Subject Group Overview

Mathematics (MYP 1)

Unit Title	Key Concepts	Related Concepts	Global Context & Explorations	Statement of Inquiry	Objectives	Approaches to Learning	Content
MYP1 Maths UNIT 1: Set Theory 2020 2021	Logic	Representation, Model	Identities and relationships Identity formation	The representation of the surrounding world with the use of a symbolic Language through the concept of set can sharpen the perception about ourselves and Others and identities.	**A: Knowing and understanding** i. select appropriate mathematics when solving problems in both familiar and unfamiliar situations ii. apply the selected mathematics successfully when solving problems iii. solve problems correctly in a variety of contexts **C: Communicating** i. use appropriate mathematical language (notation, symbols and terminology) in both oral and written statements **D: Applying mathematics in real-life contexts** i. identify relevant elements of authentic real-life situations ii. select appropriate mathematical strategies when solving authentic real-life situations iii. apply the selected mathematical strategies successfully to reach a solution iv. explain the degree of accuracy of a solution v. describe whether a solution makes sense in the context of the authentic real-life situation	Description **Learning Experiences:** **Thinking:** Transferring information between subjects, and learning how to use mathematical language to describe different contexts. **Thinking** • X. Transfer skills • Utilizing skills and knowledge in multiple contexts • Inquire in different contexts to gain a different perspective • Make connections between subject groups and disciplines	Sets and Their Elements; Subsets; The Intesection of Sets; The Union of Sets; Venn Diagrams Real-life situation represent by Setas and their relationship

Unit Title	Key Concepts	Related Concepts	Global Context & Explorations	Statement of Inquiry	Objectives	Approaches to Learning	Content
MYP1 Maths UNIT2: Number Systems and Rules in Mathematics- 2020/2021	Relationships	Quantity, Equivalence **Other**: Operation	Personal and cultural expression Languages and linguistic systems	Rules build a language used to establish relationships among quantities that are calculated and obtained in equivalent ways.	**A: Knowing and understanding** i. select appropriate mathematics when solving problems in both familiar and unfamiliar situations ii. apply the selected mathematics successfully when solving problems iii. solve problems correctly in a variety of contexts **B: Investigating patterns** i. apply mathematical problem-solving techniques to recognize patterns ii. describe patterns as relationships or general rules consistent with correct findings iii. verify whether the pattern works for other examples **C: Communicating** i. use appropriate mathematical language (notation, symbols and terminology) in both oral and written statements ii. use different forms of mathematical representation to present information iii. communicate coherent mathematical lines of reasoning iv. organize information using a logical structure	Description **Learning Experiences:** **Communication:** The students are introduced to other Number System, and challenged to operate with numbers written in a different way. We will then discuss the benefits of our Decimal System. Students are asked to not use the "X" for the multiplication, and we have to standardize some symbols and way of writing mathematics. Different calculation methods are encouraged, e.g. the American versus European way of performing long division. Feedback is given in the form of comments on homework and tests. Understand and use mathematical notation in both the two languages of instruction. Students have formative oral tasks in which their ability to translate from one language to the	History of Number Systems The set of natural numbers Significance and properties of the sum, subtraction, multiplication and division (with remainder). Example of applications of properties in order to perform mind calculations. Formulae and identities: how do we write rules in mathematics? How do we describe them? Difference between an instance of a general rule (an example), its symbolic formula, and its general description in words. The order of operations and its importance. The definition of power with non-negative integer base and exponent. Properties (laws) or powers (indices). Example of properties that do NOT hold for

other is tested.

Students are asked to summarize what learned throughout the unit in a one-page summary (mind map or diagram with basic information). Also, we encourage students to take particular care in the organization and presentation of solutions of long problems, such expressions with many terms or "word problems". Comments on their work is provided by teacher(s).

Take effective notes in class is an ATL skill that we consider essential for mathematics. Normally notebooks are checked at least twice in a year. During online lessons it is not always required that they takes notes, but they have to show their active participation, and will have to organize the material produced by the teacher(s).

