 3-D figures by a factor k.**
4.2. The Theorem of Pythagoras		8.4.2.1. **Investigating the relationship between the sides of a right – angled triangle to develop the Theorem of Pythagoras.** 8.4.2.2. **Using the Theorem of Pythagoras to calculate a missing length in a right – angled triangle leaving irrational answers in surd form.**	9.4.2.1. **Using the Theorem of Pythagoras to calculate a missing length in known geometric figures and solids.**
4.3. Classification of angles	7.4.3.1. **Classification of angles:** • Acute • Right • Obtuse • Straight • Reflex • revolution		

4.4. Measurement of angles	**7.4.5.1. Drawing angles accurate to one degree using protractor for estimation, comparison and measurement.**	**8.4.5.1. Drawing angles accurate to one degree using protractor for estimation, comparison and measurement**	
4.5. History of the development of π	**7.4.6.1. Describing and illustration of the historical development of Pi (π) as an irrational number in the development of numbers for measurement.**	**8.4.6.1. Develop the relationship between:** • the radius, diameter and circumference of a circle. • radius and area of a circle.	

5. DATA HANDLING

CONTENT	GRADE 7	GRADE 8	GRADE 9
5.1. Collect data	**7.5.1.1. Posing questions relating to human rights, social, economic, environmental and political issues in own environment.** **7.5.1.2. Selecting appropriate sources for the collection of data (including peers, family, newspapers, books, magazines).** **7.5.1.3. Using simple questionnaires (with a variety of possible responses) and designs and uses questionnaires (with yes/no type responses) in order to collect data (alone and/or as a member of a group or team) to answer questions.**	**8.5.1.1. Posing questions relating to human rights, social, economic, environmental and political issues in own environment.** **8.5.1.2. Selects appropriate sources for the collection of data (including peers, family, newspapers, books, magazines, the Internet).** **8.5.1.3. Designing and using questionnaires with a variety of possible responses in order to collect data (alone and/or as a member of a group or team) to answer questions.**	**9.5.1.1. Posing questions relating to human rights, social, economic, environmental and political issues in South Africa.** **9.5.1.2. Selecting, justifying and using appropriate methods for collecting data (alone and/or as a member of a group or team), which include questionnaires and interviews, experiments, and sources such as books, magazines and the Internet in order to answer questions and thereby draw conclusions and make predictions about the environment.**

5.2. Organize, record and summarize data	**7.5.2.1. Distinguishing between samples and populations, and suggesting appropriate samples for investigation (including random samples).** **7.5.2.2. Organising (including grouping where appropriate) and records data using** • tallies • tables • stem-and-leaf displays. **7.5.2.3. Summarising and distinguishing between ungrouped numerical data by determining:** • mean • median • mode **7.5.2.4. Identification of the largest and smallest scores in a data set and determining the difference between them in order to determine the spread of the data (range).**	**8.5.2.1. Performing simple experiments using random number generators, coins, spinners, dice and cards in order to collect data.** **8.5.2.2. Organising (including grouping where appropriate) and records data using** • tallies • tables • stem-and-leaf displays. **8.5.2.3. Summarising and distinguishing between ungrouped numerical data by determining:** • mean • median • mode **8.5.2.4. Determining measures of dispersion, including range and extremes.**	**9.5.2.1. Organising numerical data in different ways in order to summarise by determining:** • measures of central tendency; • measures of dispersion.
5.3. Display data	**7.5.3.1. Drawing a variety of graphs by hand/technology to display and interpret data (grouped and ungrouped) including**: • bar graphs and double bar graphs; • histograms with given intervals; • pie charts; • line and broken-line graphs.	**8.5.3.1. Drawing a variety of graphs by hand/technology to display and interpret data including:** • bar graphs and double bar graphs; • histograms with given and own intervals; • pie charts; • line and broken-line graphs; • scatter plots.	**9.5.3.1. Drawing a variety of graphs by hand/technology to display and interpret data including:** • bar graphs and double bar graphs; • histograms with given and own intervals; • pie charts; • line and broken-line graphs; • scatter plots.
5.4. Interpret data	**7.5.4.1. Critically reading and interpreting data presented in a variety of ways to draw conclusions and make predictions sensitive to the role of:** • context (e.g. rural or urban, national or provincial); • categories within the data (e.g. age, gender, race); • scales used in graphs as a source of error and bias; • choice of summary statistics (mean, median or mode); • any other human rights and inclusivity issues.	**8.5.4.1. Critically reading and interpreting data presented in a variety of ways in order to draw conclusions and make predictions sensitive to the role of:** • context (e.g. rural or urban, national or provincial); • categories within the data (e.g. age, gender, race); • data manipulation (e.g. grouping, scale, choice of summary statistics) for different • purposes; • the role of outliers on data distribution; • any other human rights and inclusivity issues.	**8.5.4.1. Critically reading and interpreting data with awareness of sources of error and manipulation to draw conclusions and make predictions about:** • social, environmental and political issues (e.g. crime, national expenditure, • conservation, HIV/AIDS); • characteristics of target groups (e.g. age, gender, race, socio-economic groups); • attitudes or opinions of people on issues (e.g. smoking, tourism, sport); • any other human rights and inclusivity issues.
5.5. Probability	**7.5.5.1. Performing simple experiments where the**	**8.5.5.1. Considering a simple situation (with equally**	**9.5.5.1. Considering situations with equally probable**

	possible outcomes are equally likely and: • lists the possible outcomes based on the conditions of the activity; • determines the frequency of actual outcomes for a series of trials; • determines the relative frequency using the definition of relative frequency	**likely outcomes) that can be described using probability and:** • lists all the possible outcomes; • determines the probability of each possible outcome using the definition of probability • finds the relative frequency of actual outcomes for a series of trials; • compares relative frequency with probability and explains possible differences; • predicts with reasons the relative frequency of the possible outcomes for a series of trials based on probability.	**outcomes, and:** • determines probabilities for compound events using two-way tables and tree diagrams; • determines the probabilities for outcomes of events and predicts their relative • frequency in simple experiments; • discusses the differences between the probability of outcomes and their relative frequency.

Chapter 3:

Curriculum and Assessment Policy Statement (CAPS)
Mathematics - Senior Phase

(Content Outline)

Introduction

- Chapter 3 (Content Outline) is aligned to the Chapter 2 (overview) and provides the teacher with sequenced content topics to be taught in each term.

- The examples given in the column "Clarification or Notes" in Chapter 3 are intended to guide the teacher on the content to be covered. Therefore, these notes do not cover the whole content.

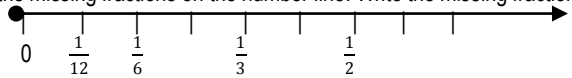
- The order of content areas in not rigid but care must be taken not to teach content areas that involve measurement before the basic operations such as addition, subtraction, multiplication and division have been mastered at the required level.

- Calculators should only be used where indicated from grade 7 upwards.

TERM 1 – Grade 7			
CONTENT AREA	**CONTENT**	**CLARIFICATION or NOTES**	**DURATION (in weeks)**
Numbers and number operations	**1.5. Properties of Rational Numbers** *Properties of numbers*	• The commutative property of addition: $a + b = b + a$ • The commutative property of multiplication: $a \times b = b \times a$ **Examples:** a) 33 + 99 = 99 + 33 = 132 b) 55 x 17 = 17 x 55 = 935 • The associative (grouping) property of addition: $(a + b) + c = a + (b + c)$ • The associative (grouping) property of multiplication: $(a \times b) \times c = a \times (b \times c)$ **Examples:** a) 51 + (19 + 46) = (51 + 19) + 46 = 116 b) 3 x (4 x 6) = (3 x 4) x 6 = 72 • The distributive property of multiplication over addition: $a(b + c) = a \times b + a \times c$ **Example:** 4(12 + 9) = 4 × 12 + 4 × 9 = 48 + 36 = 84 and conversely : 9 × 64 + 9 × 36 = 9 × (64 + 36) = 9 × 100 = 900 • The distributive property of multiplication over subtraction: $a(b - c) = a \times b - a \times c$ **Example:** 4 (12 – 9) = 4 × 12 – 4 × 9 = 48 – 36 = 12 **Note:** Learners should be able to use the properties but not necessarily know the names of the properties.	**1 week**
	The properties of 0 and 1	• Zero is the identity or neutral element of addition: Any number **t + 0 = t** **Example:** 76 + 0 = 76 • One is the identity or neutral element of multiplication: Any number **t × 1 = t** **Example:** 376 × 1 = 376 • However, any number t ÷ 0 is undefined **Example:** 376 ÷ 0 is undefined.	
	1.4. Multiples and Factors *Multiples of natural numbers*	• Revise natural numbers, whole numbers, odd and even numbers, prime numbers and composite numbers. • **Note the correct notation:** The multiples of 6 are 6 , 12 , 18 , 24 , ... or M_6 = {6 ; 12 ; 18 ; 24 ; ...}	**1 week**

	LCM	• LCM of 6 and 18 is 18 • LCM of 6 and 7 is 42	
	Factors, prime factors and HCF of 3-digit natural numbers	• Revise the rules for dividing by 2 , 3 , 4 , 5 and 10 • Determine the factors and prime factors of numbers • **Note the correct notation:** The factors of 6 are 1, 2, 3 and 6 or F_6 = {1 ; 2 ; 3 ; 6 **Examples:** a) Determine the factors of 24 are 1, 2, 3, 4, 6, 12 and 24 by inspection. b) The prime factors of 24 are 2 and 3 c) The factors of 140 are 1, 2, 5, 7, 10, 14, 28, 35, 70 and 140 because : if 2 and 7 are factors, 14 is a factor i. if 5 and 7 are factors, 35 is a factor ii. if 2 and 14 are factors, 28 is a factor etc. • Determine the HCF of 3-digit numbers. **Example:** Determine the HCF of 120; 300 and 900 120 = 5 x 3 x 2^3 300 = 5^2 x 3 x 2^2 900 = 5^2 x 3^2 x 2^3 HCF = 5 x 3 x 2^2 = 60	
	1.1. Exponents *Squares and cubes of whole numbers*	• Determine squares of whole numbers to at least 12^2 and cubes of whole numbers to at least 5^3 • Emphasize that: a) 12^2 = 12 x 12 and not 12 x 2 b) 1^3 means 1 x 1 x 1 and not 1 x 3	**1 week**
	Square roots and cube roots of whole numbers	• Square roots and cube roots are the converse operations of squaring and cubing. **Examples:** a) $\sqrt{4} = 2$ because $2^2 = 4$ b) $\sqrt[3]{27} = 3$ because $3^3 = 27$ • **Emphasize that:** a) $\sqrt{16+9} = \sqrt{25} = 5$ **and not** $\sqrt{16+9} = 4 + 3 = 7$. b) the square of 9 = 81 whereas the square root of 9 = 3.	**1 week**
	Exponential forms of whole numbers	• **10 x 10 x 10 x 10 x 10 x 10 x 10** is written **10^7** in exponential form. 10^7 is read "10 to the power of 7" where 10 is called the base of the power and 7 is called the exponent or index.	**1 week**

