



MINISTRY OF EDUCATION AND TECHNICAL AND VOCATIONAL TRAINING

CURRICULUM DIVISION

SCIENCES SECTION

MATHEMATICS (HIGH SCHOOL) UNIT

NATIONAL PACING GUIDE

SENIOR HIGH SCHOOL

GRADES 10 – 12

Table of Contents

MASTER COURSE OUTLINES B.G.C.S.E. CORE / EXTENDED

Grade 10	3
Grade 11	4
Grade 12	5

Pacing Guides

Grade 10	
Term 1	6
Term 2	9
Term 3	15
Grade 11	
Term 1	18
Term 2	20
Term 3	26
Grade 12	
Term 1	29
Term 2	33
Term 3	36

**MASTER COURSE OUTLINE
B.G.C.S.E. CORE / EXTENDED**

GRADE: 10

TERM ONE			TERMS TWO & THREE		
No.	Topics	Month	No.	Topics	Month
1.	The Real Number System & Natural and Whole Numbers	<i>Sep</i>	1.	Exponents/Indices/Powers	<i>Jan</i>
2.	Order of Operations	<i>Sep</i>	2.	Algebra	<i>Jan</i>
3.	Sequences of Natural Numbers	<i>Sep</i>	3.	Matrices	<i>Jan</i>
4.	Integers	<i>Oct</i>	4.	Sets & Venn Diagrams	<i>Feb</i>
5.	Fractions	<i>Oct</i>	5.	Patterns, Relations & Functions	<i>Feb</i>
6.	Decimals	<i>Oct</i>	6.	Coordinate Geometry & Graphs	<i>Feb</i>
7.	Estimation, Approximation & Rounding	<i>Oct</i>	7.	Geometry & Spatial Sense	<i>March</i>
8.	Percents and Percentages/Consumer Math	<i>Nov</i>	8.	Vectors	<i>April</i>
9.	Ratios, Rates, Proportions & Variation	<i>Nov</i>	9.	Transformations	<i>April</i>
10.	Standard Form/ Scientific Notation	<i>Dec</i>	10.	Trigonometry	<i>May</i>
			11.	Measurement	<i>May</i>
			12.	Statistics	<i>May</i>
			13.	Probability	<i>June</i>

**MASTER COURSE OUTLINE
B.G.C.S.E. CORE / EXTENDED**

GRADE: 11

TERM ONE			TERMS TWO & THREE		
No.	Topics	Month	No.	Topics	Month
1.	The Real Number System & Natural and Whole Numbers	<i>Sep</i>	1.	Exponents/Indices/Powers	<i>Jan</i>
2.	Order of Operations	<i>Sep</i>	2.	Algebra	<i>Jan</i>
3.	Sequences of Natural Numbers	<i>Sep</i>	3.	Matrices	<i>Jan</i>
4.	Integers	<i>Oct</i>	4.	Sets & Venn Diagrams	<i>Feb</i>
5.	Fractions	<i>Oct</i>	5.	Patterns, Relations & Functions	<i>Feb</i>
6.	Decimals	<i>Oct</i>	6.	Coordinate Geometry & Graphs	<i>Feb</i>
7.	Estimation, Approximation & Rounding	<i>Oct</i>	7.	Geometry & Spatial Sense	<i>March</i>
8.	Percents and Percentages/Consumer Math	<i>Nov</i>	8.	Vectors	<i>April</i>
9.	Ratios, Rates, Proportions & Variation	<i>Nov</i>	9.	Transformations	<i>April</i>
10.	Standard Form/ Scientific Notation	<i>Dec</i>	10.	Trigonometry	<i>May</i>
			11.	Measurement	<i>May</i>
			12.	Statistics	<i>May</i>
			13.	Probability	<i>June</i>

**MASTER COURSE OUTLINE
B.G.C.S.E. CORE / EXTENDED**

GRADE: 12

TERM ONE			TERMS TWO & THREE		
No.	Topics	Month	No.	Topics	Month
1.	The Real Number System & Natural and Whole Numbers	<i>Sep</i>	1.	Patterns, Relations & Functions	<i>Jan</i>
2.	Order of Operations	<i>Sep</i>	2.	Coordinate Geometry & Graphs	<i>Jan</i>
3.	Sequences of Natural Numbers	<i>Sep</i>	3.	Differentiation	<i>Jan</i>
4.	Integers	<i>Sep</i>	4.	Geometry & Spatial Sense	<i>Feb</i>
5.	Fractions	<i>Sep</i>	5.	Vectors	<i>March</i>
6.	Decimals	<i>Sep</i>	6.	Trigonometry	<i>March</i>
7.	Estimation, Approximation & Rounding	<i>Sep</i>	7.	Transformations	<i>March</i>
8.	Percents and Percentages/Consumer Math	<i>Sep</i>	8.	Measurement	<i>April</i>
9.	Ratios, Rates, Proportions & Variation	<i>Oct</i>	9.	Statistics	<i>April</i>
10.	Standard Form/ Scientific Notation	<i>Oct</i>	10.	Probability	<i>April</i>
11.	Algebra	<i>Oct</i>			
12.	Exponents/Indices/Powers	<i>Nov</i>			
13.	Matrices	<i>Nov</i>			
14.	Sets & Venn Diagrams	<i>Dec</i>			

