Unit title	Key concept	Related concepts	Global context	Statement inquiry	Objectives	ATL skills	Content
Unit 1 **Numbers and Algebra** Ch: 1,2,4, 6 September, October, November 12 weeks	Relationships	Simplification Equivalence Models Generalization	Scientific and technical innovation: the natural world and its law	Relationships in natural world can be simplified by algebraic models.	A i, ii, iii B i, ii C i, ii, iii, iv	● Communication skills (understand, use and interpret mathematical notation in algebra/algebraic expressions; make inferences and draw conclusions solving problems written literally) ● Social- collaboration (manage and resolve conflict and work collaboratively in teams; listen actively to others; negotiate ideas with peers and teacher concerning equivalence) ● Self-management - reflection skills (consider content, develop new skills, techniques and strategies for effective learning) ● Thinking - critical thinking skills (recognize and evaluate propositions for number patterns, draw reasonable conclusions and generalizations and test them: evaluate evidence and arguments concerning equivalence) ● Thinking - transfer (apply skills in unfamiliar situations)	**Topics:** - Forms of numbers - Number lines - Operations with algebraic expressions - Integer exponents - Linear equations and inequalities - Absolute value (extended) <u>Knowing and understanding:</u> - Expanding, simplifying and factoring algebraic expressions - Using substitution for evaluation and simplification of an expression/equation - Solving equations, inequalities algebraically and graphically - Using the laws of exponents <u>Investigating patterns:</u> - Discovering last digit of numbers written as product - Determining the general rule that represents numerical patterns <u>Communicating:</u> - Using different forms of numbers: integers, fractions, decimals, exponents, standard form, scientific notation - Translating sentences into algebraic expressions and vice versa - Solving problems written literally

Unit 2 **Coordinate Geometry and Simultaneous Equations** Ch: 8,19 December, January. February 8 weeks	Relationships	Representation Models	Scientific and technical innovation- the impact of scientific and technological advances on communities and environments	Patterns between variables and relationships can be represented visually	A i, ii, iii C i, ii, iii D i, ii, iii, iv	● Communication skills (Take effective notes in class; make inferences and draw conclusions relating equations of lines) ● Social-collaboration (work collaboratively in teams during group work) ● Self-management-organisation skills (bring necessary equipment and supplies: rulers) ● Thinking-critical thinking skills (use models and simulations to explore complex systems and issues: equations of lines, applying in real-life contexts)	**Topics:** - The Cartesian plane - The distance formula - The midpoint formula - Equations of lines - Simultaneous equations - Simultaneous inequalities (extended) Knowing and understanding: - Calculating the distance between two points - Calculating the midpoint of a segment - Finding the equation of a straight line - Solving systems of equations algebraically and graphically Communicating: - Using coordinate system to present and inspect information Applying mathematics in real-life contexts: - Using equations of lines in real-life situations
Unit 3 **Trigonometry and Transformation Geometry** Ch: 13,16 February, March 5 weeks	Form	Patterns Space	Orientation in space and time- the relationships between, and the interconnectedness of, individuals and civilizations, from personal, local and	Form in everyday life can be explored using geometry and trigonometry	A i, ii, iii C i, ii, iii D i, ii, iii, iv	● Communication skills (use and interpret a range of discipline-specific terms and symbols; trigonometric ratios, transformations) ● Social-collaboration (exercise leadership and take on a variety of roles within groups) ● Self-management-organisation skills (bring necessary equipment and supplies to class; calculators)	**Topics:** - Trigonometric ratios in right-angled triangles - Simple isometric transformations - Identical representation of transformations (extended) Knowing and understanding: - Using sine, cosine and tangent to relate angles and sides of right-angled triangles - Transforming figures by rotation, reflection, translation and enlarging

			global perspectives			● Reflection (identify strengths and weaknesses of personal learning strategies) ● Research-Information literacy (use memory techniques to develop long term memory; trigonometric ratios) ● Thinking-critical thinking skills (Identify obstacles and challenges) ● Thinking-research (make connections between subject groups and disciplines)	Communicating: - Using and interpreting trigonometric ratios - Making connections between different forms of a same object Applying mathematics in real-life contexts: - Solving real-life situations using trigonometry - Designing geometrical patterns
Unit 4 **Further Algebra and Quadratic Equation** Ch: 9,11,18 March, April, May 8 weeks	Logic	Generalization Simplification	Identities and relationships- identity; beliefs and values	Discovering mathematical identities and relationship leads to effective action	A i, ii, iii B i, ii, iii D i, ii, iii, v	● Communication skills (organize and depict information logically; give and receive meaningful feedback) ● Self-management-organisation skills (keep an organized and logical system of information files/notebooks) ● Self-management-reflection (develop new skills, techniques and strategies for effective learning) ● Affective skills (practice analysing and attributing causes for failure) ● Thinking-critical thinking skills (test generalizations and conclusions, propose and evaluate a variety of solutions; select appropriate solutions)	**Topics:** - Factorization of algebraic expressions - Further factorization (extended) - Algebraic fractions - Quadratic equations Knowing and understanding: - Solving quadratic equations by formula - Performing operations with algebraic fractions - Factoring algebraic expressions Investigating patterns: - Discovering relations between coefficients of quadratic equations and their solutions Applying mathematics in real-life contexts: - Applying quadratic equations in geometry, physics and other real-life contexts