		• Emphasize that any number (except zero) raised to the power of zero is equal to 1, in other words $a^0 = 1$. **Examples :** a) $9^0 = 1$ and 0^0 is undefined. b) $4 \times 10^5 + 3 \times 10^4 + 2 \times 10^3 + 7 \times 10^0 = 432\,007$ c) $2^2 + 2^3 + 2^4 = 4 + 8 + 16 = 28$ d) $(7-4)^4 = 3^4 = 81$	
	Calculations using a non-scientific calculator including the brackets and memory keys.	• Revise rounding off numbers to the nearest 5, 10, 100 or 1 000. • Estimate the possible answer before doing a calculation on a calculator. **Examples:** a) 573 + 883 ≈ 1 500 b) 9,3 × 7 ≈ 63 c) Use a calculator to calculate $\frac{37\,318}{536+258}$	**1 week**
Space and Shape (Geometry)	**3.6. Construction of Geometric figures** *Accurately construct geometric figures for investigation of their properties*	• Revise measuring angle sizes using a protractor. • Teach learners how to use a set square and a pair of compasses correctly. • Accurately construct line segments, parallel and perpendicular lines, triangles and circles. • Classify triangles according to the properties of their sides and angles. • Construct and investigate the properties of the sides, angles and diagonals of quadrilaterals. • Classify quadrilaterals. • Focus on the similarities and differences between all quadrilaterals including trapeziums and kites.	**1 week**
	3.3. Transformation Geometry *Similar figures and congruent figures*	• Recognise and describe properties of congruent and similar shapes and the differences between them. • Emphasize that: a) Two or more figures are congruent if they are equal in all respects. b) Two or more figures are similar if they have the same shape but differ in size.	**1 week**
	3.4 Position and Movement *Compass directions*	• Locate positions on grids and maps using compass directions. **Examples:** a) Without using a protractor draw a sketch to illustrate the position of point T which is 20° West of South from point P. b) David walks for 4 km in a direction of 50° East of North from his house to John's house. He then walks to a shop in the direction 40° West of North. By construction determine how far David is from his house	**1 week**
	1 Task and 2 Tests		**1 week**

TERM 2 – Grade 7			
CONTENT AREA	**CONTENT**	**CLARIFICATION or NOTES**	**DURATION (in weeks)**
Number and number operations	**1.3 Fractions** *Common fractions*	• Revise proper fractions, improper fractions and mixed numbers. • Revise writing fractions in equivalent form **Example:** $\frac{1}{2}=\frac{2}{4}=\frac{5}{10}=\frac{12}{24}$ etc.	**1 week**
	Addition and subtraction of common fractions with unrelated denominators	• Revise writing fractions in the simplest form. **Emphasize that:** common fractions with the same denominators can be added or subtracted. **Examples:** a) $1\frac{2}{5}+\frac{3}{5}=2$ b) $2\frac{1}{2}+3\frac{1}{5}=\frac{5}{2}+\frac{16}{5}=\frac{25}{10}+\frac{32}{10}=\frac{57}{10}=5\frac{7}{10}$ c) $4\frac{1}{4}-2\frac{1}{8}=\frac{17}{4}-\frac{17}{8}=\frac{34}{8}-\frac{17}{8}=\frac{17}{8}=2\frac{1}{8}$	
	Ordering of common fractions	• Revise ordering of common fractions and inserting common fractions on a number line **Example:** a) $\frac{1}{3}<\frac{2}{5}<\frac{2}{3}<\frac{3}{4}$ b) Insert the missing fractions on the number line. Write the missing fractions in simplest form.  	
	Multiplication of common fractions	• Do multiplication of common fractions developmentally – not just short-cut cancelling methods. **Examples:** Simplify a) $\frac{1}{4}\times 8=2$ b) $\frac{3}{4}\times 8=3\times 2=6$ c) $1\frac{3}{4}$ x $8=\frac{7}{4}$ x $8=7$ x $2=14$ d) $\frac{1}{4}\times\frac{1}{3}=\frac{1}{12}$ (illustrate using a diagram) e) $\frac{3}{4}$ x $\frac{2}{5}$ (divide 2 and 4 by 2) $=\frac{3}{2}$ x $\frac{1}{5}=\frac{3}{10}$ f) $\frac{6}{7}$ x $4\frac{2}{3}=\frac{6}{7}$ x $\frac{14}{3}=4$ because $\frac{6}{3}=3$ and $\frac{14}{7}=2$ g) $(\frac{1}{2}+\frac{1}{3})$ x $\frac{3}{10}=\frac{5}{6}$ x $\frac{3}{10}=\frac{1}{2}$ x $\frac{1}{2}=\frac{1}{4}$	**1 week**

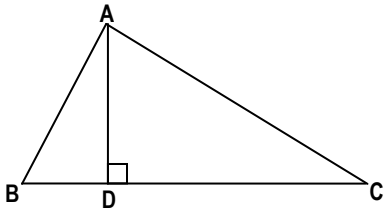
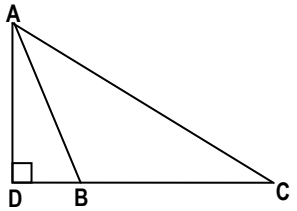
		h) $\frac{1}{2} + \frac{1}{3} \times \frac{3}{10} = \frac{1}{2} + \frac{1}{10} = \frac{5}{10} + \frac{1}{10} = \frac{6}{10} = \frac{3}{5}$ i) $\frac{2}{3}$ of $\frac{6}{7} + 1 = \frac{2}{3} \times \frac{6}{7} + 1 = \frac{4}{7} + 1 = 1\frac{4}{7}$	
Numbers and number operations	*Problem-solving involving common fraction*	Solve problems involving common fractions in context: **Examples:** a) Calculate what fraction $5\frac{1}{2}$ hours is of one day. b) James spent $\frac{2}{5}$ of his pocket money. He saved $\frac{1}{3}$ of the remainder. What fraction of the original amount was left? **NB**: $\frac{3}{7}$ of $R42 = 3 \times R6 = R18$ Note: It is incorrect to write that $\frac{3}{7} = R18$	**1 week**
	Decimal fractions	• Revise the place values of the digits in decimal fractions. • Insert decimal fractions on number lines. • Count forwards and backwards in decimal intervals. • Do conversions between common fractions and decimal fractions. • Compare and order decimal fractions to at least three decimal places. **Example**: $0,7 < 0,707 < 0,\dot{7}$ • Round off numbers to at least 1 decimal place **Example:** a) 56,28 ≈ 56,3 correct to 1 decimal places b) 248, 72 ≈ 248,7 correct to 1 decimal places a) 814,35 ≈ 814,4 correct to 1 decimal places or 814,35 ≈ 814,4 correct to the nearest tenth	**1,5 weeks**
	Addition, subtraction and multiplication of positive decimals to at least 2 decimal places	• Add and subtract *and* multiplication of positive decimals to at least 2 decimal places. **Examples:** Calculate a) 2,37 + 4,53 – 3,88 b) 5,276 × 30 c) 0,3 x 0,2 x 100	
	Decimal fractions *Division of positive decimals with at least 3 decimals places by whole numbers*	• Divide positive decimals with at least 3 decimals places by whole numbers **Examples:** a) Calculate 99,132 ÷ 12 b) Calculate 7,356 ÷ 30 c) If 330,72 ÷ 53 = 6,24 write down the value of:	

<table>
<tr><td></td><td></td><td>i. 330,72 ÷ 6,24
I. 330,72 ÷ 5,3
II. 6,24 x 5,3
• Solve real life problems involving decimals</td><td></td></tr>
<tr><td>Measurement</td><td>4.2 Perimeter, surface area and volume

Calculation of the
• perimeter of polygons
• area of squares, rectangles and triangles, using appropriate formulae</td><td>• Calculate the perimeter of polygons, area of squares, rectangles and triangles, using appropriate formulae

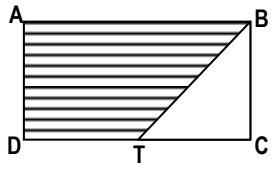
Examples: Calculate the:
a) Perimeter of a rectangle which is 24 cm long and 18 cm wide.
b) Perimeter of a regular octagon if the length of each side is 17 cm.
c) Area of ∆ABC if BC = 12 cm and its height AT = 9 cm.
d) Perimeter of a square if its area is 225 cm^2.

Note: The height of a triangle is a line segment drawn from any vertex perpendicular to the opposite side.
Example: AD is the height onto base BC of ∆ABC.

 
 
• Use and convert between appropriate SI units
Note: If 1 cm = 10 mm then 1 cm^2 = 100 mm^2
and if 1 m = 100 cm then 1 m^2 = 10 000 cm^2

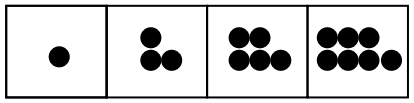
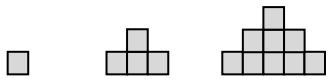
• Solve real like problems involving perimeter and area.

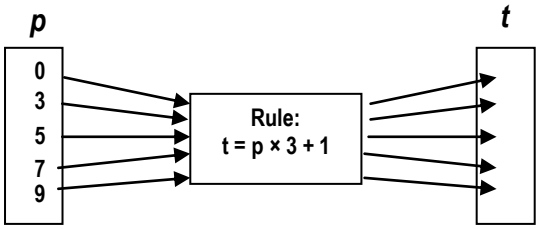
Examples:
a) Calculate the area of the shaded part in the adjacent diagram if ABCD is a rectangle, AB = 18,6 cm, DC = 2TC and BC = 8 cm.
b) The area of the floor of the dining room is 18,4 cm^2. How many square tiles with side 20 cm are needed to tile the floor?
c) The length of the side of a square is doubled. Will the area of the enlarged square be double or four times that of the original square?

