4. Mathematics

Content Map Grade 7 – 9

	Subject: Mathematics		Grade: 7 - 9
	Revised Content Map per Phase		
Key Topic	**Grade 7**	**Grade 8**	**Grade 9**
Common Fractions	• Addition and subtraction of fractions where one denominator is not a multiple of the other • Multiplication of common fractions, including mixed numbers, not limited to fractions where one denominator is a multiple of another	• Divide whole numbers and common fractions by common fractions • Calculate the squares, cubes, square roots and cube roots of common fractions	• All four operations, with numbers that involve the squares, cubes, square roots and cube roots of common fractions
Decimal Fractions	• Order, compare and place value of decimals to at least three decimal places and rounding off to at least 2 decimal places • Addition and subtraction of decimal fractions to at least three decimal places • Multiply decimal fractions to at least: ▪ 3 decimal places by whole numbers ▪ 2 decimal places by decimal fractions to at least 1 decimal place • Divide decimal fractions by whole numbers	• Multiplication of decimals by decimal fractions **not limited** to one decimal place • Divide decimal fractions by decimal fractions' • Calculate the squares, cubes, square roots and cube roots of decimal fractions	• Multiple operations with or without brackets, with numbers that involve the squares, cubes, square roots and cube roots of decimal fractions
Percentages	• Calculate the percentage of part of a whole • Calculate percentage increase or decrease of whole numbers • Recognize equivalence between common fraction, decimal fraction and percentage forms of the same number	• Calculate amounts if given percentage increase or decrease	
Integers	• Count, order and compare integers • Add and subtract with integers • Use commutative, associative and distributive properties of addition and multiplication for integers • Solve problems in contexts involving addition and subtraction with integers	• Multiply and divide with integers • Perform calculations involving all four operations with integers • Perform calculations involving all four operations with numbers that involve the squares, cubes, square roots and cube roots of integers	• Incorporated in the algebraic expressions and equations

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		• Recognize and use additive and multiplicative inverses for integers • Solve problems in contexts involving multiple operations with integers	
Numeric and Geometric Patterns	Investigate and extend patterns looking for relationship or rules in own words	Investigate and extend patterns looking for relationship or rules in algebraic language	Investigate and extend patterns looking for relationship or rules in algebraic language
Algebraic Expressions	• Recognize and interpret rules or relationships represented in symbolic form • Identify variables and constants in given formulae and/or equations	• Recognize and identify conventions for writing algebraic expressions • Identify and classify like and unlike terms in algebraic expressions • Recognize and identify coefficients and exponents in algebraic expressions • Expand and simplify algebraic expressions	• Factorise algebraic expressions • Simplify algebraic expressions involving factorisation
Algebraic equations	• Solve equations by substitution, inspection and trial and improvement	• Solve equations by additive and multiplicative inverse	• Solve equations by additive and multiplicative inverse • Solve equations by factorisation
Functions and Relationships	• Determine input values, output values or rules for patterns and relationships using: ▪ flow diagrams ▪ tables ▪ formulae • Determine, interpret and justify equivalence of different descriptions of the same relationship or rule presented: ▪ verbally ▪ in flow diagrams ▪ in tables ▪ by formulae ▪ by number sentences	• Incorporated in the algebraic expressions	• Extend determining input values, output values or rules for patterns and relationships to include equations • Extend determining, interpreting and justifying equivalence of different descriptions of the same relationship or rule to include representing the equivalence by means of: ▪ equations ▪ by graphs on a Cartesian plane

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Graphs	• Analyse and interpret global graphs of problem situations, with special focus on the following trends and features: ▪ linear or non-linear ▪ constant, increasing or decreasing • Draw global graphs from given descriptions of a problem situation, identifying features listed above	• Extend the focus on features of graphs to include: ▪ maximum or minimum ▪ discrete or continuous • Draw global graphs from given descriptions of a problem situation, identifying features listed above • Use tables or ordered pairs to plot points and draw graphs on the Cartesian plane	• Extend the focus on features of graphs with special focus on the following features of **linear graphs**: ▪ x-intercept and y-intercept ▪ gradient • Extend drawing of graphs with special focus on: ▪ drawing linear graphs from given equations ▪ determining equations from given **linear graphs**
Geometry of 2D shapes	**Classification of 2 D shapes** • Describe, sort, name and compare triangles • Describe, sort, name and compare quadrilaterals • Describe and name parts of a circle **Similar and congruent 2D shapes** • Recognize and describe similar and congruent figures by comparing size and shape **Solving problems** • Solve simple geometric problems involving unknown sides and angles in triangles and quadrilaterals, using known properties.	**Investigating properties of geometric figures** • By construction, investigate the angles in a triangle, focusing on: ▪ the sum of the interior angles of triangles ▪ the size of angles in an equilateral triangle ▪ the sides and base angles of an isosceles triangle • By construction, investigate sides and angles in quadrilaterals, focusing on: ▪ the sum of the interior angles of quadrilaterals ▪ the sides and opposite angles of parallelograms N.B. **Provide learners with accurately constructed figures to investigate the properties** **Classification of 2 D shapes** • Identify and write clear definitions of triangles • Identify and write clear definitions of quadrilaterals focusing on sides **Similar and congruent 2D shapes** • Identify and describe the properties of congruent shapes • Identify and describe the properties of similar shapes **Solving problems** • Extend solving geometric problems to include definitions.	**Investigating properties of geometric figures** • By construction, investigate the angles in a triangle, focusing on the relationship between the exterior angle of a triangle and its interior angles • By construction, investigate sides, angles and diagonals in quadrilaterals, focusing on: ▪ the diagonals of rectangles, squares, parallelograms, rhombi and kites ▪ exploring the sum of the interior angles of polygons • By construction, explore the minimum conditions for two triangles to be congruent N.B. **Provide learners with accurately constructed figures to investigate the properties** **Classification of 2 D shapes** • Write clear definitions of quadrilaterals focusing on diagonals **Similar and congruent triangles** • Through investigation, establish the minimum conditions for congruent triangles