TERM ONE: 2 September 2024 – 20 December 2024

NO. OF WEEKS: 14

GRADE 10

TOPICS /CONCEPTS	Time	OBJECTIVES
The Real Number System & Natural and Whole Numbers	Sep	<p>The students will be able to:</p> <ul style="list-style-type: none"> • Revise types of numbers such as natural numbers, whole numbers, odd, even, prime, composite, square, and cube numbers. • Estimating the results of arithmetic operations including powers and roots. • Use of a scientific calculator to compute operations including powers and roots. • Use the commutative and associative properties of addition and multiplication and the distributive property of multiplication over addition to simplify computations with natural numbers. • Using H.C.F./ G.C.D., L.C.M, square roots and cube roots to solve problems. <p><i>*Incorporate consumer math problems during problem solving</i></p>
Order of Operations	Sep	<ul style="list-style-type: none"> • Use an appropriate order of operations mnemonic and a scientific calculator to evaluate arithmetic expressions with at least three operations, involving integers, common fractions, decimals, powers and roots. • Identify true arithmetic statements. • Insert operations and/or brackets to obtain true statements.
Sequences of Natural Numbers	Sep	<ul style="list-style-type: none"> • Use simple algebraic expressions to generalize the pattern in sequences involving consecutive even/odd numbers; consecutive numbers; multiples; squares and cubes, triangular number and Fibonacci sequence. • Use the general pattern to continue the sequence and to find missing term(s).

Integers	Oct	<ul style="list-style-type: none"> • Use a scientific calculator to operate on integers. • Use integers to solve problems in practical situations
Fractions	Oct	<ul style="list-style-type: none"> • Use of the fraction key on calculators to add, subtract, multiply and divide fractions and mixed numbers. • More challenging problem solving involving addition, subtraction, multiplication and division of up to three fractions and/or mixed numbers and two operations.
Decimals	Oct	<ul style="list-style-type: none"> • Problem solving involving at least two of the operations, addition, subtraction multiplication and division.
Estimation, Approximation & Rounding	Oct	<ul style="list-style-type: none"> • Make estimates of numbers and quantities. • Approximate numbers by rounding to the nearest whole, to specified place value, numbers of decimal places and significant figures. • Estimate the results of calculations to check the reasonableness of calculator answers.
Percents and Percentages/Consumer Math	Nov	<ul style="list-style-type: none"> • Review: Convert between common fractions, decimals and percent. • Review: calculating a percentage of a number or quantity. *Consumer Math * Find the selling price given the cost price and the percentage mark-up. *Find the sale price given the original selling price and the percentage discount/mark-down. • Review: expressing one quantity as a percentage of another. • Determine the increased/decreased amount as a percentage of the original.

Ratios, Rates, Proportions & Variation	Nov	<ul style="list-style-type: none">• Use ratios and proportions to represent quantitative relationships.• Demonstrate an understanding of the basic ideas of ratios rates and proportions• Solve problems involving ratios, rates and proportions
Standard Form/Scientific Notation <i>(Use calculators)</i>	Dec	<ul style="list-style-type: none">• Define standard form/scientific notation.• Express numbers in standard form/scientific notation.• Convert numbers from standard form to decimal form.• Problems involving multiplication and division of numbers in standard form.

TERM TWO: 6 January 2025 – 11 April 2025

NO. OF WEEKS: 12

GRADE 10

TOPICS/CONCEPTS	Time	OBJECTIVES
Exponents/Indices/Powers	Jan	<p>The students will be able to:</p> <ul style="list-style-type: none"> • Discover and apply laws of definitions for zero and negative integer exponents. • Discover and apply laws of indices: product, quotient, power (power of a product, power of a quotient, and power of a power).
Algebra	Jan	<p>Algebraic Representation</p> <ul style="list-style-type: none"> • Translate/write/create expressions with more than two operations, including brackets and powers. • Translate/write/create equations with more than two operations, including brackets. <p>Basic Algebraic Operation</p> <ul style="list-style-type: none"> • Use addition, subtraction, multiplication and division to simplify expressions. <p>Substitution</p> <ul style="list-style-type: none"> • Evaluate algebraic expressions and formulae by substituting real numbers for symbols (including powers & roots). <p>Factorization</p> <ul style="list-style-type: none"> • Determine the H.C.F. of the algebraic terms/monomials • Factorizing algebraic expressions using the highest common factor. <p>Algebraic Fractions</p> <ul style="list-style-type: none"> • Find the L.C.M of monomials.