  </td><td>1,5 weeks</td></tr>
<tr><td></td><td>Volume and capacity of cubes, rectangular prisms and triangular prisms</td><td>Emphasize that:the amount of space inside a prism is called its <u>capacity</u>; and the amount of space occupied by a prism is called its <u>volume</u>.

• Calulate the volume of right prisms. The volume of a right prism = the area of the base × the height. Hence:
a) The volume of a cube $= l^3$, the volume of a rectangular prism $= l \times b \times h$;</td><td>2 weeks</td></tr>
</table>

		b) The volume of a triangular prism $= \frac{b \times h}{2} \times$ height of the right prism • **Emphasize that:** a) If 1 cm = 10 mm then 1 cm^3 = 1 000 mm^3; and b) If 1 m = 100 cm then 1m^3 = 1 000 000 or 10^6 cm^3. c) An object with a volume of 1cm^3 will displace exactly 1 m*l* of water; and d) An object with a volume of 1m^3 will displace exactly 1 k*l* of water.	
	Surface area of cubes and rectangular prisms *Problems involving volume, capacity and surface area*	• Investigate the nets of cubes and rectangular prisms in order to deduce formulae for calculating their surface areas. • Solve problems in everyday-life involving volume, capacity and surface area.	
	1 Task, 1 Test and 1 Mid-year/ Half-yearly Examination		**2 weeks**

TERM 3 – Grade 7			
CONTENT AREA	**CONTENT**	**CLARIFICATION or NOTES**	**DURATION (in weeks)**
Patterns, Functions and Algebra	**2.1 Numeric and Geometric patterns** *Numeric and Geometric patterns and patterns found in natural and cultural forms and patterns of the learners' own creation*	• Investigate and extend numeric and geometric patterns in order to find relationship. • Identify a constant difference or ratio if there is one. • Describe, explain and justify the relationship in own words or by a rule. **Examples:** a) The next 2 numbers in the sequence 3 ; 6 ; 9 ; ... are 12 and 15. The rule is: multiply each number by 3, in other words 3 x n for n a natural number. b) Dot array patterns (growing patterns):  The sequence is 1; 3; 5; 7; ... (odd numbers) The rule is add 2; or 1; 1 + 2; 2 + 3; 3 + 4; ... or 2 x n – 1 for n a natural number. c) Growing patterns  The sequence is 1 ; 4 ; 9 ; ... (square numbers) or 1; 1 + 3;; 1 + 3 + 5; ...	**2 weeks**

<table>
<tr>
<td rowspan="2"></td>
<td>2.2 Input and output values</td>
<td>Determine input and/or output values using
• Verbal descriptions
• Flow diagrams
• Tables
Examples:
a) Use the given rule to calculate the values of t for each value of p.
 

b) Describe the relationship between the numbers in the top row and bottom row in the table. Then write down the value of m and n.
<table>
<tr><td>x</td><td>1</td><td>2</td><td>3</td><td>4</td><td>12</td><td>n</td></tr>
<tr><td>y</td><td>5</td><td>6</td><td>7</td><td>8</td><td>m</td><td>34</td></tr>
</table>
</td>
<td>2 weeks</td>
</tr>
<tr>
<td>2.3 Algebraic expressions

Number sentences</td>
<td>• Solve or complete number sentences by inspection, checking the solution by inspection.
Examples:
a) $2 \times x - 8 = 4$ means that $x = 6$
b) $(t - 7) \div 4 = 12$ means that $t - 7 = 48$ and $t = 55$</td>
<td>1 week</td>
</tr>
<tr>
<td>Number and number operations</td>
<td>1.7 Ratio and Rate</td>
<td>• Solve problems that involve ratio and rate.
Examples:
a) Write each of the given ratios in the simplest form:
(i) 25c : R4,25 (ii) $\frac{1}{2} : \frac{2}{3}$
b) If 3 books cost R27, calculate the cost of
(i) 9 (ii) 5 of the same books.
c) Share R60 between A and B in the ratio 7 : 8.
d) Which is the fastest? 540 km travelled in 5 hours or 672 km travelled in 6 hours.
e) A motorist travelled at an average speed of 98 km per hour for 2 hours and then at an average speed of 106 km per hour for the next 3 hours. How far did he travel altogether in 5 hours? Calculate his average speed for the whole journey.</td>
<td>1 week</td>
</tr>
<tr>
<td>Patterns, Functions and Algebra</td>
<td>2.5 Graphs</td>
<td>• Draw graphs using ordered numbered pairs in order to illustrate relationships between numbers or quantities.
• Draw graphs representing relationships in real-life context e.g. time/distance relationships.
• Describe a situation by interpreting a graph of the situation.
• Use scales on plans or maps to determine actual lengths or distances.</td>
<td>1 week</td>
</tr>
</table>

Number and number operations	**1.3 Fractions** *Percentages*	• Revise and extend the interrelationship between common fractions, decimal fractions (including recurring decimals) and percentages. Examples a) 25% = $\frac{1}{4}$ = 0,25 , 40% = $\frac{2}{5}$= 0,4 and 33 $\frac{1}{3}$% = $\frac{1}{3}$ = 0,$\dot{3}$ • Do calculations with percentages. **Examples:** a) Calculate 60% of R105 Amount = $\frac{3}{5}$ × R105 = R63 b) What percentage is 40c of R3,20? Percentage = $\frac{40}{320} \times 100\% = 12\frac{1}{2}\%$ c) Calculate the percentage increase if R60 is increased to R80. Amount increased = R20. Therefore percentage increase = $\frac{20}{60} \times 100\% = 33\frac{1}{3}\%$	**1 week**
	1.6 Financial Mathematics	• Solve financial problems in context including profit and loss, discount, VAT, SI, loans, hire purchase and exchange rates.	
	2 Tests and 1 Task		**2 weeks**

TERM 4 – Grade 7			
CONTENT AREA	**CONTENT**	**CLARIFICATION or NOTES**	**DURATION (in weeks)**
Numbers and number operations	**1.2 Integers**	• Count forwards and backwards in integers for any interval. • Recognise and compare integers. • Order integers e.g. – 6 < – 5 < 0 • Use number lines to add integers. • Subtract, multiply and divide integers. • Solve problems that involve multiple operations with integers. **Examples**: Calculate: a) 7 – 4 = – 11 b) 5 x (– 3) = – 15 c) 7 – 12 – 7 = – 12 d) 9 – (– 5) = 9 + 5 = 14 e) 8 ÷ (-2) – 5 × 3 – 3 = - 4 – 15 – 3 = – 22 and **not** – 4 – 0 = – 4 f) (7 + 6) ÷ (3 – 3) = 13 ÷ 0 which is undefined	**1 week**

	2.3 Algebraic equations	Solve simple algebraic equations. **Examples:** Solve for x if : a) $x + 4 = 7$ (subtract 4 from each side) b) $x - 4 = 7$ (add 4 to each side) c) $4x = -8$ (divide each side by 4) d) $\frac{2}{3}x = -6$ (multiply by 3 and divide by 2 or multiply by the reciprocal $\frac{3}{2}$) e) $2x + 5 = 7$ (subtract 5 from each side and then divide each side by 2) f) $4 - 3x = -2$ (subtract 4 from each side and then divide each side by – 3)	**1 week**
Space and Shape (Geometry)	**3.3 Transformation Geometry**	• Investigate symmetrical figures and shapes. • Draw lines of symmetry in geometric figures. • Recognise, describe and perform translations, reflections and rotations on geometric figures and shapes. **NB**: These transformations simply changes the position of the figures without changing their shape or size. • Enlarge/reduce the size of diagrams. **Example:** Use squared paper to draw ΔPQR with P(2;1) , Q(5;1) and R(5;5). Draw ΔABC with A(4;2), B(10;2) and C(10;10). Compare the lengths of the sides of the triangles and write down the factor of enlargement. **NB**: This enlargement is a transformation which changes the size of ΔPQR without changing its shape. Thus ΔPQR ||| ABC.	**1 weeks**
Data Handling	**5. 1 Collection of Data**	• Pose questions relating to real life situations e.g. situations affecting the number of children in families. • Use simple questionnaires containing a variety of questions and responses (e.g. yes/no, multiple choice) to collect data on posed questions. • Select an appropriate source from which to collect data and focus on one set of data only • Distinguish between samples and populations and understand the difference between the "population" and a sample and the reasons why data is often collected from a sample rather than the population.	**1 week**
	5.2 Organising, recording and summarising data	• Arrange data in ascending and descending order • Organise and record data using tally marks, tables and stem-and-leaf displays. • Calculate the mean, median and mode of a single data set of ungrouped data like data relating to classroom context. • Determine the range of the data set.	**1 week**
	5.3 Displaying data	• Represent collected and organised data graphically using the following graphs: a) Bar graphs b) Histograms c) Pie charts d) Line and broken-line graphs.	**1 week**

	5.4 Read and interpret graphs	• Critically read and interpret tables, graphs and measures (mean, median, mode, range) in order to answer questions. • Identify points or values on a graph from values given on the vertical and horizontal axis.	
	5.5 Probability	• Perform simple experiments where the possible outcomes are equally likely, and: a) List the possible outcomes based on conditions of the activity b) Determine the frequency of actual outcomes for a series of trials c) Determine the relative frequency using the definition of relative frequency.	**1 week**
	Revision, 1 Test and a Final Examination		**3 weeks**

TERM 1 – Grade 8			
CONTENT AREA	**CONTENT**	**CLARIFICATION** or **NOTES**	**DURATION (in weeks)**
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.5 Properties of numbers** *Rational, Irrational and Real numbers*	• Recognise, classify represent and compare natural numbers, whole numbers, and integers. • Identify and classify rational, irrational and real numbers. • Emphasize that real numbers may be rational or irrational **Examples:** a) $\sqrt{9} = 3$ is a real, rational, integer, whole and natural number. b) $\sqrt{8}$ is a real, irrational number because 8 is not a square number. c) $\sqrt{-9}$ is a non-real number. **Examples :** a) Which of the numbers $0.\dot{4}$; $\sqrt[6]{6}$; $\sqrt[3]{-8}$; $1\frac{3}{4}$ are rational numbers? b) Are all rational numbers integers? • Revise the properties of 0 and 1 including why any number divided by 0 is undefined.	**1 week**
	1.4 Multiples and factors *Factorisation of natural numbers*	• Factorise natural numbers by inspection or using the ladder method. • Write natural numbers in exponential form. **Examples:** a) $4 = 2 \times 2 = 2^2$ b) $81 = 3 \times 3 \times 3 \times 3 = 3^4$	**1 week**

