Mathematics - Subject Group Overview Makiko Wood, Michael Collins, Murat Gokalp

Year 1: Grade 6

Unit title:	Key concept:	Related concept(s):	Global context and exploration:	Statement of inquiry:	Objectives:	ATL Skills:	Content:
The 'Queen of Sciences' how measurement and data bond Mathematics and Science. (2 weeks)	Relationships	Generalization, Measurement	**Orientation in Space and Time**	Generalising relationships between measurements can help explore the formation of human and natural landscapes.	A: i, ii,	**Communication** Communication skills	Students will learn about: - Define the nature of measurement - Define, describe, analyse and process a basic data set. - Understand the nature of a dimension. - Convert between metric measurements.
Number: Working with Fractions, Decimals and Percentages. (15 weeks)	Logic	Change, Equivalence,	**Scientific and technical innovation**	Measuring change, using numbers and logic in balance may lead to scientific progress	A: i, ii B: i, ii, iii C: i, ii, iii, iv, v D: i, ii, iii, iv, v	**Communication** Communication skills **Self-management** Organization skills	Students will learn about: - Accomplish fraction, decimal and percent computation - Use order of operations that include two numbers as decimals. - Use divisibility rules. - Perform a complete range of operations with fractions. - Solve one or two step word problems using a variety of operations - Find a percentage of a quantity by changing the percentage to a fraction or decimal. - Arrange a combination of fractions, decimals and percentages in ascending and descending order - Convert between equivalent fractions, decimals, and percents
Algebra: Expressions, Equations and Patterns. (8 weeks)	Logic	Pattern, Representation	**Scientific and technical innovation**	A logical process is needed to see patterns through an inquiry into using a set of mathematical steps in order to seek solutions.	A: i, ii B: i, ii, iii D: i, ii, iii, iv, v	**Self-management** Organization skills	Students will learn about: - Understand and apply basic algebraic notation. - Demonstrate a confident understanding of the notion of a variable. - Simplify algebraic expressions. - Recognise simple patterns. - Substitute numbers into algebraic expressions. - Solve simple equations.

Unit title:	Key concept:	Related concept(s):	Global context and exploration:	Statement of inquiry:	Objectives:	ATL Skills:	Content:
Geometry: Perimeter, Area, Volume and the Cartesian plane.

(9 weeks) | Logic | Measurement, Space | **Scientific and technical innovation** | The measurement of space is a logical process. | B: i, ii, iii
C: i, ii, iii, iv, v | **Communication**
Communication skills
. | Students will learn about:
● calculate angles in lines, at a point, triangles and quadrilaterals.
● Properties and types of triangles.
● Simple constructions of parallel lines and triangles.
● Name and define the properties of polygons.
● Properties and types of quadrilaterals.
● Find the area of triangles and quadrilaterals.
● Calculate volume and capacity of cuboids. |
| Statistics: The Data Handling Cycle

(8 weeks) | Relationships | Representation, Justification | **Identities and Relationships** | Being able to represent relationships effectively can help justify characteristics and trends uncovered in communities. | C: i, ii, iii, iv, v
D: i, ii, iii, iv, v | **Self-management**
Organization skills | Students will learn about:
● Define data as categorical, continuous or discrete.
● Draw dot plots and tally charts
● Draw accurate bar charts.
● Draw pie charts
● Construct stem-and-leaf displays
● Introduction to line graphs
● Calculate the mean, median, mode and range for a given data set. |

Year 2: Grade 7

Unit title:	Key concept:	Related concept(s):	Global context and exploration:	Statement of inquiry:	Objectives:	ATL Skills:	Content:
Ratio, Proportion and Percent
(10 weeks)	Relationships	Quantity	Scientific and technical innovation	Ratios allow us to compare quantities and is linked to the wider, philosophical suggestion, that everything is relative.	A: i, ii, iii
B: i, ii, iii
D: i, ii, iii, iv, v	**Thinking:**
Critical thinking
Transfer skills	Students will learn about: ● Calculate direct proportions ● Simplify, compare and divide ratios ● Solve ratio / proportion problems (including currency) ● Calculate an unknown length on a shape, given a similar shape ● Calculate map distances given the scales. ● Perform a variety of calculations involving percentages including reverse percentages. ● Apply fractions, decimals, ratios and proportions to solve real-life problems.