		<ul style="list-style-type: none"> • Add and subtract algebraic fractions with monomial denominators. Eg 1) $\frac{5x}{8x} + \frac{3}{10x}$ Eg 2) $\frac{x}{4} - \frac{7x}{8}$ Eg 3) $\frac{x-2}{3} + \frac{3x-1}{2}$ • Multiplying and dividing algebraic fractions with monomial numerators and denominators by expanding powers. $\frac{3a}{4} \times \frac{8ab}{3} \qquad \frac{3a}{4} \div \frac{9a}{10}$ <p>Equations</p> <ul style="list-style-type: none"> • Solve word problems using simple linear equations involving brackets and variables on both sides. • Solve fractional equations with constant, variable and monomial denominators. <p>Transposition of Formulae</p> <ul style="list-style-type: none"> • Change the subject of formulae, including squares and square roots, cubes, and cube roots and the subject appearing once. <p>Inequalities</p> <ul style="list-style-type: none"> • Solving linear inequalities. • Illustrate the solution set on the number line. • Graphing linear inequalities in two variables.
Matrices	Jan	<ul style="list-style-type: none"> • Use matrices to display data and solve problems. • Identify and define types of matrices. • State matrix size/order and position of elements. • Determine the compatibility of two matrices for addition and subtraction. • Add and subtract matrices. • Multiply by a matrix by a scalar. • Solve simple matrix equations involving addition, subtraction, and scalar multiplication.

<p style="text-align: center;">Sets & Venn Diagrams</p>	<p style="text-align: center;">Feb</p>	<p>Identify and use set language and notation for the following:</p> <ul style="list-style-type: none"> • Set braces • Set names • Set membership • Number of elements in a set • The Empty set • Complement of a set • The Universal set • Is a proper and/or improper subset • Union and intersection • Finite and infinite sets • Equal and equivalent sets • Set builder notation <ul style="list-style-type: none"> • Draw Venn diagrams to show relationships between two sets within the universal set. • Use set notation to describe and shade regions in Venn diagrams with up to two subsets of the universal set. • Read, interpret, draw and use venn diagrams to solve problems involving up to two subsets of the universal set.
<p style="text-align: center;">Patterns, Relations and Functions</p>	<p style="text-align: center;">Feb</p>	<ul style="list-style-type: none"> • Define a relation and describe types of relations. • Draw and use arrow/mapping diagrams. • Describe the relationship between two sets of numbers or identify the rule in a given mapping diagram • Construct/ complete tables of values for functions that are; <ul style="list-style-type: none"> - linear ($y = ax + b$), - quadratic ($y = \pm x^2 + bx + c$) - and simple reciprocal ($y = \frac{a}{x}$) , <p>Draw, identify and interpret the graphs of linear, quadratic and simple reciprocal functions.</p>

		<ul style="list-style-type: none"> Determine whether a point lies on a graph with a given equation.
Coordinate Geometry & Graphs	Feb	<p>Construct/ complete tables of values for linear ($y = ax + b$), quadratic ($y = \pm x^2 + bx + c$) and simple reciprocal ($y = \frac{a}{x}$), functions.</p> <p>Draw, identify and interpret the graphs of linear, quadratic and simple reciprocal functions.</p> <p>Determine whether a point lies on a graph with a given equation.</p> <p>Use the equation of a line to determine the x and y intercepts and sketch its graph.</p>
Geometry & Spatial Sense	March	<p style="text-align: center;">Geometric Terminology & Notation</p> <ul style="list-style-type: none"> Review basic geometrical terms: (point, line, plane, angle, angle types, parallel, perpendicular, etc.). Define bearings Define compass direction, bearings from north/south and three figure bearings <p>Angle Properties</p> <ul style="list-style-type: none"> Sketching the position of one point from another using compass direction, bearing from north/south and three figure bearings. Determining the compass direction, north/south bearings and three figure bearings of one point relative to another from a diagram. Describe and apply angle properties related to: <ul style="list-style-type: none"> Complementary & supplementary angles. Angles on a line Angles at a point Vertically opposite angles Angles between parallel lines and a transversal. <p style="text-align: center;">Triangles, Quadrilaterals and Other Polygons</p>

		<p>Describe and use the properties of triangles and quadrilaterals.</p> <p>Identify and name polygons up to 12 sides</p> <p>Informally prove that the sum of the exterior angles of any polygon is 360°</p> <p>Determine the sum of the interior angles of polygons.</p> <p>Circles</p> <p>Define and identify parts of the circle</p> <ul style="list-style-type: none"> - major and minor arcs, segments, and sectors - tangents. <p>Drawing and measuring angles formed by chords or arcs: at centre and at circumference, at circumference in a semi-circle, at the circumference in the same segment.</p> <p>Drawing and measuring angles between tangents and radius, angles in cyclic quadrilaterals.</p> <p>Discover the relationships between angles subtended by chords or arcs.</p> <p>Discover the relationship between angles formed in circles.</p>
<p>GEOMETRY & SPATIAL SENSE Continued</p>	<p>March</p>	<p style="text-align: center;">Constructions & Scale Drawings</p> <p>Use a pencil, ruler and a pair of compasses only to construct:</p> <ul style="list-style-type: none"> • 90° angle at a point and 120° angles • Perpendicular bisector • A perpendicular from a point to a given line. • Construct triangles

		<ul style="list-style-type: none"> • Draw given diagrams of simple geometrical shapes to scale. <p>Solid Shapes</p> <p>Identify and sketch nets of cubes, cuboids, cylinders and other solids.</p> <p style="text-align: center;">Similarity and Congruency</p> <p>Define and recognize congruent and similar figures.</p> <p>Determine the ratio of corresponding sides in similar figures.</p>
Vectors	April	<p>Definition and notation</p> <p>Represent vectors as directed line segments and as column matrices</p> <p>Identify types of vectors: equal, parallel and opposite vectors.</p> <p>Add and subtract vectors</p> <p>Multiply vectors by scalar quantities.</p>