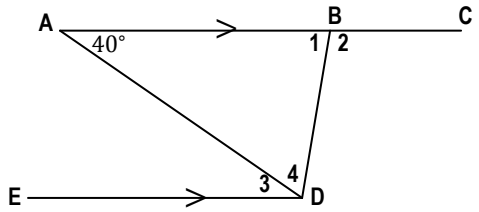
		• Calculate the Highest Common Factor (HCF) of two-and three-digit natural numbers by inspection or factorisation **Examples:** a) The HCF of 7 and 11 is 1 b) The HCF of $2^2 \times 3 \times 5$ and $2 \times 3 \times 7$ is $2 \times 3 = 6$ • Calculate the Lowest Common Multiple (LCM) of two-and three-digit natural numbers by inspection or factorisation **Examples:** a) The LCM of 7 and 11 is $7 \times 11 = 77$ b) The LCM of $2 \times 2 \times 3 \times 5$ and $2 \times 3 \times 7$ is $2 \times 2 \times 3 \times 5 \times 7 = 420$	
	1.1 Exponents *Square numbers and the square roots of whole numbers*	• Square whole numbers from 0 to 20. • **Emphasize that**: a) $13^2 = 169$ and not 13×2 b) $\sqrt{7^2} = 7$ and NOT $\sqrt{7^2} = 7$ c) $\sqrt{7^2} = 7$ than $\sqrt{7^2} = \sqrt{49} = 7$ d) $\sqrt{16+9} = \sqrt{25} = 5$ and not $\sqrt{16+9} = 4+3 = 7$ e) If $\sqrt{4} = 2$ then $\sqrt{8} = \sqrt{4 \times 2} = 2\sqrt{2}$	**1 week**
	Cubic numbers and the cube root of natural numbers *Scientific notation for very large numbers*	• **Emphasize that:** a) $1^3 = 1$ and not 3 b) $\sqrt[3]{27} = 3$ and not $27 \div 3$ c) $\sqrt[3]{11} = 11$ d) If $\sqrt[3]{8} = 2$ then $\sqrt[3]{16} = \sqrt[3]{8 \times 2} = 2\sqrt[3]{2}$ • Write very large numbers in scientific notation. **Examples:** a) $76\,430\,202 = 7{,}6430202 \times 10^7$ b) 52 billion $= 52 \times 10^{12} = 5{,}2 \times 10^{13}$	
	1.2 Integers	• Revise calculations that involve adding, subtracting, multiplying and dividing integers.	

	Operations with integers	• Use correct terminology and avoid "*a minus and a plus gives a plus*". Rather say "*negative 5 plus negative 4 equals negative 9*", whereas "*negative 5 times negative 4 equals positive 20*". • Do calculations that involve the squares, cubes, square roots and cube roots of integers **Examples:** a) $(-6^2) = 36$ b) $(-6^3) = 216$ c) $-\sqrt{9} = -3$ d) $\sqrt[3]{-8} = -2$	**1,5 weeks**
		• Do calculations that involve multiple operations • Emphasise the order of operations **Examples:** a) $2 \times 3 - 3 = 6 - 3 = 3$ and not $2 \times 0 = 0$ b) $6 \div (-2) + 4 \times (-3) - 1 = -3 - 12 - 1 = -16$ • Investigate sequences that involve integers **Examples:** a) Write down the next 2 terms in the sequence $-1;\ 4;\ -7;$ ... and determine the 10th and the 20th term. b) Write down the next 2 terms in the sequence $-2;\ 4;\ -8;$ ... and determine the 8th and 25th term.	
	1.3 Fractions *Operations with rational numbers*	• Divide whole numbers and common fractions by common fractions. • Emphasize that to divide by any number means to multiply by its reciprocal **Examples:** a) $8 \div \frac{2}{3} = 8 \times \frac{3}{2} = 12$ b) $\frac{7}{10} \div \frac{1}{2} =$ c) $6\frac{1}{8} \div 1\frac{3}{4} =$ • Divide decimal fractions by decimal fractions **Example:** $\frac{6,4}{0,04} = \frac{640}{4} = 160$. • Calculate the squares, cubes, square roots and cube roots of rational numbers	**1,5 weeks**

		Examples: a) $(0,7)^2 = 0,49$ b) $\sqrt{0,04} = 0,2$ **c)** $(0,1)^3 = 0,001$ d) $\sqrt[3]{-0,084} = -0,2$ • Do calculations that involve multiple operations and rounding off rational numbers • Solve problems that involve rational numbers in context.	

PATTERNS, FUNCTIONS AND ALGEBRA	**2.3 Algebraic expressions**	• **Emphasise terminology:** variable, constant, coefficient, power, base of the power, exponent, like and unlike terms, algebraic expression and algebraic equation. • Add, subtract, multiply and divide terms with coefficients that are: a) whole numbers, b) integers, c) rational numbers • **Emphasize:** a) $x + x = 2x$ and not $x2$ b) $x^2 + x^2 = 2x^2$ and not $2x^4$ c) $2^3.2^4 = 2^7$ and not 4^7 d) $(-2x^2)^3 = -8x^6$ and not $-6x^5$ **Examples:** Determine the numerical value of algebraic expressions by substitution. a) If $x = 2$ then $3x^2 = -3(2)^2 = -3 \times 4 = -12$ and not $(-6)^2$ b) If $x = -2$ then $-x^2 - x = -4 + 2 = -2$ and not $4 + 2 = 6$ • Simplify algebraic expressions that involve brackets using the distributive property of multiplication over addition or subtraction **Example:** $2(5 + x - x^2) - x(3x + 1) = 10 + 2x - 2x^2 - 3x^2 - x = -5x^2 + x + 10$ • Divide a multi-term algebraic expression by a monomial **Examples:** $\frac{x^4 - 6x^2 - 1}{x^2} = x^2 - 6 - \frac{1}{x^2}$ **and not** $x^4 - 6 - 1$ by cancelling x^2 • Calculate the squares, cubes, square roots and cube roots of single algebraic terms or like algebraic terms **Examples:** a) $\sqrt{36x^{36}} = 6x^{18}$ and not $6x^6$ b) $\sqrt{25x^2 - 9x^2} = \sqrt{16x^2} = 4x$ **and not** $5x - 3x = 2x$ • Do calculations that involve multiple operations **Examples:** $\frac{6x^3 - (-x^2)(2x)}{-x^2} = \frac{6x^3 + 2x^3}{-x^2} = \frac{8x^3}{-x^2} = -8x$	**2 weeks**
	2 Tests and 1 Task		**1 week**

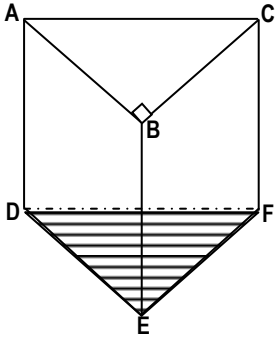
TERM 2 – Grade 8			
CONTENT AREA	**CONTENT**	**CLARIFICATION or NOTES**	**DURATION (in weeks)**
PATTERNS, FUNCTIONS AND ALGEBRA	**2.4 Algebraic equations**	• Solve linear equations with 1 variable and test the solution by substitution. • Emphasise the importance of additive and multiplicative inverses. • Balance equations by performing the same operation on the LHS and RHS of the equation. **Examples:** a) $x + 6 = -9$ means $x + 6 - 6 = -9 - 6$ and $x = -15$ **and <u>not</u>** take 6 across and change its sign. b) c) $2x = 8$ means $\frac{-2x}{-2} = \frac{8}{-2}$ and $x = -4$ and not take -2 across and change its sign. • Model and solve simple problems that involve numbers, ages, averages, perimeter, area, money, speed/time/distance **Examples:** **The area of a rectangle = length x breadth. If** a) the area of a rectangle is $(4x^2 - 6x)$ cm^2 and the breadth is $2x$ cm, calculate the length. b) Thandi is 6 years older than Sophie. In 3 years time Thandi will be twice as old a Sophie. How old is Thandi now?	**2,5 weeks**
SPACE AND SHAPE (GEOMETRY)	**3.5 Geometry of straight lines**	• Investigate pairs of angles formed by: a) perpendicular lines (adjacent supplementary angles) b) intersecting lines (adjacent supplementary angles and vertically opposite angle) c) a transversal intersecting parallel lines (corresponding, alternate, and co-linear angles) • Solve problems that involve the relationships between the pairs of angles referred to above. **Emphasize:** a) The language of Geometry. b) Setting out of answers and displaying reasoning. c) That a reason must be given for each written statement.	**1,5 weeks**
	3.6 Constructions of Geometric figures	• Use a pencil, ruler, protractor and a pair of compasses to accurately: a) Bisect line segments and angles. b) Draw perpendicular lines at a given point or from a given point. • Construct angles of 45^o , 60^o , 30^o and their multiples without using a protractor . **Examples:** By construction investigate the properties of: a) the sides, interior and exterior angles of triangles. b) concurrent line segments in triangles.	**1 week**

		c) the sides, angles and diagonals of quadrilaterals and other polygons.	
	1.1 Geometric figures and solids *The Geometry of triangles, quadrilaterals and other polygons*	• Describe, classify and solve problems that involve the sides and angles of triangles, quadrilaterals and polygons. **Emphasize that:** a) rectangles and a rhombi are special kinds of parallelograms b) a square is a special kind of rectangle or rhombus • Revise regular, irregular, convex and concave polygons. **Examples:** a) In $\Delta ABC,\ AB = AC$ and $\angle A = 70°$, calculate the size of $\angle C$. b) **Given:** $\angle B_1 = 62°, \angle A = 40°$ and $AC \parallel ED$. Calculate the size of $\angle D_3$ and $\angle D_4$  c) Calculate the size of each interior angle of a regular polygon with10 sides.	**2 weeks**
	1 Task, 1 Test and 1 Mid-year/ Half-yearly Examination		**3 weeks**