						Students will learn about:
Conceptual Algebra - building expressions and equations to problem solve (11 weeks)	Form	Simplification and Equivalence	Scientific and technical innovation	The ability to manipulate, simplify, find equivalency and ultimately generalise through the use of algebra is the cornerstone of the strong bond between Mathematics and Science.	A: i, ii, iii	**Communication**: Communication Skills **Thinking:** Critical Thinking Skills	Students will learn about: ● Solve equations involving variables on both sides, fractional coefficients and brackets. ● Form and solve and equations from written text ● Solve linear inequalities ● Expand more than one set of brackets and simplify by collecting like terms. ● Rearrange simple formulae to make any other variable the subject. ● Check that an expression is factorised correctly by expanding and check an equation by substitution.
Geometric Reasoning (11 weeks)	Relationships	Generalization Measurement	Identities and relationships	Generalising relationships between measurements can help explore the formation of human and natural landscapes.	A: i, ii, iii C: i, ii, iii, iv, v	**Thinking** Transfer Skills	Students will learn about: ● Use a table of values to draw a linear graph. ● Graphically and algebraically find x and y intercepts of a linear graph. ● Determine the size of angles given a known situation including alternate, corresponding, co-interior and by applying the properties of known polygons. ● Determine the size of an angle using algebra, giving reasons for answers. Set up an equation to solve algebraically. ● Identify the properties of quadrilaterals and triangles. ● Use the formula (n-2) x 180 to find the sum and size of interior angles. ● Determine the size of unknown angles in regular polygons. ● Construct equilateral, isosceles and right-angled triangles using a ruler and compass only ● Use the correct formula to calculate the area and perimeter of any given simple or compound shape, including fractions of circles. ● Calculate the volume and surface area of a given simple or compound cuboid and other prisms and cylinders.
Probability (10 weeks)	Logic	Representation, Systems and Justification	Personal and cultural expression	A logical system of representation can help explore and	A: i, ii, iii B: i, ii, iii	**Communication** Communication skills	Students will learn about: ● Calculate the probability of compound events (with replacement

				analyse games that humans play.	C: i, ii, iii, iv, v D: i, ii, iii, iv, v	**Thinking:** Critical thinking skills	only) using decimals, percentages and fractions ● Describe the nature and meaning of chance. ● Assign a value (fraction, decimal or percentage) to the probability of an event occurring. ● Understand the complement of an event. ● Recognize $P(E) = 1$ means something is certain to happen and $P(E)=0$ means it will certainly not happen ● Understand the difference between theoretical and experimental probability ● Calculate theoretical probability of single events in fractions, decimals and percentages ● Introduction to tree diagrams, sample space. ● Use combinatorics to list outcomes

Year 3: Grade 8

Unit title:	Key concept:	Related concept(s):	Global context and exploration:	Statement of inquiry:	Objectives:	ATL Skills:	Content:
Numbers theory (10 wks)	Form	Equivalence, Simplification, Quantity	Scientific and technical innovation	Representing and simplifying quantities in different, but equivalent, forms can help explore remarkable discoveries and developments.	A: i, ii B: i, ii, iii C: i, ii, iii, iv, v D: i, ii, iii, iv, v	**Thinking:** Critical thinking Transfer skills	Students will learn about: ● Understand and apply the laws of indices. ● Apply expansion laws. ● Use scientific notation (standard form). ● Understand what is meant by significant figures. ● Find the prime factors of a number. ● Solve multi-step equations and explain on a conceptual level how they arrived at their solution. ● Solve basic exponential equations. ● Understand and explain the importance of equivalence when solving exponential equations.