TERM THREE: 22 April 2025 – 20 June 2025

NO. OF WEEKS: 6

GRADE 10

TOPICS/CONCEPTS	Time	OBJECTIVES
Transformations	April	<p>The students will be able to:</p> <p>Determine the properties of reflections.</p> <p>Identify reflections and reflect shapes in the Cartesian plane in the x-axis, y-axis and horizontal/vertical lines.</p> <p>·</p> <p>Recognize and complete shapes with reflective symmetry.</p> <p>Identify rotations and rotate objects about the origin through multiples of 90° clockwise and anticlockwise.</p> <p>Define rotational symmetry and order of rotational symmetry, whole number scale factor.</p> <p>Recognize shapes with rotational symmetry and determine the order of rotational symmetry</p> <p>Complete a shape given its order of rotational symmetry.</p> <p>Recognize and perform a translation through a given vector.</p> <p>Develop the concept of enlargement.</p> <p>Enlargement from the origin by a positive.</p>
Trigonometry	May	<p>Standard notation for labeling vertices, sides and angles of right triangles.</p> <p>Verify the Pythagorean theorem in given right triangles.</p> <p>Apply Pythagoras' theorem to find a missing side in a right triangle.</p>

Measurement	May	<p>Units of Measurement</p> <p>Adding and subtracting mixed units of time.</p> <p>Calculating start time, elapsed time and end time.</p> <p>Perimeter and Area</p> <p>Perimeters and areas of compound shapes, including semi-circles and quadrants.</p> <p>Calculate surface areas of cubes, cuboids and cylinders.</p> <p>Converting between metric units of area</p> <p>Volume/ Capacity</p> <p>Volumes and capacity of cubes, cuboids and cylinders.</p> <p>Converting between metric units of volume</p>
Statistics	May	<p>Define and explain the terms: data, raw data, and qualitative (categorical) data and quantitative (numerical): discrete and continuous data.</p> <p>Construct grouped and ungrouped frequency tables from secondary data.</p> <p>Draw histograms and frequency polygons from ungrouped frequency tables</p> <p>Interpret histograms and frequency polygons of ungrouped data.</p> <p>Calculate the measures of central tendency (mean, median, mode) and range from ungrouped frequency tables.</p>
Probability	June	<p>Determine probabilities of single events and their complements, writing results as a fraction, decimal or percent.</p> <p>Constructing tables to represent possibility spaces and determine probabilities from them.</p>

		<p>Multiply probabilities of single events to calculate probabilities of compound events: $P(A \text{ and } B) = P(A) \cdot P(B)$</p> <p>Compare probabilities obtained possibility spaces with those obtained by multiplying.</p>
--	--	---

TERM ONE: 2 September 2024 – 20 December 2024

NO. OF WEEKS: 14

GRADE 11

TOPICS /CONCEPTS	Time	OBJECTIVES
The Real Number System & Natural and Whole Numbers	Sep	<p>The students will be able to:</p> <p>Understand that square roots of non-perfect squares and cubes are irrational</p> <p><i>*Review concepts from prior grades</i></p> <p><i>*Incorporate consumer math problems during problem solving</i></p>
Order of Operations	Sep	<ul style="list-style-type: none"> Apply the correct order of operations to evaluate arithmetic expressions.
Sequences of Natural Numbers	Sep	<p>Find the nth term in a sequence given the formula for the nth term.</p> <p>Determine and use a formula for the nth term in a number sequence.</p> <p>Solve problems involving sequences.</p>
Integers	Oct	<ul style="list-style-type: none"> Identify pairs of integers with given products and sums
Fractions	Oct	<ul style="list-style-type: none"> Understand that the denominator of a fraction cannot be zero.
Decimals	Oct	<ul style="list-style-type: none"> Understand that rational numbers are terminating or repeating decimals.
Estimation, Approximation & Rounding	Oct	<p>Give answers to reasonable accuracy in the context of the given problem.</p> <p>Calculate the percentage error of the approximation/estimation.</p> <p>Find lower and upper bounds of derived values given the degree of accuracy.</p>

<p>Percents and Percentages/Consumer Math</p>	<p>Nov</p>	<p>Determining a final amount as a percentage of the original amount.</p> <p>Reverse percentages: finding the original amount given the final amount and the percentage.</p> <p>Finding the cost price given the selling price and the percentage profit/mark-up.</p>
<p>Ratios, Rates, Proportions & Variation</p>	<p>Nov</p>	<p>Increase and decrease a quantity in a given ratio.</p> <p>Distinguish between direct and inverse variation and represent graphically.</p> <p>Use a graph to illustrate the relationship between two quantities the vary directly or inversely.</p> <p>Read and interpret graphs represent the relationship between two quantities the vary directly or inversely</p>
<p>Standard Form/Scientific Notation <i>(Use calculators)</i></p>	<p>Dec</p>	<p>Compare and order numbers expressed in standard form.</p> <p>Add and subtract numbers expressed in standard form.</p> <p>Problems involving addition, subtraction, multiplication and division of numbers in standard form.</p>