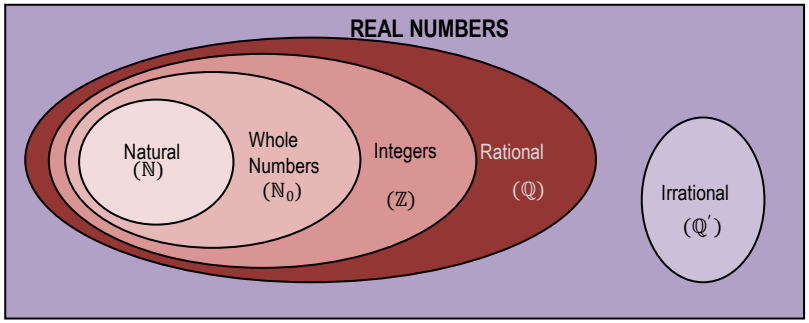
TERM 3 – Grade 8			
CONTENT AREA	**CONTENT**	**CLARIFICATION or NOTES**	**DURATION (in weeks)**
MEASUREMENT	**4.3 The Theorem of Pythagoras**	• Investigate the relationship between the lengths of the sides of a right-angled triangle i.o.w. develop the Theorem of Pythagoras. • Conversely, if the lengths of its 3 sides are given, determine whether a triangle is a right-angled or not. • Use the Theorem of Pythagoras to calculate a missing side-length in a right-angled triangle, leaving irrational answers in surd form. **Example:** In ΔABC, $\angle B = 90°$, $AC = 4$ cm, $BC = 2$ cm. Calculate the length of AB without using a calculator. Leave the answer in the simplest surd form.	**1 week**
	4.2 Perimeter, surface area and Volume *Perimeters and Areas of 2-D figures*	• Calculate the perimeters and areas of squares, rectangles and triangles. Emphasize that every triangle has 3 bases, each with its related altitude. • Calculate the areas, to at least 2 decimal places, of polygons by decomposing then into rectangles and/or triangles, using and converting between appropriate square SI units. • Define a circle and revise the terminology associated with circles viz. centre, radius, diameter, circumference, chord, secant, tangent, segment and sector. • Describe the meaning of and use the irrational number π in calculations that involve circles. **Emphasize that:** a) π represents the value of $\frac{c}{d}$ for any circle. b) π is an irrational number and is given as 3,141592654 correct to 9 decimal places on the calculator. c) $\frac{22}{7}$ or 3,14 are approximate rational values of π in every-day use. • Develop the relationship between: a) the radius, diameter and circumference of a circle viz. $d = 2r, c = \pi d$ and $c = 2\pi r$. b) the radius and the area of a circle namely, $A = \pi r^2$. • Solve problems, with or without a calculator, by selecting and using the appropriate formulae.	**1,5 weeks**
PATTERNS, FUNCTIONS AND	**2.1 Numeric and Geometric patterns.** *Numeric and Geometric patterns and patterns found in natural and cultural*	• Investigate and extend numeric and geometric patterns looking for a relationship. • Identify a constant difference or ratio if there is one . • Describe, explain and justify the relationship in own words or by a rule. **Examples:**	**0,5 week**

ALGEBRA	*forms and patterns of the learner's own design.*	a) The next 2 numbers in the sequence 1 ; 3 ; 5 ; 7; ... are 9 and 11. There is a constant difference of 2, but the numbers are **not** multiples of 2. b) The next 2 numbers in the sequence 1 ; 4 ; 9 ; ... are 16 and 25. The numbers are square numbers.	
	2.5 Graphs	• Investigate the properties of graphs illustrating real-life relationships e.g. time-distance graphs. • Draw graphs given co-ordinates of points. **Emphasize that:** a) The co-ordinates of a point indicates the unique position of that point relative to the Y-axis and to the X-axis. b) If P (6;3) it means that point P lies 6 units to the right of the Y-axis **and** 3 units above the X-axis. • Describe or interpret graphs with special focus on trends and features such as: a) Linear or non-linear functions b) Increasing or decreasing functions c) Discrete or continuous variables d) Maximum/minimum independent variables.	**1 week**
SPACE AND SHAPE (GEOMETRY)	**3.3 Transformation Geometry**	• Investigate symmetrical figures and shapes. • Draw lines of symmetry in geometric figures. • Recognise, describe and perform translations, reflections and rotations on geometric figures and shapes. Emphasize that these transformations simply change the position of the figures without changing their shape or size. **Examples:** a) On squared paper plot point $A(4;3)$ and A' , its image, after reflection in: i. the y-axis ii. the x-axis. b) Write down the co-ordinates of T' if $T(-2;3)$ is translated 4 units downwards. c) Complete: Under the translation $(x;y) \rightarrow (x+3;y)$: $P(-4;7) \rightarrow P'(\ldots;\ldots)$	**1 week**
NUMBERS, OPERATIONS AND RELATIONSHIPS	**4.1 Ratio and Rate**	• Simplify ratios **Example:** 45 cm : 1,8m = 45 cm = 45cm : 1800cm = 1:40 • Increase or decrease quantities in a given ratio or percentage **Examples:** a) Increase 160kg in the ratio 7:4 means the increased mass = $160 \times \frac{7}{4}$ kg $= 280$kg b) Decrease R400 by 20% means the decreased amount = R400 × 0,8 = R320	**1,5 week**

		• Share amounts or quantities in a given ratio **Examples:** Share R187 between A and B in the ratio 9:8. Then A's share = $\frac{9}{17}$ ×R187 = R99 and B's share = $\frac{8}{17}$ × R187 = R88 • Solve problems involving ratios in real life situations. **Emphasize that**: a) the cost of 4kg = R10 **and not** 4kg = R10 b) $\frac{1}{3}$ of the distance = 45km **and not** $\frac{1}{3}$ = 45km c) 10% of the capacity = $63l$ **and not** 10% = $63l$ • Use words like "*for*", "*for every*", "*per unit*", "*per hundred*" etc. as an aid in identifying equal and unequal rates.	
	Transformation geometry *Scale drawing*	• Use scale on plans or maps to determine actual lengths or distances. • Use proportion to describe the effect of enlargement or reduction on the properties of geometric figures. **Examples:** The perimeter of square ABCD = 48cm. a) Write down the perimeter of the square if the length of each side is doubled. b) Will the area of the enlarged square be twice or four times that of the original square?	**0,5 week**
	1.6 Financial Mathematics	• Calculate: a) Profit and Loss, discount, budgets. b) Simple interest and hire purchase. c) Exchange rates **Examples:** a) Calculate the cost price of a shirt if it is sold for R116 at a loss of 20%. b) Calculate the selling price of a table marked R1699,00 if a discount of 5% is given for cash. c) The simple interest on R1 800 invested at 8,5% p.a. for n years is R459. Determine the value of n. d) Calculate how many: i. USA dollar ($), and ii. Pound (£) can be exchanged for R8 000 if the exchange rate is R7,20 to the USA dollar and R12,10 to the pound.	**2 weeks**
	2 Tests and 1 Task		**1 week**

TERM 4 – Grade 8			
CONTENT AREA	**CONTENT**	**CLARIFICATION or NOTES**	**DURATION (in weeks)**
SPACE AND SHAPE (GEOMETRY)	**3.2 Properties of geometric figures and solids** *Polyhedra*	• Revise the relationship between the number of faces, edges and vertices of 3-D figures. • Use the nets of cubes, prisms, cylinders and pyramids and use them to make models of these 3-D figures. • Investigate the 5 Platonic solids viz. the tetrahedron, hexahedron (cube) octahedron, dodecahedron and icosahedron with reference to number of vertices, edges, faces and shape of faces.	**1 week**
MEASUREMENT	**4.2 Perimeter, surface area and volume** *Volume and Surface area*	• Revise the conversions of appropriate SI linear, square and cubic units of measurement. • Calculate the volume of rectangular prisms, triangular prisms and cylinders. • Calculate the surface areas of rectangular prisms, triangular prisms and cylinders. • Solve problems that involve the volume, capacity and surface area, correct to at least 2 decimal places, in context. **Examples:** a) Calculate the volume of a cylinder, without using a calculator if its diameter is 28 cm, its height is 30 cm and $\pi = \frac{22}{7}$. b) Calculate the surface area of a cylinder, correct to 2 decimal places if its height is 65 cm and the circumference of its base is 47,6 cm. c) Calculate the volume and surface area of the adjacent prism if AB = 8 cm, BC = 6 cm and CF = 16 cm.  	**1 week**
Data Handling	**5. 1 Collection of Data**	• Pose questions relating to real life situations e.g. situations affecting the learners in the school like type and quantity of litter in the school grounds. • Use simple questionnaires containing a variety of questions and responses (e.g. yes/no, multiple choice, open ended) to collect data on posed questions. • Revise the distinction between samples and populations. • Select an appropriate source from which to collect data and focus on one set of data only.	**1 week**

	5.2 Organising, recording and summarising data	• Arrange ungrouped data in ascending and descending order. • Determine the range of the data and understand why it is important to know the spread of the data. • Group data into intervals. **Example:** Group data on all the heights of the learners in the Grade 8 class into different height s intervals: 0,6 m to 1 m; 1,1 to 1,5 m etc. • Organise and record data using tally marks, tables and stem-and-leaf displays. • Calculate the mean, median and mode of a single data set of ungrouped data like data relating to school and classroom context.	**1 week**
	5.3 Displaying data	• Represent collected and organised data graphically using the following graphs: e) Bar graphs f) Histograms with given intervals g) Pie charts h) Line and broken-line graphs i) Scatter plots.	**1 week**
	5.4 Read and interpret graphs	• Identify points or values on a graph from values given on the vertical and horizontal axis. • Critically read and interpret tables, graphs and measures (mean, median, mode, range) in order to answer questions. • Analyse graphs and explain the message being displayed or represented on a graph and /or describe trends in the graphs. **Example:** Analyse a graph showing the distribution of test scores for a class of learners and make deductions about the performance of that group of learners.	
	5.5 Probability	• Perform simple experiments where the possible outcomes are equally likely, and: d) List the possible outcomes based on conditions of the activity e) Determine the frequency of actual outcomes for a series of trials f) Determine the relative frequency using the definition of relative frequency.	**1 week**
	Revision, 1 Test and a Final Examination		**3 weeks**

TERM 1 – Grade 9			
CONTENT AREA	**CONTENT**	**NOTES or CLARIFICATION**	**DURATION (in weeks)**
NUMBERS, OPERATIONS AND RELATIONSHIPS	**Real Number System**	• Consolidate and extend knowledge gained in previous grades involving natural numbers, whole numbers, integer, rational and irrational numbers. • The diagrammatic representation of sets of numbers in the real number system.  	
	1.1 Exponents	**The laws of exponents for $\mathbf{m, n \in N}$ and $\mathbf{a, t \neq 0}$:** $a^m \times a^n = a^{m+n}$ **Examples:** • $x^3 \times x^4 = x^7$ • $2^3 \times 2^4 = 2^7 = 128$ $a^m \div a^n = a^{m-n}$ if m> n **Examples:** • $x^5 \div x^3 = x^2$ • $3^5 \div 3^2 = 3^3 = 27$ $a^m \div a^n = \frac{1}{a^{m-n}}$ if $m < n$ **Examples:** • $x^3 \div x^5 = x^{-2} = \frac{1}{x^2}$ • $7^3 \div 7^5 = 7^{-2} = \frac{1}{7^2} = \frac{1}{49}$ $(a^m)^n = a^{mn}$ **Example:** $(2^3)^2 = 2^6 = 64$	**2 week**