							- Describe the difference between rational and irrational numbers. - Describe the nature of a surd and understand when and how to leave an answer in surd form. - Simplify surds and use them in calculations.
Factoring and its applications (11 weeks)	Logic	Change, Representation.	Scientific and technical innovation	Expressions can be logically represented in a variety of forms, allowing them to be manipulated and changed to suit a diverse range of applications.	A: i, ii B: i, ii, iii C: i, ii, iii, iv, v D: i, ii, iii, iv, vs	**Communication** Communication	Students will learn about: - Apply the distributive law. - Expand expressions of the form (a+b) (c+d) - Expand radical expressions. - Identify and eliminate common factors. - Factorise the difference of two squares. - Recognise equations in the standard quadratic form. - Solve quadratic equations by factoring. - Solve worded or geometrical problems with quadratic equations. - Recognise and solve simultaneous equations. - Solve simultaneous equations by substitution, elimination and graphically. - Find the gradient of a line drawn on a set of axes - Solve simultaneous and linear equations with fractions or decimals as coefficients. - Find the nth term in a sequence.
Trigonometry (10 weeks)	Relationships	Measurement	Scientific and technical innovation	All right-angled triangles have certain constant relationships that can be explored through the measurement of their dimensions.	A: i, ii B: i, ii, iii C: i, ii, iii, iv, v D: i, ii, iii, iv, v	**Thinking:** Critical thinking Transfer skills	Students will learn about: - Construct triangles using SAS, ASA, SSS. - Investigate proof of why the angle sum of a triangle is always 180. - Generalise to form a rule for calculating the interior angle sum of a shape with n-sides - Use Pythagoras' theorem to calculate the length of any side in a

							right-angled triangle, use it to prove if a triangle is right-angled or not. ● Explore in 3d, recognise triples, and solve word problems, giving answers either simplified or in surd form. ● Explore the ratio of two sides of various similar triangles. This will form as an introduction to trigonometric ratios. ● Recognise parallel lines and lines with positive and negative slope ● Find x or y of a coordinate pair, if the point lies on a given line, y = mx + c ● Find the gradient of a line drawn on a set of axes by selecting 2 points and finding 'change in y/change in x'. ● Find the gradient of a line, given two points on the line (Gradient Formula). ● Identify the gradient and y-intercept from a given equation. ● Find the equation of a line drawn on a set of axes and put the equation in the form y = mx + c. ● Rearrange equations to get into slope-intercept form.
Statistics and Marketing (10 wks)	Perspective	Justification, Representation	Globalization and sustainability	Statistics can be used by individuals and organisations to both represent and justify a given perspective.	A: i, ii B: ii, iii C: i, ii, iii, iv, v D: i, ii, iii, iv, v	**Communication** Communication	Students will learn about: ● Understand what constitutes data and the different forms it can take. ● Categorise data ● Collect and process data. ● Use, interpret or conduct; surveys, polls, census, stratified samples, tally charts, frequency tables, etc. ● Use a variety of techniques to present data.Bar graphs, line graphs, two-way tables, pie charts, scatter graphs, cumulative frequency graphs, histograms, box-plots, stem and leaf diagrams, frequency polygons, composite bar graphs, etc. ● Develop a conceptual understanding of what method would be most appropriate for a given data set. Understand the limitations of data. ● Interpret from a variety of perspectives.

							● Understand bias. ● Understand why a corporation might be selective about what data it chooses to present, and how it is presented.

Year 4: Grade 9 Standard

Unit title:	Key concept:	Related concept(s):	Global context and exploration:	Statement of inquiry:	Objectives:	ATL Skills:	Content:
Exponents and radicals (8 weeks)	Form	Change, Representation, Simplification	*Globalization and sustainability- Population and demography*	Numbers can change their form to represent mathematical relationships through simplification.	A: i, ii, iii B: i, ii, iii C: i, ii, iii, iv, v	**Self-management** Reflection skills	Students will learn about: **Indices** ● Evaluate expressions like $27^{(-2/3)}$ without a calculator. ● Solve problems with any fractional exponents such as $x^{(-2/3)} = 9$ ● Simplify expressions like $[(-2a^3)^4 \times (-3a^2)^2] / 24a^{12}$ without a calculator. ● Solve equations with multiple bases on each side including quadratics within the exponent **Radicals** ● Rationalise simple radicals $(a/(b\sqrt{c})$ ● Multiply radicals (including $(a\sqrt{b} + c\sqrt{d})(e\sqrt{f} + g\sqrt{h})$) ● Rationalise radicals (include up to $a\sqrt{b}/c\sqrt{d}$ ● Solve equations with radicals (including $2\sqrt{(x+5)}-9=0$ and $(s(x+5)2/3-3=12.)$ ● Recognise the conjugate $(a+\sqrt{b})(a-\sqrt{b})$ ● Multiply conjugate pairs
Linear functions and Quadratic functions (12 weeks)	Relationships	Pattern, Representation	Scientific and technical innovation-	Patterns in the natural world can be represented as relationships and thus help in making predictions	A: i, ii, iii B: i, ii, iii C: i, ii, iii, iv, v D: i, ii, iii, iv, v	**Communication** Communication skills **Thinking** Critical thinking	Students will learn about: **Linear Graphs** ● Identify the gradient and y-intercept from a given equation.