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			• Through investigation, establish the minimum conditions for similar triangles **Solving problems** • Extend solving geometric problems to include properties of congruent and similar triangles.
Geometry of 3D objects	**Excluded**	**Excluded**	**Excluded**
Geometry of straight lines	Definitions	• Angle relationships • Solving problems	• Angle relationships • Solving problems
Transformation Geometry	• Perform transformations on a grid paper • Enlargements and reductions	To be done in Grade 9	• Perform transformations on a Cartesian plane • Extend transformations to include reflection in the line $y = x$
Construction of geometric figures	**Excluded**	**Excluded**	**Excluded**
Area and perimeter of 2D shapes	Use appropriate formulae to calculate perimeter and area of squares, rectangles and triangles to at least I decimal place and convert units from mm^2 to cm^2 and cm^2 to m^2	• Extend use of appropriate formulae to calculate perimeter and area of polygons to include circles to at least 2 decimal places and convert between appropriate SI units, including and up to km^2 • Calculate perimeter and area of complex figures	• Use appropriate formulae and conversions between SI units, to solve problems and calculate perimeter and area of polygons and circles. • Investigate how doubling any or all of the dimensions of a 2D figure affects its perimeter and its area
Surface area and volume of 3D objects	• Use appropriate formulae to calculate the surface area, volume and capacity of cubes and rectangular prisms • Describe the interrelationship between surface area and volume of the objects mentioned above • Use and convert between appropriate SI units, including: ▪ $mm^2 \leftrightarrow cm^2$ ▪ $cm^2 \leftrightarrow m^2$ ▪ $mm^3 \leftrightarrow cm^3$ ▪ $cm^3 \leftrightarrow m^3$ • Use equivalence between units when solving problems: ▪ $1\ cm^3 \leftrightarrow 1$ ml ▪ $1\ m^3 \leftrightarrow 1\ kl$	• Extend use appropriate formulae to calculate the surface area, volume and capacity of triangular prisms • Describe the interrelationship between surface area and volume of the objects mentioned above • Use and convert between appropriate SI units, including: ▪ $mm^2 \leftrightarrow cm^2 \leftrightarrow m^2 \leftrightarrow km^2$ ▪ $mm^3 \leftrightarrow cm^3 \leftrightarrow m^3$ ▪ $ml\ (cm^3) \leftrightarrow l \leftrightarrow kl$	• Extend use appropriate formulae to calculate the surface area, volume and capacity of cylinders • Investigate how doubling any or all the dimensions of right prisms and cylinders affects their volume

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The Theorem of Pythagoras		Develop and use the Theorem of Pythagoras	Solve problems using the Theorem of Pythagoras
Collect, organize, represent, summarise and interpret data	• Complete data cycle with bar graphs, pie charts and histograms • Identify the largest and smallest scores in a data set and determine the difference between them in order to determine the spread of the data (range)	• Extend completion of data cycle with graphs to include broken line graphs • Summarise data using measures of dispersion, including: ▪ range ▪ extremes	• Extend completion of data cycle with graphs to include scatter plots • Extend summarising data using measures of dispersion to include outliers
Analyse data	• Critically analyse data by answering questions related to: ▪ data categories, including data intervals ▪ data sources and contexts ▪ central tendencies (mean, mode, median) ▪ scales used on graphs	• Extend critical analysis of data to include: ▪ samples and populations ▪ dispersion of data ▪ error and bias in the data	• Extend critical analysis of data to include: ▪ data collection methods ▪ summary of data ▪ sources of error and bias in the data
Report data	• Report data in short paragraphs by: ▪ drawing conclusions about the data ▪ making predictions based on the data ▪ identifying sources of error and bias in the data ▪ choosing appropriate summary statistics for the data (mean, median, mode)	• Extend reporting data in short paragraphs to include: ▪ choosing appropriate summary statistics for the data (mean, median, mode, range) ▪ the role of extremes in the data	• Extend reporting data in short paragraphs to include: ▪ choosing appropriate summary statistics for the data (mean, median, mode, range) ▪ the role of extremes and outliers in the data
Probability			• Consider situations with equally probable outcomes, and: ▪ determine probabilities for compound events using two-way tables and tree diagrams ▪ determine the probabilities for outcomes of events and predict their relative frequency in simple experiments ▪ compare relative frequency with probability and explains possible differences