Communication
- I. Communication skills
- Reading, writing and using language to gather and communicate

some operations and how to prove they don't apply.

information
- Understand and use mathematical notation

Self-management
- III. Organization skills
- Managing time and tasks effectively
- Keep an organized and logical system of information files/ notebooks

Unit Title	Key Concepts	Related Concepts	Global Context & Explorations	Statement of Inquiry	Objectives	Approaches to Learning	Content
MYP1 Maths UNIT3: Tutti d'un pezzo! (or maybe not)- 2020/2021	Form	Pattern, Representation	Scientific and technical innovation Principles and discoveries	The discovery that Numbers are organized following specific Patterns, that do not depend on the Form we decide to use to represent them, will lead to better define the power of numbers.	**A: Knowing and understanding** i. select appropriate mathematics when solving problems in both familiar and unfamiliar situations ii. apply the selected mathematics successfully when solving problems iii. solve problems correctly in a variety of contexts **C: Communicating** i. use appropriate mathematical language (notation, symbols and terminology) in both oral and written statements iii. communicate coherent mathematical lines of reasoning iv. organize information using a logical structure	Description **Learning Experiences:** **Thinking:** Students will be asked to investigate Number Properties based on graphical representation. **Thinking** - VIII. Critical thinking skills - Analysing and evaluating issues and ideas - Draw reasonable conclusions and generalizations - Test generalizations and conclusions	Divisibility Tests Factors, Prime Factors Prime and Composite Numbers Multiples of natural numbers Highest common factor (HCF) Lowest common multiple (lcm)

Unit Title	Key Concepts	Related Concepts	Global Context & Explorations	Statement of Inquiry	Objectives	Approaches to Learning	Content
MYP1 Maths UNIT4: Be Rational! - 2020/2021	Relationships	Equivalence, Quantity	Scientific and technical innovation	The same Quantity might be represented in	**A: Knowing and understanding** i. select appropriate	Description **Thinking**	Fractions; Fractions as Divisions; Fractions of Quantities;

					Objectives	Approaches to Learning	Content
		Principles and discoveries	different (but Equivalent!) ways, these principles can leads to a better understanding of the relationship between different Areas of Mathematics.		mathematics when solving problems in both familiar and unfamiliar situations ii. apply the selected mathematics successfully when solving problems iii. solve problems correctly in a variety of contexts **D: Applying mathematics in real-life contexts** i. identify relevant elements of authentic real-life situations ii. select appropriate mathematical strategies when solving authentic real-life situations iii. apply the selected mathematical strategies successfully to reach a solution iv. explain the degree of accuracy of a solution v. describe whether a solution makes sense in the context of the authentic real-life situation	• VIII. Critical thinking skills • Analysing and evaluating issues and ideas • Practise observing carefully in order to recognise problems • Recognise unstated assumptions and bias	Fractions on a Number Line; Equal Fractions; Comparing Fractions; Adding and Subtracting Fractions; Multiplying and Dividing Fractions. Converting Between Decimals and Fractions.

Unit Title	Key Concepts	Related Concepts	Global Context & Explorations	Statement of Inquiry	Objectives	Approaches to Learning	Content
MYP1 Maths UNIT 5: Paper and Pencil - 2020-2021	Form	Representation, Space	Orientation in space and time Scale	Geometry is the study of Forms Represented in Space and establishes Orientation in Space.	**A: Knowing and understanding** i. select appropriate mathematics when solving problems in both familiar and unfamiliar situations ii. apply the selected mathematics successfully when solving problems	Description **Thinking** • VIII. Critical thinking skills • Analysing and evaluating issues and ideas • Practise observing carefully in order to recognise problems	Points and Lines; Angles (Angles at a Point or on a Line); Measuring and classify Angles Property of Angles Vertically Opposite Angles; Bisecting Angles; Parallel and perpendicular lines

					iii. solve problems correctly in a variety of contexts **B: Investigating patterns** i. apply mathematical problem-solving techniques to recognize patterns ii. describe patterns as relationships or general rules consistent with correct findings iii. verify whether the pattern works for other examples	• Interpret data	Polygons; Triangles; Classify Triangles Angles of Triangles

Unit Title	Key Concepts	Related Concepts	Global Context & Explorations	Statement of Inquiry	Objectives	Approaches to Learning	Content
MYP1 Maths UNIT 6: Statistics -2020/2021	Relationships	Validity, Representation	Orientation in space and time Frequency and variability	Graphs and Data are a way to Represent and identify Relationships, Frequency and Validity of elements in the world.	**A: Knowing and understanding** i. select appropriate mathematics when solving problems in both familiar and unfamiliar situations ii. apply the selected mathematics successfully when solving problems iii. solve problems correctly in a variety of contexts **D: Applying mathematics in real-life contexts** i. identify relevant elements of authentic real-life situations ii. select appropriate mathematical strategies when solving authentic real-life situations iii. apply the selected mathematical strategies successfully to reach a	Description **Research** • VI. Information literacy skills • Finding, interpreting, judging and creating information • Process data and report results	The number plane Cartesian plane and quadrants x and y Coordinate of a point Graph of point and vertical and horizontal line in the Cartesian plane Samples and Populations Categorical Data Graphs of Categorical Data Numerical Data Mean or Average Mode and Median

solution
iv. explain the degree of accuracy of a solution
v. describe whether a solution makes sense in the context of the authentic real-life situation