TERM TWO: 6 January 2025 – 11 April 2025

NO. OF WEEKS: 12

GRADE 11

TOPICS/CONCEPTS	Time	OBJECTIVES
Exponents/Indices/Powers	Jan	<p>The students will be able to:</p> <ul style="list-style-type: none"> • Discover and apply definitions for fractional exponents. • Apply laws of indices • Solve simple exponential equations.
Algebra	Jan	<p>Algebraic Representation</p> <ul style="list-style-type: none"> • Translate/write/create expressions and equations with two variables. • Translate/write/create expressions and equations with powers of the variable. <p><i>Basic Algebraic Operation</i></p> <p><i>Review</i></p> <p>Substitution</p> <ul style="list-style-type: none"> • Evaluate algebraic expressions and formulae by substituting real numbers for symbols (including fractional exponents). <p>The Distributive Property</p> <ul style="list-style-type: none"> • Identify the pattern for the product of two binomial expressions where the coefficient of the variable is one, the perfect square and the difference of two squares. <p>Factorization</p> <ul style="list-style-type: none"> • Factorize algebraic expressions by grouping.

- Factorize quadratic expressions of the form $x^2 + bx + c$

- Difference of two squares of the form $x^2 - k^2$

Algebraic Fractions

- Find the H.C.F. of binomials and trinomials.
- Simplify an algebraic fraction by factoring its numerator and denominator and eliminating the common factor(s).
- Multiplying and Dividing Algebraic fractions.

Equations

- Solve simultaneous linear equations algebraically.
- Problem solving involving simultaneous linear equations.
- Solve $x^2 = k$
- Solve quadratic equations given in the general form $x^2 + bx + c = 0$, by factorization.
- Solve quadratic equations given in the general form $ax^2 + bx + c = 0$, by formula.
- Problem solving involving quadratic equations

Transposition of Formulae

- Change the subject of formulae, including squares and square roots, cubes, and cube roots and the subject appearing more than once.

Inequalities

- Solving problems involving linear inequalities.

		<ul style="list-style-type: none"> Graph systems of linear inequalities.
Matrices	Jan	<p>Multiply a row matrix by a column matrix</p> <p>Multiplying a square matrix by a column matrix.</p> <p>Multiplying compatible matrices.</p> <p>Verify the associative laws for matrix addition and multiplication.</p> <p>Solving matrix equations involving the multiplication of two matrices.</p>
Sets & Venn Diagrams	Feb	<p>Use Venn diagrams to show relationships between three sets within a universal set</p> <p>Use set notation to describe and shade regions in Venn diagrams with up to three subsets of the universal set.</p> <p>Read, interpret, draw, and use Venn diagrams to solve problems involving up to three subsets of a universal set.</p> <p>Read, interpret, draw and use Venn diagrams to solve problems involving up to two subsets of the universal set.</p>
Patterns, Relations and Functions	Feb	<p>Define a function</p> <p>Use function notation.</p> <p>Evaluate functions.</p> <p>Find the corresponding domain element given the range element.</p>
Coordinate Geometry & Graphs	Feb	<p>Find the gradient/slope of a straight line</p> <p>(a) By drawing a triangle to determine rise over run</p> <p>(b) Using the coefficient of x when the equation is written in the form $y = mx + c$</p> <p>(c) Using the coordinates of two points on the line</p>

		$m = \frac{y_2 - y_1}{x_2 - x_1}$ <p>Gradients of parallel and perpendicular lines</p> <p>Determine the equation of a line given</p> <p>(a) The gradient and y – intercept (b) Two points on the line (c) The graph of the line.</p> <p>Use the slope and the y-intercept to graph a line.</p> <p>Use graphical method to solve systems of linear equations.</p>
<p style="text-align: center;">Geometry & Spatial Sense</p>	<p style="text-align: center;">March</p>	<p style="text-align: center;">Geometric Terminology & Notation</p> <p>Three figure bearings involving a change of direction</p> <p>Define back (reverse) bearings</p> <p>Angle Properties</p> <p>Sketching diagrams involving bearing from at least two points using compass direction, bearings from north/south and three figure bearings.</p> <p>Determine back (reverse) bearings using compass direction, bearings from north/south and three figure bearings.</p> <p style="text-align: center;">Triangles, Quadrilaterals and Other Polygons</p> <p>Define a regular polygon.</p> <p>Define and identify isosceles trapezium/ trapezoid.</p> <p>Determine the size of an interior angle in a regular polygon.</p>

		<p>Define a tessellation and determine which regular polygons tessellate the plane</p> <p>List properties of isosceles trapezium/ trapezoid.</p> <p>Use interior and exterior angle properties of to solve problems involving regular or irregular polygons.</p> <p>Circles Draw and measure angles to verify circle theorems.</p> <p>Apply circle theorem to find the size of angles:</p> <ul style="list-style-type: none"> - At center & circumference - At the circumference in a semicircle - In the same segment. - Between tangents and radius - In a cyclic quadrilateral. <p>.</p>
<p>GEOMETRY & SPATIAL SENSE Continued</p>	<p>March</p>	<p style="text-align: center;">Constructions & Scale Drawings</p> <ul style="list-style-type: none"> • A line through a point, parallel to a given line. • Construct quadrilaterals. • Draw or construct scale diagrams involving bearings <p>Solid Shapes</p> <p>Identify and sketch nets of prisms and solids of uniform cross-section.</p> <p>Sketch cubes, cuboids, cylinders, and other solids of uniform cross-section.</p> <p style="text-align: center;">Similarity and Congruency</p> <p>Identify and state properties of</p>