							skills	• Find the equation of a line drawn on a set of axes and put the equation in the form y = mx + c.

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Find the equation of a line drawn on a set of axes and put the equation in the form y = mx + c.
Draw and label lines, given their equations.
Find the equation of a line, given two points on a line.
Recognise the gradient and y-intercept of a line given its equation in either of the forms y = mx + c ; ax + by + c = 0 ; ax+by=c
Convert between the 2 equation forms y = mx +c and ax+by+c =0
Given two points on a line, find the equation of that line in each of the forms y = mx + c and ax + by + c = 0 (a,b,c integers)
Be familiar with the point-slope form: (y - a) = m(x-b)
Find the perpendicular bisector of the line joining two points

Factorising and Quadratic Equations

Factorise and solve equations involving coefficients of x² other than 1 or -1 after factoring out the HCF.
Factor more complicated expressions (e.g. ex +ey + dx + dy = e(x+y)+d(x+y) = (e+d)(x+y))
Rearrange a quadratic equation into the standard form ax² + bx + c= 0
Solve a quadratic equation by means of factoring (e.g x² - 2x = 8)
Solve a quadratic equation by means of the quadratic formula. (e.g. 3x² = 2x + 7)
Solve a quadratic equation by means of a graphing calculator.
Find the vertex and roots of a parabola using a GDC and change the viewing window to an appropriate size.

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<td>Sets and probability (6 weeks)</td>
<td>Logic</td>
<td>Representation, System</td>
<td>Scientific and technical innovation</td>
<td>Using logical representations and systems help us to</td>
<td>A: i, ii, iii
B: i, ii, iii
C: i, ii, iii, iv, v
D: i, ii, iii, iv, v</td>
<td><u>Communication</u>
Communication skills</td>
<td colspan="2">Students will learn about:
Sets

Read information from a shaded Venn diagram

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				understand the natural world.		**Thinking** Critical thinking skills	- Solve word / logical problems using Venn diagrams including three overlapping sets. - Use algebra to find missing values from a Venn diagram - Use terminology and notation to correctly to describe sets of numbers - Identify the contents of the sets Z, Q, N, and R. - Recognise the set of Natural numbers includes zero. - Use n(A) for the number of elements within set A - List elements in unions or intersections of sets - Represent given information in a Venn diagram - Use vocabulary of only/and/or to create a Venn diagram - Represent a given set using set builder notation - List or describe the elements of the complement of a set. *Probability* - Sample Space with lists, tables, Venn-diagrams and tree-diagrams - Find probability using AND rule and OR rule - Use venn-diagrams and tree diagrams to find compound event probabilities - Calculate probability with and without replacement. - Use Venn diagrams and tree-diagrams to solve conditional probabilities
Similarity and trigonometry (8 weeks)	Form	Space	Scientific and technical innovation-	Space can be measured in a triangular form and applied to make adaptations to built environments.	A: i, ii, iii	**Thinking** Critical Thinking	Students will learn about: - Finding the sizes of sides and angles of right triangles by using the ratios sine, cosine and tangent and their inverses. - Translate a word problem into a diagram involving right triangles, and solve the problem.