		$(\boldsymbol{a \times t})^{\boldsymbol{n}} = \boldsymbol{a^n t^n}$ $(3x^2)^2 = 27x^6 1$ $\boldsymbol{a^0 = 1}$ **Example:** $(37)^0 = 1$ $(4x + y)^0 = 1$ $\boldsymbol{a^{-n} = \frac{1}{a^n}}$ **Example:** $5^{-3} = \frac{1}{5^3}$ **Examples:** a) $2^{-1}.6^2.3^{-2}$ b) $(-2x^2)(-2x)^{-2}$ c) $\frac{2^n.2^{n+1}}{4^n}$ d) $\frac{9^{n-1}.12^n}{4^{n+1}.27^n}$ **Common errors** **Emphasise that:** a) $2^5 \times 2^7 = 2^{12}$ **and not** $2^5 \times 2^7 = 4^{12}$ b) $4^5 \div 2^2 = (2^2)^5 \div 2^2 = 2^{10} \div 2^2 = 2^8$ **and not** $4^5 \div 2^2 = 2^3$ c) $2x^{-2} = 2\frac{1}{x^2}$ **and not** $2x^{-2} = \frac{1}{2x^2}$	
	Simple exponential equations	**Examples:** **Solve for x:** *a)* $3^x = 9$ b) $2^x = \frac{1}{4}$ *c)* $2^{x+1} = 64$ d) $3^x.9^{x-1} = \frac{1}{27}$ e) $5^{x+1} = 1$	**1 week**
	Scientific Notation for very		

	small numbers.	• Revise calculations involving very large numbers and write the answers in scientific notation. **Examples:** Calculate $2{,}6 \times 10^5 \times 9 \times 10^7$ without using a calculator and give the answer in scientific notation • **Write very small numbers in scientific notation** **Example:** 0,00053 • **Do calculations with or without using a calculator writing the answers in scientific notation.** **Examples:** Calculate a) $5{,}8 \times 10^{-4} + 2{,}3 \times 10^{-5}$ without using a calculator b) $9{,}43 \times 10^{-5} - 24{,}6 \times 10^{-7}$ using a calculator	1 **week**
	2.3 Algebraic Expressions *Addition and subtraction of polynomials*	• Revise addition and subtraction of like terms • Learners should be able to: a) Recognise polynomials and differentiate between monomials, binomials, trinomials. b) Identify the degree of a polynomial and arrange polynomials in descending or ascending order. c) Add and subtract polynomials	**1 week**
	Substitution	• Determine the numerical value of a polynomial by substitution **Example:** If $x = -2$ then $-x^2 + 3x + 4 = -(-2)^2 + 3(-2) + 4 = -4 - 6 + 4 = -6$	1 **week**
	Multiply a polynomial by a monomial	• Use the distributive property of multiplication over addition/subtraction to determine the product of a polynomial by a monomial. **Example:** $2x(3x^2 - 4x + 5) = 6x^3 - 8x + 10x$	2 **weeks**
	Multiply two binomials	• Use the distributive property of multiplication over addition/subtraction to determine the product of two binomials. • Learners should be able to determine the product of two binomials by inspection. **Examples:** 1. $(x + 2)(x + 3) = x^2 + 5x + 6$ 2. $(x - 2)(x - 3) = x^2 - 5x + 6$ 3. $(x + 2)(x - 3) = x^2 - x - 6$ 4. $(x - 2)(x + 3) = x^2 + x - 6$ 5. $(x \pm 2)^2 = x^2 \pm 4x + 4$	
	Simplify expressions		**1 week**

	containing products of binomials	**Example:** $2(x-3)^2-3(x+1)(2x-5)$	
	Divide a polynomial by a monomial	**Example:** $\frac{6x^3-8x^2+2x+10}{2x} = 3x^2-4x+1+\frac{5}{x}$	1 **week**
	Factorize algebraic expressions which contain common factors and expressions of the form a^2-b^2	**Note that:** • Factorisation is the converse of multiplication • 1 and -1 are common factors of every expression. **Examples:** a) $a-4b=1(a-4b)$ b) $4b-a=-1(a-4b)$ c) $6a^4-4a^2$ d) $2x(a-b)-3(a-b)$ e) $(3a+b)(p-2t)-(3a+b)(2p+t)$ f) $(a+b)^2-5(a+b)$ g) $25a^2-1$ h) a^4-b^4 i) $9(a+b)^2-1$ j) $3x^2-27$ k) $ax-bx+2a-2b$	**1 week**
	Simplify algebraic fractions using factorization	**Emphasise that:** a) $\frac{2x+6y}{x+3y}=\frac{2(x+3y)}{x+3y}=2$ **and NOT** $\frac{2x+6y}{x+3y}=\frac{2+2}{1+1}=\frac{4}{2}=2$ b) $\frac{3x-3y}{6x-6y}=\frac{3(x-y)}{6(x-y)}=\frac{3}{6}=\frac{1}{2}$ **and NOT** $\frac{3x-3y}{6x-6y}=\frac{1-1}{2-2}=\frac{0}{0}=0$	**1 week**
	Factorize trinomials of the form ax^2+bx+c *where a is:* • *positive 1* • *a common factor.*	**Examples:** a) $x^2+5x+6=(x+2)(x+3)$ b) $x^2-5x+6=(x-2)(x-3)$ c) $x^2+x-6=(x-2)(x+3)$ d) $x^2-x-6=(x+2)(x-3)$ e) $x^2+6x+9=(x+3)(x+3)=(x+3)^2$ f) $x^2-6x+9=(x-3)(x-3)=(x-3)^2$ g) $2x^2+10x+12=2(x^2+5x+6)=2(x+2)(x+3)$	
	2.4 Algebraic Equations *Solving Algebraic*	**Solve:** a) linear equations containing brackets	**1 week**

	Equations	b) linear equations which contain fractions c) linear equations which contain fractions which have variables in the denominator d) equations of the form: a product of factors = 0 **Examples:** **Solve for x** a) $3(x-2)=x+1$ b) $\frac{x}{3}+\frac{2x-1}{4}=1$ c) $\frac{7}{x-2}=\frac{3}{x}$ provided $x \neq 0; 2$ d) $(x-1)(x+3)=0$ e) $x^2-3x=0$ f) $x^2-25=0$	
	2 Tests and 1 Task		

TERM 2 – Grade 9			
CONTENT AREA	**CONTENT**	**NOTES** or **CLARIFICATION**	**DURATION (in weeks)**
SPACE AND SHAPE	**3.5 Geometry of Straight lines** *Consolidate and extend Geometry knowledge involving the properties of:* • *Intersecting and parallel lines.* • *The sides and interior angles of triangles and quadrilaterals* • *The diagonals of kites, parallelograms, rectangles, rhombi and squares.*	• **Geometry of straight lines:** primarily refers to parallel lines cut by a transversal, perpendicular lines and intersecting lines in terms of angle relationships (namely, complementary, supplementary, vertically opposite, corresponding angles, alternate angles, co-interior angles,). • **Emphasise:** a) The language of Geometry b) Setting out answers c) Displaying logic/reasoning d) Reasons for each statement e) Exterior angles of triangles, and sum of interior angles of triangles f) Interior angles of polygons	**1 week**

<table>
<tr>
<td></td>
<td>3.2 Properties of geometric figures</td>
<td>
• Similarity:
a) Establish through investigations that for polygons to be similar, corresponding angles must be equal and corresponding sides must be proportional.
b) Similar figures have the same shape but differ in size. Triangles are similar if corresponding angles are equal and corresponding sides are proportional.

• Congruence:
a) Conditions for two triangles to be congruent:
○ Three sides are equal (S;S;S)
○ Two sides and the included angles are equal (S,A,S) or (S, ∠ ,S)
○ Two corresponding angles and sides are equal (A,A, S) or (∠, ∠,S)
○ Right angle, hypotenuse and sides equal (R, H, S) or (90°, H;,S)
b) Learners should calculate the measures of unknown sides and angles in pairs of similar triangles and congruent triangles.
</td>
<td>2 weeks</td>
</tr>
<tr>
<td></td>
<td>3.3 Transformation Geometry</td>
<td>
• Consolidate and extend knowledge and skills about transformations.
• Investigate whether the given transformation is a: translation, reflection, rotation or enlargement.
• Transform points, line segments and simple geometric figures.

Examples:

<table>
<tr><th>Coordinates of a given point</th><th>Transformation</th><th>Coordinates of the image</th><th>General rule</th></tr>
<tr><td>$A(3;-4)$</td><td>Translate 2 units to the right</td><td>$A'(5;-4)$</td><td>$(x;y) \rightarrow (x+2;y)$</td></tr>
<tr><td>$A(3;-4)$</td><td>Translate 2 units to the right</td><td>$A'(3;-7)$</td><td>$(x;y) \rightarrow (x;y-3)$</td></tr>
<tr><td>$A(3;-4)$</td><td>Reflect in the y-axis</td><td>$A'(-3;4)$</td><td>$(x;y) \rightarrow (-x;y)$</td></tr>
<tr><td>$A(3;-4)$</td><td>Reflect in the x-axis</td><td>$A'(3;4)$</td><td>$(x;y) \rightarrow (x;-y)$</td></tr>
<tr><td>$A(3;-4)$</td><td>Reflect in the $y = x$ line</td><td>$A'(4;3)$</td><td>$(x;y) \rightarrow (y;x)$</td></tr>
<tr><td>$P(4;0)$</td><td>Rotate 90°anti-clockwise about the origin</td><td>$P'(0;4)$</td><td>$(x;y) \rightarrow (-y;x)$</td></tr>
<tr><td>$P(4;0)$</td><td>Rotate 90°clockwise about the origin</td><td>$P'(0;-4)$</td><td>$(x;y) \rightarrow (y;-x)$</td></tr>
<tr><td>$P(4;0)$</td><td>Rotate 180°anti-clockwise about the origin</td><td>$P'(-4;0)$</td><td>By investigation</td></tr>
<tr><td>$P(4;0)$</td><td>Rotate 180°clockwise about the origin</td><td>$P'(-4;0)$</td><td>By investigation</td></tr>
</table>