		<p>(a) Similar triangles (b) Congruent triangles (SSS, SAS, ASA, AAS, RHS)</p> <p>Use the properties of similar and congruent triangles to find the measure of missing sides and angles.</p>
Vectors	April	<p>Calculate the magnitude and determine the direction of a vector.</p> <p>Use the position vectors of a point relative to the origin.</p> <p>Unit vectors</p> <p>Express a vector as the sum or difference of two vectors.</p>

TERM THREE: 22 April 2025 – 20 June 2025

NO. OF WEEKS: 6

GRADE 11

TOPICS/CONCEPTS	Time	OBJECTIVES
<p align="center">Transformations</p>	<p align="center">April</p>	<p>The students will be able to:</p> <p>Identify the properties of each type of transformation.</p> <p>Identify, describe fully, and perform the following transformations:</p> <ul style="list-style-type: none"> • Reflections in the x-axis, y-axis and horizontal/ vertical lines. • Rotations about the origin through multiples of 90^0 , clockwise and anticlockwise. • Translations using column vectors • Enlargements centered at the origin, with natural number scale factor. <p>Recognize shapes that have both line symmetry and rotational symmetry.</p> <p>Deduce the relationship between the number of lines of symmetry and the order of rotational symmetry of regular polygons.</p> <p>Complete shapes that have both reflective and rotational symmetry.</p>
<p align="center">Trigonometry</p>	<p align="center">May</p>	<p>Definitions and notations for the sine, cosine and tangent ratios of acute angles in right triangles.</p> <p>Use a scientific calculator to find:</p> <ul style="list-style-type: none"> - Trigonometric ratios of acute angles. - Acute angles with given trigonometric ratios <p><i>Determine</i> the sine, cosine and tangent of acute angles in right triangles.</p> <p>Use the sine, cosine or tangent ratios to calculate the length of a side or the size of an angle of a right triangle.</p> <p>Use trigonometric ratios to solve problems involving lengths/distances, angles of elevation/depression and bearings.</p>

Measurement	May	<p>Units of Measurement</p> <p>Draw and interpret travel and conversions graphs.</p> <p>Draw and interpret distance-time speed-time graphs.</p> <p>Perimeter and Area</p> <p>Solve problems involving perimeters and areas of triangles, quadrilateral, circles and compound shapes.</p> <p>Solve word problems involving surface areas of cubes, cuboids, cylinders, prisms and other solids with uniform cross-sections.</p> <p>Converting between metric units of area</p> <p>Volume/ Capacity</p> <p>Solve word problems involving volumes and capacity of cubes, cuboids, cylinders, prisms and other solids with uniform cross-sections.</p> <p>Converting between metric units of volume.</p>
Statistics	May	<p>Define and explain the terms: data, frequency table, class, lower/upper class limits, lower/upper class boundary, class interval, mid-point, class width.</p> <p>Construct grouped and ungrouped frequency tables from secondary data.</p> <p>Draw histograms and frequency polygons from grouped and ungrouped frequency tables.</p> <p>Interpret histograms and frequency polygons of grouped and ungrouped data.</p> <p>Estimate the measures of central tendency (mean, median, and mode) and the range from grouped and ungrouped frequency tables</p>

		<p>Calculate the measures of central tendency (mean, median, mode) and the range from a frequency distribution of ungrouped and grouped data.</p> <p>Make deductions about data, given one or more measures of central tendency and the range.</p> <p>Construct and interpret histograms from equal and unequal intervals.</p>
Probability	June	<p>Draw and interpret 2 stage probability tree diagrams for the following experiments: tossing two coins, rolling a pair of dice, selecting/drawing letters/numbers/objects from two sets of letters/numbers/objects, tossing a coin twice, rolling a die twice, spinning a spinner twice, tossing a coin and rolling a die, etc.</p> <p>Apply the sum and product laws.</p> <p>$P(A \text{ or } B) = P(A) + P(B)$ $P(A \text{ and } B) = P(A) \cdot P(B)$</p>

TERM ONE: 2 September 2024 – 20 December 2024

NO. OF WEEKS: 14

GRADE 12

TOPICS /CONCEPTS	Time	OBJECTIVES The students will be able to:
The Real Number System & Natural and Whole Numbers	Sep	<ul style="list-style-type: none"> • Understand that square roots of non-perfect squares and cubes are irrational numbers. <p><i>*Incorporate consumer math problems during problem solving</i></p>
Order of Operations	Sep	<ul style="list-style-type: none"> • Apply the correct order of operations to evaluate arithmetic expressions.
Sequences of Natural Numbers	Sep	Determine a formula for the nth term of a sequence.
Integers	Sep	Understand that the square root of a negative number is not a real number.
Fractions	Sep	<ul style="list-style-type: none"> • Understand that the denominator of a fraction cannot be zero.
Decimals	Sep	<ul style="list-style-type: none"> • Understand that irrational numbers are infinite, non-repeating decimals.
Estimation, Approximation & Rounding	Sep	<ul style="list-style-type: none"> • Obtain appropriate upper and lower bounds to solutions of simple problems give data to a specified accuracy.