							Content:
							Use bearings to solve right angled trig problems • Angles of elevation & depression • Connect the appropriate trigonometric formulae to the information given. • Use the Sine Rule to solve problems • Use the Cosine Rule to solve problems • Find area of any triangle using an appropriate formula • Apply use if bearings to solve word problems with Sine and Cosine Rules • 3D examples, using all 3 trig operations
Transformations and tessellation	Form	Space, Patterns	Personal and cultural-	An understanding of patterns created by forms in space can enhance creativity and help express beliefs and values	B: i, ii, iii C: i, ii, iv, v D: i, ii, iii, v	**Communication** Communication skills **Thinking** Transfer skills	Students will learn about: • rotating, translating and enlarging objects given the necessary information • vector notation to describe translations • reflect in the lines y=x, y=-x, y=a, x=a • Define absolute value] • combine transformations and find the single transformation equivalent to the combination • properties of transformations

Year 4: Grade 9 Extended

Unit title:	Key concept:	Related concept(s):	Global context and exploration:	Statement of inquiry:	Objectives:	ATL Skills:	Content:
Exponents and radicals (8 weeks)	Form	Change, Representation, SImplification	*Globalization and sustainability*	Numbers can change their form to represent mathematical relationships through simplification.	A: i, ii, iii	**Self-management** Reflection skills	Students will learn about: **Indices** • Evaluate expressions like 27^(-2/3) without a calculator. • Solve problems with any fractional exponents such as x^(-2/3) = 9 • Simplify expressions like [(-2a^3)^4 x (-3a^2)^2] / 24a^12 without a calculator.

							• Solve equations with multiple bases on each side including quadratics within the exponent **Radicals** • Rationalise simple radicals $(a/(b\sqrt{c})$ • Multiply radicals (including $(a\sqrt{b} + c\sqrt{d})(e\sqrt{f} + g\sqrt{h})$) • Rationalise radicals (include up to $a\sqrt{b}/c\sqrt{d}$ • Solve equations with radicals (including $2\sqrt{(x+5)}-9=0$ and $(s(x+5)2/3-3=12.)$ • Recognise the conjugate $(a+\sqrt{b})(a-\sqrt{b})$ • Multiply conjugate pairs
Linear functions and Quadratic functions (15 weeks)	Relationships	Pattern, Representation	Scientific and technical innovation	Patterns in the natural world can be represented as relationships and thus help in making predictions	A: i, ii, iii B: i, ii, iii C: i, ii, iii, iv, v D: i, ii, iii, iv, v	**Communication** Communication skills **Thinking** Critical thinking skills	Students will learn about: **Linear Graphs** • Find the equation of a line through a point perpendicular to a given line or through a line joining two given points • Find the distance between two points • Find the equation of a line parallel to another line, given a point on the first line. • Recognise the gradient and y-intercept of a line given its equation in either of the forms $y = mx + c$; $ax + by + c = 0$; $ax+by=c$ • Convert between the 2 equation forms $y = mx +c$ and $ax+by+c =0$ • Given two points on a line, find the equation of that line in each of the forms $y = mx + c$ and $ax + by + c = 0$ (a,b,c integers) • Be familiar with the point-slope form: $(y - a) = m(x-b)$ • Find the perpendicular bisector of the line joining two points **Factorising and Quadratic Equations**

						- Factorise and solve equations involving coefficients of x^2 other than 1 or -1 after factoring out the HCF. - Factor more complicated expressions (e.g. ex +ey + dx + dy = e(x+y)+d(x+y) = (e+d)(x+y)) - Rearrange a quadratic equation into the standard form $ax^2 + bx + c = 0$ - Solve a quadratic equation by means of factoring (e.g $x^2 - 2x = 8$) - Solve a quadratic equation by means of the quadratic formula. (e.g. $3x^2 = 2x + 7$) - Solve a quadratic equation by means of a graphing calculator. - Find the vertex and roots of a parabola using a GDC and changing the viewing window to an appropriate size. **Parabolas** - Make reasonable sketch of parabola from given quadratic function. - Mark special points such as roots, y intercept, vertex. - Form links between algebraic quadratic function and graph - Understand transformational meaning of values a, h, k in the y=a(x-h)^2+k form - Recognise line of symmetry is midpoint of roots and/or through vertex
Sets and probability (6 weeks)	Logic	Representation, System	Identities & Relationships	Using logical representations and systems help us to understand the natural world.	A: i, ii, iii B: i, ii, iii C: i, ii, iii, iv, v	**Communication** Communication skills **Thinking** Critical thinking skills	Students will learn about: *Sets* - Read information from a shaded Venn diagram - Solve word / logical problems using Venn diagrams including three overlapping sets.