| Unit 5 **Statistics** Ch: 10 May, June 4 weeks | Relationships | Patterns Quantity Models | Scientific and technical innovation- the impact of environments on human activity; how humans adapt environments to their needs | Statistics are a powerful model to develop global perspective | A i, ii, iii B i, ii, iii C i, ii, iii, v D i, ii, iii, v | ● Communication skills (use and interpret a range of discipline-specific terms and symbols)
 ● Self-management- organisation skills (use appropriate strategies for organizing complex information; Select and use technology effectively and productively)
 ● Research-Information literacy (collect and analyse data to identify solutions and/or make informed decisions)
 ● Thinking-critical thinking skills (revise understanding based on new information and evidence) | **Topics:**
 Knowing and understanding:
 - Collecting data, constructing and interpreting graphs, drawing the line of best fit
 - Calculating the mean, median and mode; choosing the best measure of central tendency
 - Calculating the standard deviation
 - Histograms for continuous fixed interval groups (extended)

 Investigating patterns:
 - Discovering Investigating how transformation of data influences measures of central tendency

 Communicating:
 - Presenting data using pie charts, histograms, line graphs, scatter plots, box-and whisker- plots
 - Discussing and interpreting data using mean, mode, median, quartile, percentile

 Applying mathematics in real-life contexts:
 - Analysing real-life situations statistically
 - Using a line of best fit to discover relationships between phenomena |

Unit title	Key concept	Related concepts	Global context	Statement inquiry	Objectives	ATL skills	Content
Unit 1 **Probability** September, October 6 weeks	Relations hips	Representation Quantity	Fairness and Development	Establishing relationships represented by quantities allows the exploration of access to equal opportunities.	A: i, ii, iii B: i, ii, iii C: i, ii, iii, iv, v D: iii, v	● Thinking -critical thinking skills (Consider ideas from multiple perspectives; Draw reasonable conclusions and generalizations) ● Thinking -creative thinking skills (-Make guesses, ask "what if" questions and generate testable hypotheses; Use brainstorming and visual diagrams to generate new ideas; Consider multiple alternatives, including those that might be unlikely or impossible) ● Communication skills (Organize and depict information logically; Read critically and for comprehension) ● Self-management - organization skills (Use appropriate strategies for organizing complex information)	<u>Topics:</u> - Experimental and theoretical probability - Sample space - Tree diagrams and Venn diagrams - Probabilities of independent, mutually exclusive and combined events - Probability of successive trials <u>Knowing and understanding:</u> - Describing experimental and theoretical probability - Finding probabilities of independent, mutually exclusive and combined events <u>Investigating patterns:</u> Discovering patterns in dice problems <u>Communicating:</u> Representing data to calculate probabilities using tree diagrams and Venn diagrams <u>Applying mathematics in real-life contexts:</u> Applying probability to make a fair decision
Unit 2	Form	Models Representation	Globalization and sustainability	Using a model to represent a form can give us a strategy in urban planning	A: i, ii, iii B: i, ii, iii	● Thinking -critical thinking skills (Evaluate evidence and arguments; Propose and evaluate a variety of solutions) ● Communication skills (Find information for disciplinary	<u>Topics:</u> - Relations and functions - Quadratic, cubic and rational functions, - Maximum/minimum of functions - Non-linear inequalities

| Number plane graphs | | | | | C: i, ii, iii, iv, v

D: i, ii, iii, iv, v | inquiries, using a variety of media, Structure information in summaries, essays and reports)
● Self-management - organization skills (Select and use technology effectively and productively)
●Research (Seek a range of perspectives from multiple and varied sources) | - Arithmetic and geometric sequences (extended)
Knowing and understanding:
- Graphing quadratic function by transformations, by vertex and intercepts
- Using different forms of quadratic function (standard, vertex and intercepts form)
- Finding equations of functions given graphically
- Determining and interpreting maximum or minimum of the quadratic function
- Graphing cubic and rational function by transformations
- Solving non-linear inequalities
Investigating patterns:
- Investigating relationships between form of the formulas and their graphs (general form, x-intercepts form, vertex form)
Communicating:
- Representing functions using tables, graphs and formulas and move between different forms of representations
- Explaining and justifying whether an arch is a parabola or not
-Using notation and formulae for arithmetic and geometric sequences
Applying mathematics in real-life contexts:
- Applying quadratic function in modelling real-life phenomena
- Justifying interpreting maximum/minimum |
| October, November, December