<p>Percents and Percentages/Consumer Math</p>	<p>Sep</p>	<p>Solve the three main percentage problems:</p> <ul style="list-style-type: none"> • Expressing one number as a percentage of another • Calculating a percentage of a quantity. • Finding the original amount given final amount and the percentage increase or decrease. <p>*Consumer Math</p> <p>Calculate compound interest for up to a maximum of three time periods.</p>
<p>Ratios, Rates, Proportions & Variation</p>	<p>Oct</p>	<p>Direct and inverse variation:</p> $y \propto x \text{ or } y = kx$ <p>Use notation $y \propto \frac{1}{x} \text{ or } y = \frac{k}{x}$</p> <p>Determine the constant of proportionality and unknown quantities.</p> <p>Solve word problems</p>
<p>Standard Form/Scientific Notation (Use calculators)</p>	<p>Oct</p>	<p>Powers and roots of numbers in standard form.</p> <p>Problem solving of numbers in standard form involving all operations.</p>
<p>Algebra</p>	<p>Oct</p>	<p>Algebraic Representation</p> <p>Translate/write/create expressions Translate/write/create expressions and equations with one or two variables and powers of the variable(s).</p> <p>The Distributive Property</p> <p>Identify the pattern for the product of two binomial expressions where the coefficient of the variable is not one, the perfect square and the difference of two squares.</p> <p>Factorization</p> <p>Factorize quadratic expressions of the form</p>

	Nov	<p>$ax^2 + bx + c$</p> <p>Difference of two squares of the form $a^2x^2 - b^2y^2$</p> <p>Algebraic Fractions</p> <ul style="list-style-type: none"> • Find the L.C.M of binomials and trinomials. • Add and subtract algebraic fractions with binomial and trinomial numerators and denominators. <p>Equations</p> <p>Solving linear-quadratic simultaneous equations</p> <p>Solve quadratic equations given in the general form $ax^2 + bx + c = 0$, by factorization.</p> <p>Solve quadratic equations given in the general form $ax^2 + bx + c = 0$, by formula.</p> <p>Understand that the discriminant, $b^2 - 4ac$, determines the type of solution of the quadratic equation $ax^2 + bx + c = 0$</p> <p>Transposition of Formulae</p> <ul style="list-style-type: none"> • Change the subject of formulae including powers and roots and the subject appearing more than once. <p>Inequalities</p> <p>Graphing systems of linear inequalities.</p> <p>Describing shaded regions using systems of linear inequalities.</p> <p>Deriving linear inequalities that define shaded regions on a coordinate plane.</p>
--	-----	---

Exponents/Indices/Powers	Nov	Solve exponential equations using laws of indices.
Matrices	Nov Dec	<p>Identify the operations that are similar to the properties of matrix operations that are similar to the properties of real numbers.</p> <p>The identity matrix for matrix multiplication and inverse matrices.</p> <p>Find the determinant and the inverse of a non-singular matrix square matrix.</p> <p>Identify singular matrices.</p> <p>Use an inverse matrix to solve a matrix equation for an unknown matrix.</p> <p>Use matrices to solve simultaneous equations.</p>
Sets & Venn Diagrams	Dec	<p>Apply formulas or use Venn diagrams to determine cardinal numbers of complements, unions, and intersections of sets.</p> <p>Draw Venn diagrams and apply algebraic techniques to solve problems involving up to three subsets of a universal set.</p>

TERM TWO: 6 January 2025 – 11 April 2025

NO. OF WEEKS: 12

GRADE 12

TOPICS/CONCEPTS	Time	OBJECTIVES
Patterns, Relations and Functions	Jan	<p>The students will be able to:</p> <p>Determine the inverse of a one to one function.</p> <p>Determine and evaluate composite functions.</p>
Coordinate Geometry & Graphs	Jan	<p>Construct/complete tables of values for quadratic functions of the form $y = ax^2 + bx + c$</p> <p>Draw, identify and interpret the graphs of such functions.</p> <p>Determine the features of a parabola from its graph and its equation.</p> <p>Estimate the gradient of a curve at a given point by drawing a tangent at the point.</p> <p>Use the graphs to solve, or estimate the solutions of associated equations.</p>
Differentiation	Jan	<p>Find the derivative of a function. (use of the rule $dy/dx = anx^{n-1}$ for $y = ax^n$)</p> <p>Derivatives of constant and linear functions.</p> <p>Differentiating polynomial and other functions involving rational exponents.</p> <p>Calculate the gradient of a curve at a given point.</p> <p>Find the coordinates of a point where a curve has a given gradient.</p> <p>Calculate the maximum and minimum values of a function at turning points.</p> <p>Calculate the maximum and minimum values of a function at turning points.</p>