							• Use algebra to find missing values from a Venn diagram • Use terminology and notation to correctly to describe sets of numbers • Identify the contents of the sets Z, Q, N, and R. • Recognise the set of Natural numbers includes zero. • Use n(A) for the number of elements within set A • List elements in unions or intersections of sets • Represent given information in a Venn diagram • Use vocabulary of only/and/or to create a Venn diagram • Represent a given set using set builder notation • List or describe the elements of the complement of a set. ***Probability*** • Sample Space with lists, tables, Venn-diagrams and tree-diagrams • Find probability using AND rule and OR rule • Use venn-diagrams and tree diagrams to find compound event probabilities • Calculate probability with and without replacement. • Use Venn diagrams and tree-diagrams to solve conditional probabilities •
Similarity and trigonometry (4 weeks)	Form	Space Measurement	Scientific and technical innovation	Space can be measured in a triangular form	A: i, ii, iii	**communication** communication skills	Students will learn about: • surface area of pyramids, cylinders, cones, spheres and compound shapes based on these • volumes of prisms and compound shapes • volumes of pyramids, cylinders, cones, spheres and

							compound shapes based on these.
							• congruent shapes and decide whether given length and/or angle information is sufficient to construct a unique triangle (ASA, RHS rules…)
							• lengths of sides in similar shapes.
							• the changes to the area and volume when the dimensions are all multiplied by a scale factor
							• backwards to find the scale factor when given new and original values of area or volume (not necessary for DP)
							• the sizes of sides and angles of right triangles by using the ratios sine, cosine and tangent and their inverses.
							• bearings to solve right angled trig problems
							• angles of elevation & depression
							• the Sine Rule to solve problems including the Ambiguous Case
							• the Cosine Rule to solve problem
							• sarea of any triangle using an appropriate formula
							• bearings to solve word problems with Sine and Cosine Rules
							• using all 3 trig operations in 3D
							• bisectors of line segments

Year 5: Grade 10 Standard

Unit title:	Key concept:	Related concept(s):	Global context and exploration:	Statement of inquiry:	Objectives:	ATL Skills:	Content:
Number manipulation (8 weeks)	Form	Simplification, Representation	*Scientific and technical innovation*	Numbers can be simplified and represented in different forms	A: i, ii, iii B: i, ii, iii C: i, ii, iii, iv, v	**Communication** Communication skills	Students will learn about: ● round numbers to any place value, dp, or sf ● find percentage error ● express numbers in scientific notation ● categorise numbers to special number sets ● convert between different units. ● expand single brackets and double brackets
Functions (11 weeks)	Form	Model, Pattern representation	*Scientific and technical innovation*	Representing patterns with equivalent forms can lead to better systems, models and methods.	A: i, ii, iii C: i, ii, iii, iv D: i, ii, iii, iv, v	**Communication** Communication skills **Thinking** Critical thinking skills	Students will learn about: **Quadratics** ● find axes intercepts by factorising and by GDC ● find the axes of symmetry by graph of the function and by the formula ● find the vertex of quadratic functions ● identify the relation between the discriminant and x-intercepts. ● model quadratic functions ● Solve systems of equations where one equation is a quadratic and the other is quadratic or linear
Sequences and Finance (6 weeks)	Relationship	System, Pattern, Model	*Identity and relationships*	Financial growth can be modeled with a pattern that imply linear/exponential relationship.	A: i, ii, iii B: i, ii, iii C: i, ii, iii, iv, v D: i, ii, iii, iv, v	**Self-management** Organization skills **Research** Information Literacy skills	Students will learn about: **Sequence and Finance** ● find a, d in an arithmetic sequence ● find the general formula of an arithmetic sequence ● find a, r in a geometric sequence ● find the general formula of a geometric sequence ● solve exponential equations by GDC