9 weeks | | | | | | | |

							Topics:
Unit 3 **Geometry and Trigonometry** January February March 8 weeks	Systems	Change Models	Scientific and technical innovation	Understanding form and shape help us to create new and efficient products	A: i, ii, iii C: i, ii, iv, v D: i, ii, iii, iv, v	● Thinking- transfer skills (Transfer current knowledge to learning of new technologies ● Thinking-critical thinking skill (Use models and simulations to explore complex systems and issues; ● Research skills (Understand and use technology systems.) ● Self-management - Organization skills (Bring necessary equipment and supplies to class; Select and use technology effectively and productively)	- Surface area and volume of a 3D object - Sine and cosine rules Knowing and understanding: - Determining surface area and volume of a 3D object - Solving triangles using sine and cosine rule - Solving some 3-dimensional problems using geometry and trigonometry Communicating: - Representing a solid by its net and reversely - Interpreting real-life data using sine and cosine rule - Using mathematical language to Interpret trigonometric problems Applying mathematics in real-life contexts: - Creating a new object using 3D geometry - Applying sine and cosine rule in geometry - Solving authentic real-life situations using sine and cosine rule
Unit 4 **INTERDISCIPLINARY UNIT**	Relationships Communities	Patterns, Generalization	Orientation in space and time Exploration: The ways in which natural and human landscapes	Relationships between various communities are based on predictable patterns what helps us to understand	C: i, ii, iv, v D: i, ii, iii, iv, v Interdisciplinary: A, B, C, D	● Communication skills - Communication - for students to communicate complete, coherent and concise mathematical lines of reasoning; (mathematics objective C.iv) they will need to use and interpret a range of disciplines-specific terms and symbols; ● Social skills – Collaboration - for students to support	**Topics:** - constructing and interpreting frequency and relative frequency histogram with equal class width - Influence of changing the class intervals on changing the shape of distribution -using median, mode, standard deviation and the mean, range and interquartile range

1 m² of our community			could be understood	interactions in natural and human landscapes		each other in organizing data and using spreadsheets for summative assessment task they will need to help others to succeed; ● Self-management skills – Reflection for students to evaluate the benefits and limitations of disciplinary and interdisciplinary knowledge and ways of knowing in predicting patterns or finding relationships (interdisciplinary objective D ii), they will need to consider the process of learning ● Research skills - Information literacy - for students to evaluate the interdisciplinary perspectives (interdisciplinary objective A.ii), they will need to collect and analyse data to identify solutions and make informed decisions ● Thinking skills -Critical thinking - for students to analyse disciplinary knowledge (biology objective C.v.) they will need to evaluate evidence and arguments; - Transfer skills – for students to analyse disciplinary knowledge (interdisciplinary objective A.i.) they need to combine knowledge, understanding and skills to create a product or solutions.	- making inferences about data, given mean and standard deviation - using chi-squared test - understanding the difference between a population and a sample - Using mathematical language for interpreting data and biology facts - Selecting and using technology effectively for graphical representation of data and statistical calculations - describing distribution patterns - making inferences about a relationship in the whole population by using data from sample of the population - applying chi-squared test formulas on analysing communities - quantities which represent different types of data distributions
April							
May							
7 weeks							

| Unit 5 **Exponential function** May June 7 weeks | Relations hips | Systems Change | Globalization and sustainability: How world is connected as whole | Discovering relationships can lead to understanding how systems are changing | A: i, ii, iii B: i, ii, iii C: i, ii, iv, v D: i, ii, iii, iv, v | ● Self-management - Organization skills (Use appropriate strategies for organizing complex information; Practice dealing with change) ● Thinking-Transfer skills (Apply skills and knowledge in unfamiliar situations; Compare conceptual understanding across multiple subject groups and disciplines; Make connections between subject groups and disciplines) ● Communication skills (Make inferences and draw conclusions; Use and interpret a range of discipline-specific terms and symbols) | **Topics:** Exponential functions, its graph and properties Logarithms (extended) <u>Knowing and understanding:</u> -Solving exponential equations and inequalities -Solving logarithmic equations (extended) -Evaluating the logarithm of a number (extended) -Applying laws of logarithms (extended) <u>Investigating patterns:</u> Discovering properties of exponential function Discovering laws of logarithms (extended) <u>Communicating:</u> - Present exponential functions graphically -Present logarithmic functions graphically (extended) - Using asymptotes to advocate a nature of a function <u>Applying mathematics in real-life contexts:</u> -Applying exponential functions in-real life problems -Applying logarithmic functions in-real life problems (extended) |