Mathematics (MYP 2)

Unit Title	Key Concepts	Related Concepts	Global Context & Explorations	Statement of Inquiry	Objectives	Approaches to Learning	Content
MYP2 Maths UNIT 1: Be Rational-2020/2021	Relationships	Representation, Equivalence	Scientific and technical innovation Principles and discoveries	The discovery of different but equivalent representations of rational number can leads to a better understanding of relationship between different Areas of Mathematics.	**A: Knowing and understanding** i. select appropriate mathematics when solving problems in both familiar and unfamiliar situations ii. apply the selected mathematics successfully when solving problems iii. solve problems correctly in a variety of contexts **B: Investigating patterns** i. select and apply mathematical problem-solving techniques to discover complex patterns ii. describe patterns as relationships and/or general rules consistent with findings iii. verify and justify relationships and/or general rules **C: Communicating** i. use appropriate mathematical language (notation, symbols and terminology) in both oral	Description **Learning Experiences:** **Communication:** Learning how to take effective notes (Two columns note) will be introduced in three steps: 1. Produce a two columns note about Fraction, Decimal Numbers and Percentage Lessons 2. Compare notes with the classmates and receive feedback from the teacher 3. Read chapter on proportions, produce a two columns note and receive formative feedback **Research:** Research of data	- Fractions and place value (review) - Converting between decimals and fractions - Rounding decimal numbers - Placing decimal numbers on a number line - Comparing decimal numbers - Adding and Subtracting decimal numbers - Multiplying and dividing by powers of 10 - Multiplying and dividing decimal numbers - Understanding percentages - One quantity as a percentage of another

and written explanations
ii. use appropriate forms of mathematical representation to present information
iii. move between different forms of mathematical representation
iv. communicate complete and coherent mathematical lines of reasoning
v. organize information using a logical structure

D: Applying mathematics in real-life contexts
i. identify relevant elements of authentic real-life situations
ii. select appropriate mathematical strategies when solving authentic real-life situations
iii. apply the selected mathematical strategies successfully to reach a solution
iv. explain the degree of accuracy of a solution
v. explain whether a solution makes sense in the context of the authentic real-life situation

regarding the distribution of resources on Earth.

Construction of a document (poster) synthesizing collected information and showing the use of different forms of representation.

Communication
- I. Communication skills
- Reading, writing and using language to gather and communicate information
- Take effective notes in class

Research
- VI. Information literacy skills
- Finding, interpreting, judging and creating information
- Collect, record and verify data

- Finding a percentage of a quantity

- Percentage increase or decrease

- Relationship between percentages, fractions and decimal numbers

- Graphical representation of percentages

- Real-life applications of percentages (statistics)

- Interchanging number form

- Ratio and Proportion.

- property of Proportions, proportion calculation, use of property of proportions to solve numerical problems

- Direct and Inverse proportional quantities.

Unit Title	Key Concepts	Related Concepts	Global Context & Explorations	Statement of Inquiry	Objectives	Approaches to Learning	Content
MYP2 UNIT A: Mathematics: Statistics	Relationships	Model, Representation	Identities and relationships Lifestyle choices	Communities can be represented through mathematical modelling able to describe their lifestyle.	**C: Communicating** i. use appropriate mathematical language (notation, symbols and terminology) in both oral and written	Description	Numerical Data Mean or Average Mode and Median

explanations
ii. use appropriate forms of mathematical representation to present information
iii. move between different forms of mathematical representation
iv. communicate complete and coherent mathematical lines of reasoning
v. organize information using a logical structure

Learning Experiences:

Research:

Students will practice on collect data and analyse them.

Calculate the mean, mode and median and represent them with various type of graphs and models.

Research
- VI. Information literacy skills
- Finding, interpreting, judging and creating information
- Process data and report results

Frequency Tables and Diagram

Data Collection

Dependent and Independent Variables

Unit Title	Key Concepts	Related Concepts	Global Context & Explorations	Statement of Inquiry	Objectives	Approaches to Learning	Content
MYP2 Maths UNIT B: Pythagoras's Scribbles	Logic	Space, Equivalence	Orientation in space and time Natural and human landscapes and resources	Pythagoras's theorem is the proof that logical reasoning can give us higher understanding of measurement of the Natural space around us.	**A: Knowing and understanding** i. select appropriate mathematics when solving problems in both familiar and unfamiliar situations ii. apply the selected mathematics successfully when solving problems iii. solve problems correctly in a variety of contexts **B: Investigating patterns** i. select and apply mathematical problem-solving techniques to discover complex patterns	**Thinking** - X. Transfer skills - Utilizing skills and knowledge in multiple contexts - Combine knowledge, understanding and skills to create products or solutions	POLYGONS: - Quadrilaterals - Angles of a quadrilateral - Areas of polygons - Areas of composite figures PYTHAGORAS'S THEOREM: - Pythagoras Theorem - Euclid's Theorems