Enlargement
</td>
<td>2 weeks</td>
</tr>
</table>

		Examples: a) $A(2;1)$, $B(4;3)$ and $C(5;5)$ are coordinates of ΔABC. Write down the coordinates of A', B' and C' the image of ΔABC after enlargement by a scale factor of 2. **Answer:** $A'(4;2)$, $B'(8;6)$ and $C'(10;10)$ The general rule: $(x;y) \rightarrow (2x;2y)$ b) Investigate by construction, that: : i. the image of $T(3;2)$ rotated 90° anti-clockwise about the origin is $T'(-2;3)$ ii. the image of $T(3;2)$ rotated 90° clockwise about the origin is $T'(3;-2)$ iii. Hence deduce the general rule.	
MEASUREMENT	**1.7 Ratio and Rate**	• Teach ratio by revising fractions and showing that a fraction is a ratio. **Examples:** a) $\frac{1}{2}:\frac{1}{3}:\frac{1}{4} = \frac{6}{12}:\frac{4}{12}:\frac{3}{12} = 6:4:3$ and not $2:3:4$ b) $\text{R}60$ increased in the ratio $7:4 = \text{R}60 \times \frac{7}{4} = \text{R}105$ Note: To say $\text{R}60$ increased in the ratio $4:7$ is incorrect. c) 120kg decreased by $10\% = 120 \times 0{,}9\text{kg} = 108\text{kg}$ • **Solve problems involving time, distance and speed** **Examples:** a) A car travelling at a constant speed travels $60km$ in 18 minutes. How far, travelling at the same constant speed, will the car travel in 1 hour 12 minutes? b) A car travelling at an average speed of 100km/h will cover a certain distance in 3hours 20 minutes. At what constant speed must the car travel to cover the same distance in 2 hours 4o minutes?	**1 week**
NUMBERS, OPERATIONS AND RELATIONSHIPS	*Direct and indirect proportion*	• **Direct proportion** a) y is directly proportional to x if $\frac{y}{x} =$ a constant b) x and y are directly propotional if, as the value of y increases the value of x increases and as the value of y decreases the value of x decreases. c) The direct proportional relationship is represented by a straight line graph. • **Indirect proportion** a) y is indirectly or inversely proportional to x if $x \times y =$ a constant, c in other words $y = \frac{c}{x}$ b) x and y are in directly propotional if, as the value of y increases the value of x decreases and as the value of y decreases the	**1 week**

<table>
<tr><td></td><td></td><td>value of x increases.
c) Indirectly proportional relationship is represented by a non-linear curve.</td><td></td></tr>
<tr><td rowspan="3">PATTERNS, FUNCTIONS & ALGEBRA</td><td>2.1 Numeric and geometric patterns</td><td>• Investigate and extend numeric and geometric patterns and relationships by:
a) Extending the pattern
b) Generalising by using a verbal description to explain the pattern
c) Representing the pattern by a rule or algebraic formula
d) Justifying the rule that generates the pattern
e) Represent the relationship between the variables on a flow diagram or a table

• Examples:
Determine T_n and T_{20} by inspection in each of the following sequences:
a) 3; 8; 13;...
b) 17; 14; 11;...
c) 2; 8; 18;...
d) 2; 4; 8;...</td><td>1 week</td></tr>
<tr><td>2.2 Input and Output values
Determine input and/or output values using flow diagrams, tables, formulae and equations.</td><td>In the formula $A = \pi r^2$, the value of A is dependent on the value of r. Thus A is a function of r.
• In the formula $y = 3x + 2$, the value of y is dependent on the value of x. Thus y is a function of x.

• Revise:
a) Linear or non-linear function
b) Increasing or decreasing functions
c) Maximum or minimum independent variables

Example:
a) If $y = 2x^2 - 3$ calculate the values of y for $x = -2; -1; 2$.
b) Determine the relationship between p and t values. Hence, insert the missing values in the table below.

<table><tr><td>p</td><td>1</td><td>2</td><td>3</td><td>9</td><td></td></tr><tr><td>t</td><td>7</td><td>10</td><td>13</td><td></td><td>40</td></tr></table></td><td>1 week</td></tr>
<tr><td>Draw graphs on the Cartesian plane for given two – variable linear equations, using the table method.</td><td>Examples:

Draw a sketch graph defined by:
a) $x = -4$
b) $y = 2$
c) $y = 2x - 3$, for $x = -1; 0; 1; 2$
d) $y = -3x + 2$, if $x \in \mathbb{R}$ using the table method</td><td>1 week</td></tr>
</table>

<table>
<tr>
<td></td>
<td>Determine the defining equations of given graphs using tables</td>
<td>Example:
Determine the equation of a straight line passing through the points (1;4), (2;7) and (3;10)

<table>
<tr><td>x</td><td>1</td><td>2</td><td>3</td></tr>
<tr><td>y</td><td>4</td><td>7</td><td>10</td></tr>
</table>

The equation of the line is $y = 3x + 1$

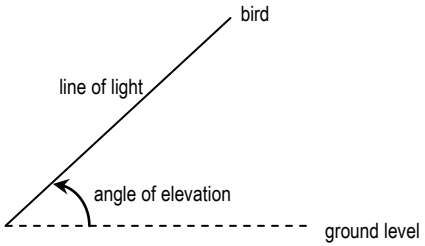
Note: The formulae: $y = ax + q$ and $y - y_1 = m(x - x_1)$ are used in Grade 10 and Grade 11 respectively.</td>
<td>1 week</td>
</tr>
<tr>
<td></td>
<td>Investigate the gradients of straight lines</td>
<td>• Investigate $\frac{the\ vertical\ \ change}{the\ horizontal\ \ change}$ between any two pints on the drawn straight line graph.
• Learners should discover that these gradient values are constant between any two points on a line.
• They should also investigate the relationship between the value of the gradient and the coefficient of x in the defining equation</td>
<td>1 week</td>
</tr>
<tr>
<td></td>
<td>Draw graphs of non – linear functions using the table method.</td>
<td>Use the table method to sketch the graph of the curve defined by:

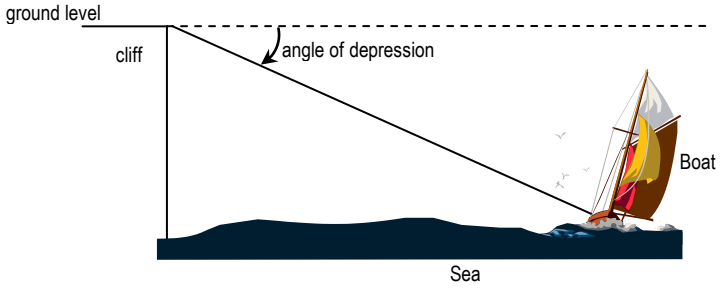
a) $y = 2x^2$

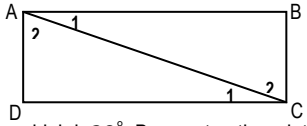
b) $y = -\frac{6}{x}$, provided $x \neq 0$</td>
<td>1 week</td>
</tr>
<tr>
<td></td>
<td>1 Task, 1 Test and 1 Mid-year/ Half-yearly Examination</td>
<td></td>
<td></td>
</tr>
</table>

TERM 3 – Grade 9			
CONTENT AREA	**CONTENT**	**NOTES or CLARIFICATION**	**DURATION (in weeks)**
NUMBERS, OPERATIONS AND RELATIONSHIPS	**1.6 Financial Mathematics** *Percentage and Finance*	• Consolidate and extend knowledge involving percentages and financial matters, namely: a) profit and loss, b) budgets, c) accounts, d) loans, e) hire purchase, f) exchange rates, g) commission, h) rentals, i) banking j) simple	**3 weeks**
		• **Simple interest:** **Examples:** a) Calculate the simple interest on R600 at 7% p.a for 3 years using the formula $SI = \frac{P.n.r}{100}$ or $SI = P.n.i$ for $i = \frac{r}{100}$ b) R800 invested at r % per annum simple interest for a period of 3 years yields R168 interest. Calculate the value of r c) How long will it take for R3 000 invested at 6% per annum to grow to R4 260?	
		• **Compound interest (without using a formula) by repeated calculation for up to three years.** **Example:** Temoso borrowed R500 from the bank for 3 years at 8% p.a compound interest. Without using a formula, calculate how much Temoso owes the bank at the end of the three years.	
		• **Derive and use the compound interest formula:** $A = P\left(1 + \frac{r}{100}\right)^n$ **Example:** Use the formula $A = P\left(1 + \frac{r}{100}\right)^n$ to calculate the compound interest on a loan of R3 450 at 6,5% per annum for 5 years.	
		• **Investigate that:** Interest calculated at 12% per annum for 4 years is equivalent to interest at: a) 6% per half year for 8 halves, b) or 3% per quarter for 16 quarters c) or 1% per month for 48 months.	

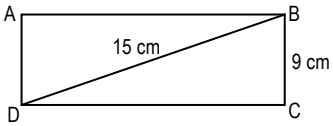
<table>
<tr><td rowspan="3">SPACE AND SHAPE</td><td>3.1 Properties of Geometric figures and solids</td><td>• Consolidate and extend knowledge about regular and irregular polyhedra, cylinders and spheres.
• Revise properties of the faces, vertices and edges of the 5 platonic solids, namely tetrahedron, hexahedron (cube), octahedron, dodecahedron, icosahedrons</td><td>1 week</td></tr>
<tr><td>3.4 Position and Movement

Use the following representational systems to describe and locate position and movement between positions :
• ordered grids
• compass directions in degrees
• angles of elevation and depression</td><td>• Plot points in any quadrant on the Cartesian plane
• Use compass directions as a representational system to describe position and movement between positions
• Describe the position of one point relative to another point in terms of compass direction in degrees e.g. S 45° E
• Use angles of elevation to describe position and movement
• Use a protractor to measure the angle formed between a point on a horizontal line and a point above it – angle of elevation
• Use angles of depression to describe position and movement between positions
• Use a protractor to measure the angle formed between a point on a horizontal line and a point below it – angle of depression
 

Examples:
a) ABCD is a rectangle. Which angle is the angle of depression of C from A?
 