							• use GDC to solve compound interest questions **Linear functions** • the concept of functions • function notations • Recognise the algebraic and graphical representation of common functions including polynomial, modulus (absolute value), piece-wise, hyperbolic, exponential, logarithmic, power, rational, and trigonometric [not in detail] • find the equation of linear functions in all gradient-intercept form, standard form and point-gradient form **Exponential functions** • Identify the algebraic and graphical representation of exponential functions • Solve exponential functions using a GDC
Shapes and Trigonometry (8 weeks)	Relationship	measurement, model	Scientific and technical innovation- Systems, models, methods; products, processes and solutions	Generalising relationships between measurements can lead to better models and methods.	A: i, ii, iii C: i, ii, iii, iv, v D: i, ii, iii, iv, v	**Research** Information literacy skills **Thinking** Critical thinking skills Transfer skills	Students will learn about: • concepts of trigonometric ratio and SOHCAHTOA • sine rule, cosine rule, area of a triangle • unit circle • graphs of sine, cosine • transformations of trigonometric curve • modelling
Statistics and life expectancy (4 weeks)	Relationship, Logic	Quantity, Representation	Fairness and development- Human capability and development; social entrepreneurs	How quantities are represented can help to establish underlying relationships and trends in a population.	A: i, ii, iii C: i, ii, iii, iv, v D: i, ii, iii, iv, v	**Self-management** Organization skills Reflection skills **Thinking** Critical thinking skills	Students will learn about: • frequency table and stem-and-leaf plot • the centre of quantitative data and grouped data

							- cumulative frequency curve and finding quartiles and percentiles. - range and interquartile - box and whisker plot - standard deviation. - GDC skills to find mean, median, Q1,Q3 and standard deviation - concept of correlation

Year 5: Grade 10 Extended

Unit title:	Key concept:	Related concept(s):	Global context and exploration:	Statement of inquiry:	Objectives:	ATL Skills:	Content:
Quadratic Equations (8 weeks)	Relationships	Change, Model.	*Scientific and technical innovation*	Change can help model situations and make predictions for technical innovation.	A: i, ii, iii C: i, ii, iii, iv D: i, ii, iii, iv, v	I. Communication skills, VIII. Critical thinking skills	Students will learn about: - Construct a sound background in Algebra, as well as coordinate geometry. - Develop factoring skills. - Develop numeracy skills well. - Recognise the roots of a quadratic equation are complex numbers - Use counting principle & factorial notation Use the Vertex Form of a quadratic function to identify vertex and line of symmetry. - Use Completing the Square method for arranging a quadratic into Vertex Form. - Solve word problems on maximising and minimising using any suitable method. - Use the discriminant to determine the nature of the roots

							- Solve systems of equations - Solve inequalities by sketching graphs. - Recognise the algebraic and graphical representation of common functions Sketch basic translations and transformations of common functions
Geometry and Trigonometry (8 weeks)	Relationships	Model, Pattern.	Scientific and technical innovation	Patterns in the real world can be modeled with trigonometric functions to demonstrate relationships	A: i, ii, iii B: i, ii, iii C: i, ii, iii, iv	I. Communication skills, VIII. Critical thinking skills, X. Transfer skills	Students will learn about: - Use Trigonometry and Geometry Concepts: - Use Pythagorean theorem - Calculate trigonometric ratios in right-angled triangles - Apply Sine and cosine rules including the ambiguous case of the sine rule - Transform trigonometric functions - Model data using sinusoidal regression - Use bearings, radians and the unit circle. - Review of basic trig operations. - Use radian and degree measures for special values Draw graphs of trig functions Write the equation of a trig function given the graph. - Solve trig equations - Use GDC to find the auxiliary angle and to draw trig graphs Modelling with trigonometric functions - Solve equations with the exponent unknown