		Derive the equation of a tangent line at a point on a curve.
Geometry & Spatial Sense	Feb	<p style="text-align: center;">Geometric Terminology & Notation</p> <p>Define space</p> <p>Define and identify</p> <ul style="list-style-type: none"> • Lines in space: <ul style="list-style-type: none"> - intersecting - perpendicular - parallel - skew • Angle between two planes • Angle between a line and a plane • Normal lines • Oblique lines <p>Angle Properties</p> <ul style="list-style-type: none"> • Describe and identify relationships between lines, planes, lines in planes. <p style="text-align: center;">Triangles, Quadrilaterals and Other Polygons</p> <p>Define and identify convex and non-convex (re-entrant) polygons.</p> <p>Problem solving involving convex and non-convex polygons.</p>

		<p>Circles Draw and measure angles between tangents and chords.</p> <p>Determine that the angle between a tangent and a chord is equal to the angle the chord forms in the alternate segment.</p> <p>Determine that the angle between a tangent and a chord is half the angle the chord subtends at the centre.</p> <p>Determine that from any point outside a circle just two tangents to the circle may be drawn and they are of equal lengths.</p>
<p>GEOMETRY & SPATIAL SENSE Continued</p>	<p>Feb</p>	<p style="text-align: center;">Constructions & Scale Drawings</p> <ul style="list-style-type: none"> • Construct polygons. • Draw or construct scale diagrams involving bearings <p>Solid Shapes</p> <p>Identify and sketch nets of pyramids and cones.</p> <p>Sketch cubes, cuboids, cylinders, and other solids.</p> <p style="text-align: center;">Similarity and Congruency</p> <p>Determine the ratio of corresponding sides/area/volume of similar objects.</p> <p>Find:</p> <p>(a) the length of sides.</p> <p>(b) the area</p> <p>(c) volume of similar shapes and objects.</p>

Vectors	March	<p>Use the properties of vectors to determine the geometrical relationships between line segments.</p> <p>Identify the properties of vectors operations that are similar to the properties of real numbers.</p> <p>Express vectors in terms of other related vectors.</p>

TERM THREE: 22 April 2025 – 20 June 2025

NO. OF WEEKS: 8

GRADE 12

TOPICS/CONCEPTS	Time	OBJECTIVES
Trigonometry	March	<p>The students will be able to:</p> <p>Use a scientific calculator to find the values of trigonometric ratios for θ such that $0^\circ \leq \theta \leq 360^\circ$.</p> <p>Find two values for θ, $0^\circ \leq \theta \leq 360^\circ$ that are solutions of basic trigonometric equations.</p> <p>Verify the sine rule and the cosine rule in given triangles.</p> <p>Use sine and cosine rules to find missing sides and angles in oblique triangles.</p> <p>Use the sine and cosine rules to solve problems involving lengths/distances, angles of elevation/depression and bearings.</p> <p>Use one of the following formulas to find the area of a triangle:</p> <ul style="list-style-type: none"> - Given the base and the altitude, $A = \frac{1}{2} \times \text{base} \times \text{height}$ $A = \sqrt{s(s-a)(s-b)(s-c)}$ <ul style="list-style-type: none"> - given the three sides, where $s = \frac{1}{2}(a+b+c)$ <p>-Given two sides and the included angle</p> $\text{Area} = \frac{1}{2} ab \sin C$ $\text{Area} = \frac{1}{2} ac \sin B$ $\text{Area} = \frac{1}{2} bc \sin A$ <p>Solve problems in three dimensions, including angle between a line and a plane.</p>

Transformations	April	<p>Identify, describe fully and perform the following transformations:</p> <ul style="list-style-type: none"> • Reflections in lines inclined 45° to the axes. • Rotations about any point, through multiples of 90°. • Translations using column vectors. • Enlargements centered at any point, including fractional and negative scale factors. <p>Define point symmetry.</p> <p>Recognize shapes with point symmetry.</p> <p>Deduce the order of rotational symmetry in shapes that have point symmetry.</p>
Measurement	April	<p>Units of Measurement</p> <p>Draw and interpret speed-time and distance-time graphs.</p> <p>Perimeter and Area</p> <p>Calculate arc length and area of a sector.</p> <p>Calculate the area of segments.</p> <p>Surface area of spheres pyramids and cones.</p> <p>Converting between metric units of area</p> <p>Volume/ Capacity</p> <p>Volume and capacity of sphere, pyramids and cones</p> <p>Solve word problems involving volume and capacity.</p> <p>Converting between metric units of volume.</p>

Statistics	April	<p>Construct and use cumulative frequency tables to estimate the mean, median and mode of grouped data.</p> <p>Draw cumulative frequency curves (ogives).</p> <p>Estimate median, upper and lower quartiles as well as interquartile range from cumulative frequency curves.</p> <p>Estimate percentiles (multiples of 10, the 25th and 75th) from cumulative frequency curves.</p>
Probability	April	<p>Determining if given events are: (a) mutually exclusive, (b) independent, (c) dependent.</p> <p>Determine conditional probabilities when drawing without replacement.</p> <p>Draw and interpret tree diagrams with more than 2 branches and more than 2 branches per stage and at most three stages.</p> <p>Solving word problems involving selecting/drawing objects with or without replacement.</p>