MYP 4 Course overview 2021/2022 MATHEMATICS

Unit title	Key concept	Related concepts	Global context	Statement inquiry	Objectives	ATL skills	Content
Unit 1 **Numbers and Algebra** Ch: 1,2,3 September, October, November 12 weeks	Relationships	Simplification Equivalence Model 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 Knowing and understanding: - 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 Investigating patterns: - Discovering last digit of numbers written as product - Determining the general rule that represents numerical patterns Communicating: - 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: 6,17 (A&B) December, January. February 8 weeks	Relationships	Representation Model	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)	**<u>Topics:</u>** - The Cartesian plane - The distance formula - The midpoint formula - Equations of lines - Simultaneous equations <u>Knowing and understanding:</u> - Solving systems of equations algebraically and graphically - Expanding, simplifying and factoring algebraic expressions - Using the laws of exponents <u>Communicating:</u> - Using coordinate system to present and inspect information <u>Applying mathematics in real-life contexts:</u> - Using equations of lines in real-life situations
Unit 3 **Trigonometry and Transformation Geometry** Ch: 12,15 February, March 5 weeks	Form	Pattern	Orientation in space and time- the relationships between, and the interconnectedness of, individuals and civilizations, from personal, local and global perspectives	Observing positions, angles and measurements in patterns could help us understand forms	A i, ii, iii C i, ii, iii D ii, iii, iv	● Thinking: Transfer skills (Combine knowledge, understanding and skills to create products or solutions ● Communication skills (use and interpret a range of discipline-specific terms and symbols; trigonometric ratios, transformations) ● Self-management-organisation skills (bring necessary equipment and supplies to class; calculators) ● Research-Information literacy (use memory techniques to develop long term memory; trigonometric ratios)	**<u>Topics:</u>** - Trigonometric ratios in right-angled triangles - Simple isometric transformations <u>Knowing and understanding:</u> - Using sine, cosine and tangent to relate angles and sides of right-angled triangles - Transforming figures by rotation, reflection, translation and enlarging <u>Communicating:</u> - Using and interpreting trigonometric ratios - Making connections between different forms of a same object

						● Research skills: Use a variety of technologies and media platforms, including social media and online networks, to source information (Explicit implementation when learning and writing about tessellations)	<u>Applying mathematics in real-life contexts:</u> - Solving real-life situations by observing positions, angles and measurements - Designing geometric patterns by observing and aplaying patterns
Unit 4 **Further Algebra and Quadratic Equation** Ch: 13,16,21 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)	**<u>Topics:</u>** - Factorization of algebraic expressions - Algebraic fractions - Quadratic equations <u>Knowing and understanding:</u> - Solving quadratic equations by formula - Performing operations with algebraic fractions - Factoring algebraic expressions <u>Investigating patterns:</u> - Discovering relations between coefficients of quadratic equations and their solutions <u>Applying mathematics in real-life contexts:</u> - Applying quadratic equations in geometry, physics and other real-life contexts

Unit 5 **Statistics** Ch: 9 May, June 4 weeks	Relationships	Pattern Quantity Model	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:** <u>Knowing and understanding:</u> - 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 <u>Investigating patterns:</u> - Discovering Investigating how transformation of data influences measures of central tendency <u>Communicating:</u> - Presenting data using pie charts, histograms, line graphs, scatter plots, box-and whisker-plots - Discussing and interpreting data using mean, mode, median, quartile, percentile <u>Applying mathematics in real-life contexts:</u> - Analysing real-life situations statistically - Using a line of best fit to discover relationships between phenomena

MYP 5 Course overview 2021/2022 MATHEMATICS

Unit title	Key concept	Related concepts	Global context	Statement inquiry	Objectives	ATL skills	Content
Unit 1 **Probability** September, October 6 weeks	Relationships	Representation Quantity	Fairness and Development: access to equal opportunities	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)	**Topics:** -Experimental and theoretical probability -Sample space -Tree diagrams and Venn diagrams -Probabilities of independent, mutually exclusive and combined events -Probability of successive trials Knowing and understanding: -Describing experimental and theoretical probability -Finding probabilities of independent, mutually exclusive and combined events Investigating patterns: Discovering patterns in dice problems Communicating: Representing data to calculate probabilities using tree diagrams and Venn diagrams Applying mathematics in real-life contexts: Applying probability to make a fair decision
Unit 2	Form	Model 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	**Topics:** - Quadratic, cubic and rational functions, -Maximum/minimum of functions -Non-linear inequalities Knowing and understanding:

Number plane graphs October, November, December 9 weeks					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)	-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 <u>Investigating patterns:</u> Investigating relationships between form of the formulas and their graphs (general form, x-intercepts form, vertex form) <u>Communicating:</u> -Representing functions using tables, graphs and formulas and move between different forms of representations -Completely and coherently explaining and justifying whether an arch is a parabola or not <u>Applying mathematics in real-life contexts:</u> - Applying quadratic function in modelling real-life objects and real-life phenomena - Justifying interpreting maximum/minimum
Unit 3	Logic	Justificati on	Identities and relationships: The nature of	Logic can help us justify our choices	A: i, ii, iii	● Thinking-critical thinking skills (Gather and organize relevant information to formulate an argument; Interpret data; Revise understanding based on	**<u>Topics:</u>** Data analysis using measures of central tendency and dispersion <u>Knowing and understanding:</u>

Statistics January, February 5 weeks		Representation	the self and relationship to others		C: i, ii, iii, iv, v D: i, ii, iii, iv, v	new information and evidence) ● Research-Information skills (Collect and analyse data to identify solutions and make informed decisions; Understand and use technology systems)	Finding mean, median and mode, range and IQR for discrete and continuous data <u>Investigating patterns:</u> Investigating how transformation of data influences measures of dispersion <u>Communicating:</u> - Organizing statistical data using a logical structure and presenting it differently -Using standard deviation in data analysis <u>Applying mathematics in real-life contexts:</u> Analysing real life situations statistically in order to make a decision

Unit 4 **Geometry and/or Trigonometry** March April 8 weeks	Systems	Change Models	Scientific and technical innovation	Understanding systems help us to change characteristic patterns or to improve existing models thus achieving scientific and technical innovations	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)	**Topics:** -Surface area and volume of a 3D object - Sine and cosine theorems Knowing and understanding: -Determining surface area and volume of a 3D object -Using unit circle to define sine and cosine of a real number and calculating their values -Drawing sine and cosine function graphs Communicating: - Representing a solid by its net and reversely - Interpreting real-life data using trigonometry - Using degrees and radians to express sizes of angles respecting their advantages - Using mathematical language to Interpret physics phenomena - Present sine and cosine functions graphically - Interpret amplitude and period of sine/cosine function Applying mathematics in real-life contexts: - Creating a new object using 3D geometry - Applying sinusoidal functions in physics - sound waves - Solving authentic real-life situations using trigonometry

Unit 5 **INTERDISCIPLINARY UNIT** Math and Biology **1 m² of our community** May June 7 weeks	Relationships Communities	Patterns, Interaction	**Orientation in space and time** Exploration: The ways in which natural and human landscapes could be understood	Relationships between various communities are based on predictable patterns what helps us to understand interactions in natural and human landscapes.	Math criteria: 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 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	**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 • 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

						(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 product or solutions.	

DIFFERENTIATION

For students with

dyslexia and dysgraphia

- Bigger font in Sarif, bigger space between rows
- Dividing text in tests, practise sheets and instruction papers in smaller sections
- More time for reading, checking if the text/questions are understood
- Tolerating writing mistakes
- Questions and enough space for answers should be on the same page
- Allowing longer time for finishing a task if needed
- Working in a pair or a team with pears

ADHD

- Bigger font and space between rows
- Shorter paragraphs
- Check which type of graphs/diagrams are suitable for the student
- Fewer questions in tests
- Frequent checking if a student is concentrated on the work
- Instead of complex questions with a, b, c..., create separate questions
- Questions and enough space for answers should be on the same page
- Work in pairs or small teams (up to four)
- Creating summary sheets if needed
- Encourage students to participate in class discussions
- Commend student on progress
- Regularly make notes about progress in e-dnevnik
- Allowing the student to leave the classroom for a short time during the lesson if needed

Hearing disability

- Face the student during a lesson as often as possible
- Check understanding of the content
- Check the notes in student's notebook
- Providing summaries for a unit or parts of it if needed
- Pay attention that the student is not disturbed by a variety of sounds (other students, films, outside noise...)
- Work in pairs and small groups

Hodgkins disesase

- Prolonging deadlines if needed
- Providing summaries if needed