							- Rearrange log equations as index equations. - Manipulate/rearrange logarithmic statements - Change of base of a logarithmic expression. - Sketch a graph of exponential and logarithmic equations
Functions and Relations (4 weeks)	Change	Change, Generalization.	Scientific and technical innovation	How can we express change in the real – world situations using independent and subsequently make deductions and generalization about the properties of the situation.	A: i, ii, iii B: i, ii, iii C: i, ii, iii, iv D: i, ii, iii, iv, v	I. Communication skills	Students will learn about: - Find domain and range of a function - Calculate the composition of two functions - Find the inverse of functions. - Algebraic OperationsSolving equations with GDC - Expand and simplify algebraic expressions, - Find the asymptotes of a function - Understand the translations of functions. - Sketch new graphs by using translations.
How the numbers approach? (Limit & Continuity)	Relationships, Form	Change, Representation. Simplification	Scientific and technical innovation	Understanding the relationships between independent and dependent variables will simplify the representation of infinity in the scientific progress.	A: i, ii, iii	I. Communication skills	Students will learn about: - Informal treatment of limits. - Evaluating simple limits. - Solving undetermined cases. - Continuous functions. - Limit definitions of derivative. - Differentiations of functions

Exponents a((d Logarithms	Relationships, Logic	Change, System	Identities and Relationships	Discovering relationships can lead to understanding how systems evolve.	B: i, ii, iii C: i, ii, iii, iv	I. Communication skills	Students will learn about: • grasp integer exponents (including negative exponents) • Calculate fractional exponents and logarithms with different bases • Simplify numerical expressions involving radicals and exponents by using the rules of exponents. • Sketch the graphs of exponential functions • Solving exponential equations. • Manipulate fractional exponents • Use the laws of exponents, and the laws of logarithms,. • Graph exponential functions and understanding their characteristics • Find inverse functions and their graphs • Solving exponential equations algebraically and graphically.

(Grade 6) Year 1 Key concepts							
		Logic	3	Relationships	2			

(Grade 6) Year 1 Related concepts							
Change	1	Equivalence	1	Generalization	1	Justification	1

Measurement	2	Model		Pattern	1	Quantity	
Representation	2	Simplification		Space	1	System	

(Grade 7) Year 2 Key concepts									
Form	1	Logic	1	Relationships	2				

(Grade 7) Year 2 Related concepts							
Change		Equivalence	1	Generalization	1	Justification	1
Measurement	1	Model		Pattern		Quantity	1
Representation	1	Simplification	1	Space		System	1

(Grade 8) Year 3 Key concepts									
Form	1	Logic	1	Relationships	1	Perspective	1		

Year 3 Related concepts							
Change	1	Equivalence	1	Generalization		Justification	1
Measurement	1	Model		Pattern		Quantity	1
Representation	2	Simplification	1	Space		System	

(Grade 9) Year 4 Standard Key concepts								
Form	2	Logic	1	Relationships	2			

Year 4 Standard Related concepts							
Change	1	Equivalence		Generalization		Justification	
Measurement		Model	1	Pattern	1	Quantity	
Representation	3	Simplification		Space	1	System	1

(Grade 9) Year 4 Extended Key concepts								
Form	2	Logic	1	Relationships	2			

Year 4 Extended Related concepts							
Change	1	Equivalence		Generalization		Justification	
Measurement	1	Model	0	Pattern	1	Quantity	
Representation	3	Simplification	1	Space	1	System	1

(Grade 10) Year 5 Standard Key concepts								
Form	2	Logic	1	Relationships	3			

Year 5 Standard Related concepts							
Change		Equivalence		Generalization		Justification	
Measurement	1	Model	3	Pattern	2	Quantity	1
Representation	3	Simplification	1	Space		System	1

(Grade 10) Year 5 Extended Key concepts									
Form	2	Logic	1	Relationships	4	Change	1		

Year 5 Extended Related concepts							
Change	4	Equivalence		Generalization	1	Justification	
Measurement		Model	2	Pattern	1	Quantity	
Representation	1	Simplification	1	Space		System	1

Year 1-5 Standard Key concepts (Total)							
Form	6	Logic	7	Relationships	10	Perspective	1

Year 1-5 Related concepts (total)							
Change	6	Equivalence	3	Generalization	3	Justification	5
Measurement	4	Model	3	Pattern	6	Quantity	2

Representation	13	Simplification	3	Space	3	System	3

Year 1-5Extended Key concepts (Total)									
Form	6	Logic	6	Relationships	9	Perspective	1	Change	1

Year 1-5 Related concepts (total)							
Change	3	Equivalence	3	Generalization	2	Justification	3
Measurement	6	Model	3	Pattern	4	Quantity	3
Representation	11	Simplification	4	Space	2	System	3