b) The angle of elevation from a sailboat to the top of a lighthouse which is 60 metres high is 39°. By construction, determine the approximate distance of a sailboat from the lighthouse.</td><td>1 week</td></tr>
<tr><td>4.2 Perimeter, surface area and volume</td><td>• Revise perimeter and area of squares, rectangles, triangles and circles.
• Determine the perimeter and areas of trapeziums, parallelograms, rhombi and kites
• Revise the volume of cubes, rectangular prisms, triangular prisms and cylinders.
• Investigate:
a) How doubling any or all the dimensions of any 2-D figure affects its perimeter and its area.
b) How doubling any or all the dimensions of right prisms and cylinders affects its volume.</td><td>1 week</td></tr>
<tr><td>MEASUREMENT</td><td>4.3 The Theorem of Pythagoras</td><td>• Revise the Theorem of Pythagoras.
• Use the Theorem of Pythagoras to solve problems involving lengths of unknown sides in known geometric figures and solids.</td><td></td></tr>
</table>

		• **Example:** a) ABCD is a rectangle where BD = 15 cm and BC = 9 cm. b) Determine the: i. perimeter of ABCD ii. area of ABCD. 	
	2 Tests and 1 Task		

TERM 4 – Grade 9			
CONTENT AREA	**CONTENT**	**NOTES or CLARIFICATION**	**DURATION (in weeks)**
DATA HANDLING	**5. 1 Collection of Data**	• Pose questions relating to real life situations e.g. situations affecting the learners in the school and the environment. • Use simple questionnaires containing a variety of questions and responses (e.g. yes/no, multiple choice, open ended) to collect data on posed questions. • Revise the distinction between samples and populations. • Select appropriate sources from which to collect data and focus on two sets of data and their comparison. **Example:** Compare the heights of male and female learners in the classroom.	**1 week**
	5.2 Organising, recording and summarising data	• Arrange ungrouped data in ascending and descending order. • Arrange data according to more than one criteria. **Example:** Arrange the marks for the learners in a class in ascending order separately for male and female learners. • Identify outliers in a data set and the impact of outliers on a data set. • Compare calculate range values for two sets of data and describe how the spread of the values in the data sets are different. • Compare the mean, median and mode of two set of data relating to the environment. • Group two sets of data into intervals. **Example:** Group data on all the heights of the male and female learners in the Grade 9 class into different height intervals: 0,6 m to 1 m; 1,1 to 1,5 m etc. • Organise and record data using tally marks, tables and stem-and-leaf displays. • Calculate the mean, median and mode of a two sets of data relating to the environment.	**2 week**
	5.3 Displaying data	• Represent collected and organised data graphically using the following graphs: a) Bar graphs and double bar graphs b) Histograms with given and own intervals	**1 week**

		c) Pie charts d) Line and broken-line graphs e) Scatter plots.	
	5.4 Read and interpret graphs	• Identify points or values on a graph from values given on the vertical and horizontal axis. • Critically read and interpret tables, graphs and measures (mean, median, mode, range and outliers) in order to answer questions. • Compare the measures and make deductions about the differences between two sets of ungrouped data. **Example:** Compare the average mark of the test results of two different classes and make a decision about which class performed better in the test • Analyse graphs and explain the message being displayed or represented on a graph and /or describe trends in the graphs. **Example:** Interpret a graph showing rainfall data for an area and make predictions about the possibility of rainfall in that area in a particular month of the year. • Investigate situations involving misleading representations of data. **Example:** Change the scale on a graph and or the point at which a graph cuts the axes to create a particular impression.	**2 weeks**
	5.5 Probability	• Revise performing simple experiments where the possible outcomes are equally likely. • Determine probabilities for compound events using two–way tables and tree diagrams. • Determine probabilities for outcome of and predicts their relative frequency. • Discuss the difference between the probability of outcomes and their relative frequency.	**1 week**
	Revision, Test and Final Examination		**3 weeks**

4.1. Forms and guidelines for assessment

The following general principles apply:

4.1.1. The minimum requirements for assessment in Mathematics Senior Phase are:

- 6 Tests;
- 1 Midyear/ Half-yearly Examination and 1 Final Examination; and
- 3 Assessments Tasks chosen from Assignments, Projects and Investigations.

Records of the assessment tasks as well as the marks of learners must be kept.

4.1.2. Tests and examinations must be done under strict supervision and assessed using a marking memorandum. Care needs to be taken to ask questions at all four cognitive levels: approximately between 25% knowledge, approximately 45% routine procedures, 20% complex procedures and 10% problem solving. Tests must be out of at least 50 marks each. Midyear/ Half-yearly examinations must be at least out of 60 marks for grades 7 and 8 and 80 marks for grade 9. Final examinations must be out of at least 80 marks for Grade 7, 100 marks for Grade 8 and 120 marks for Grade 9.

4.1.3. To cover a variety of forms of assessment, one of each of Assignment, Project and Investigation must be covered during the year. This means that one of any of these must be completed in each of the first three terms.

4.1.4. One assignment per year is required. Assignments are generally extended pieces of work completed at home. They can be collections of past questions, but should focus on the more demanding work as any resource material can be used, which is not the case in a task that is done in class under strict supervision.

4.1.5. One project should be set in a year. The assessment criteria must be clearly indicated on the project specification and should focus on the mathematics involved and not on duplicated pictures and facts copied from reference material. Good projects contain the collection and display of real data, followed by deductions that can be substantiated.

4.1.6. One investigation per year is required. An investigation must promote critical and creative thinking. It can be used to discover rules or concepts and may involve inductive reasoning, identifying or testing patterns or relationships, making conclusions, and establish general trends. To avoid having to assess work which is copied without understanding, it is recommended that whilst initial investigation could be done at home, the final write up should be done in class, under supervision, without access to any notes. Investigations are marked with rubrics which can be specific to the task, or generic, listing the number of marks awarded for each skill, for example:

- Organizing and recording ideas and discoveries using, for example, diagrams and tables.
- Communicating ideas with appropriate explanations.
- Calculations showing clear understanding of mathematical concepts and procedures.
- Generalizing and making conclusions.

4.1.7. The spread of the assessment tasks is indicated in the table in paragraph 4.2

4.2. Annual assessment plan

GRADE	TERM 1	Weighting	TERM 2	Weighting	TERM 3	Weighting	TERM 4	Weighting
7	Test	10%	Test	10%	Test	10%	**Test**	10%
	Test	10%	Midyear/ half yearly Examination	25%	Test	10%	**Final Examination**	60%
	Assignment or Project or Investigation	5%	Assignment or Project or Investigation	5%	Assignment or Project or Investigation	5%		
8	Test	10 %	Assignment or Project or Investigation	5 %	Assignment or Project or Investigation	5 %	**Test**	10%
	Test	10%	Midyear/ half-yearly Exam	25%	Test	10%	**Final Examination**	60%
	Assignment or Project or Investigation	5%	Test	10 %	Test	10 %		
9	Test	10%	Test	10%	Test	10%	**Test**	10%
	Test	10%	Midyear/ half-yearly Exam	25%	Test	10%	**Final Examination**	60%
	Assignment or Project or Investigation	5%	Assignment or Project or Investigation	5%	Assignment or Project or Investigation	5%		

Assessment in Mathematics Senior Phase comprises of Continuous Assessment (CASS) and a final examination:

Assessment Split	
Assessment	**Weighting**
Continuous Assessment (CASS)	60%
Final Examination	40%
Total	**100%**

The minimum requirements for CASS are:

Minimum Requirements			
Assessment Form	**Number per Year**	**Minimum Requirements**	**Weighting**
Test	6	• 2 tests in each of Term 1 and Term 3 • 1 test in each of Term 2 and Term 4	60%
Examinations	1	One midyear/ half-yearly examination in the second term	25%
Assessment Tasks	3	1 per term for the first 3 terms (assignment or investigation or project)	15%
Total	10	To be completed before the final examination	100%

4.3. Mathematics 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 skills 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.

4.4. Cognitive levels

The four cognitive levels used to guide all assessment tasks is based on those suggested in the TIMSS study of 1999. Descriptors for each level and the approximate percentages of tasks, tests and examinations which should be at each level are given below:

DESCRIPTION AND EXAMPLES OF COGNITIVE LEVELS		
Cognitive levels	**Description of skills to be demonstrated**	**Examples**
Knowledge **25%**	• Estimation and appropriate rounding of numbers. • Straight recall. • Identification and direct use of correct formula. • Use of mathematical facts. • Appropriate use of mathematical vocabulary.	1. Estimate the answer and then calculate with a calculator: $\frac{62\ 816}{325 + 279}$ **[Grade 7]** 2. Use the formula $A = \pi r^2$ to calculate the area of a circle if the diameter is equal to 10 cm. **[Grade 8]** 3. Write down the y-intercept the function $y = 2x + 1$ **[Grade 9]**
Routine procedures **45%**	• Perform well-known procedures. • Simple applications and calculations which might involve many steps. • Derivation from given information may be involved. • Identification and use (after changing the subject) of correct formula. • Generally similar to those encountered in class.	1. Determine the mean of 5 Grade 7 learners marks if they have respectively achieved 25; 40; 21; 85; 14 out of 50. **[Grade 7]** 2. Solve for x in $x - 6 = 9$ **[Grade 8]** 3. R600 invested at r% per annum for a period of 3 years yields R150 interest. Calculate the value of r if $= \frac{P.n.r}{100}$. **[Grade 9]**
Complex procedures **20%**	• Problems involve complex calculations and/or higher order reasoning. • Investigate elementary axioms to generalise them into proofs for straight line geometry, congruence and similarity. • There is often not an obvious route to the solution. • Problems need not be based on a real world context. • Could involve making significant connections between different representations. • Require conceptual understanding.	1. Mr Mnisi pays R75 for a book which he marks to give 20% profit. He then sells it for cash at 4% discount. Calculate the selling price. **[Grade 7]** 2. A car travelling at a constant speed travels 60 km in 18 minutes. How far, travelling at the same constant speed, will the car travel in 1 hour 12 minutes? **[Grade 8]** 3. Use investigation skills to prove that the angles on a straight line are supplementary. **[Grade 9]**
Problem solving **10%**	• Unseen, non-routine problems (which are not necessarily difficult). • Higher order understanding and processes are often involved. • Might require the ability to break the problem down into its constituent parts.	**1.** The sum of three consecutive numbers is 87. Find the numbers. **[Grade 7]** **2.** Mary travels a distance of x km in 6 hours if she travels at an average speed of 20 km/hour on her bicycle. What should be her average speed if she wants to cover the same distance in 5 hours. **[Grade 8]** **3.** The combined age of a father and son is 84 years old. In 6 year's time the father will be twice as old as the son was 3 years ago. How old are they now? **[Grade 9]**