					ii. describe patterns as relationships and/or general rules consistent with findings iii. verify and justify relationships and/or general rules		
Unit Title	**Key Concepts**	**Related Concepts**	**Global Context & Explorations**	**Statement of Inquiry**	**Objectives**	**Approaches to Learning**	**Content**
MYP2 Maths UNIT 2: Integer, Power and Roots!- 2020/2021	Form	Representation, Quantity	Orientation in space and time Natural and human landscapes and resources	Being able to represent different forms of quantities has helped humans explore and describe natural and human landscape and resources.	**A: Knowing and understanding** i. select appropriate mathematics when solving problems in both familiar and unfamiliar situations ii. apply the selected mathematics successfully when solving problems iii. solve problems correctly in a variety of contexts **D: Applying mathematics in real-life contexts** i. identify relevant elements of authentic real-life situations ii. select appropriate mathematical strategies when solving authentic real-life situations iii. apply the selected mathematical strategies successfully to reach a solution iv. explain the degree of accuracy of a solution v. explain whether a solution makes sense in the context of the authentic real-life situation	Description **Communication** • I. Communication skills • Reading, writing and using language to gather and communicate information • Use and interpret a range of discipline-specific terms and symbols **Thinking**	POSITIVE AND NEGATIVE NUMBERS: Integer - Opposites - Adding and subtracting negatives - Multiplying and dividing negatives - Combined operations POWERS AND ROOTS: - Powers, Logaritms and Roots - How to find the square root of a number by hand - Roots as fractional powers - Properties of roots - Operation with roots - Negative powers

			Explorations			**Learning**	
MYP2 Maths UNIT 3: Mathematical language and representation- 2020/2021	Form	Equivalence, Simplification	Scientific and technical innovation Mathematical puzzles	Producing equivalent forms through simplification can help to explain and solve puzzles	**A: Knowing and understanding** i. select appropriate mathematics when solving problems in both familiar and unfamiliar situations ii. apply the selected mathematics successfully when solving problems iii. solve problems correctly in a variety of contexts **C: Communicating** i. use appropriate mathematical language (notation, symbols and terminology) in both oral and written explanations ii. use appropriate forms of mathematical representation to present information iii. move between different forms of mathematical representation iv. communicate complete and coherent mathematical lines of reasoning v. organize information using a logical structure	**Communication** • I. Communication skills • Reading, writing and using language to gather and communicate information • Make inferences and draw conclusions	Elements of Algebraic language Patterns and Models in Algebra Letters to represent variables, parameters and/or unknown objects.

Mathematics (MYP 3)

Unit Title	Key Concepts	Related Concepts	Global Context & Explorations	Statement of Inquiry	Objectives	Approaches to Learning	Content
MYP 3. Unit 1: Arithmetic	Form	Change, Quantity	Scientific and technical innovation Systems	Values of quantities can be changed from one form to another, allowing one to describe systems in more	**A: Knowing and understanding** i. select appropriate mathematics when solving problems in	Description	sets of numbers operations with fractions and BEDMAS properties of powers and roots

convenient and intuitive ways.

both familiar and unfamiliar situations
ii. apply the selected mathematics successfully when solving problems
iii. solve problems correctly in a variety of contexts

D: Applying mathematics in real-life contexts
i. identify relevant elements of authentic real-life situations
ii. select appropriate mathematical strategies when solving authentic real-life situations
iii. apply the selected mathematical strategies successfully to reach a solution
iv. explain the degree of accuracy of a solution
v. explain whether a solution makes sense in the context of the authentic real-life situation

Learning Experiences:

Communication:

In order for students to *apply the selected mathematical strategies successfully to reach a solution* they must *take effective notes in class.*

Self-management:

In order for students to *apply the selected mathematical strategies successfully to reach a solution,* they will *consider content: what did I learn about today? What don't I yet understand? What questions do I have now?*

Thinking:

In order for students to *identify relevant elements of authentic real-life situations* they must *inquire in different contexts to gain a different perspective.*

Communication
- I. Communication skills
- Reading, writing and using language to gather and communicate information
- Take effective notes in class

scientific notation and metric multipliers

Subject Group Overview

Unit Title	Key Concepts	Related Concepts	Global Context & Explorations	Statement of Inquiry	Objectives	Approaches to Learning	Content
MYP3 - Unit a -2D Geometry: circles	Form	Representation	Scientific and technical innovation Principles and discoveries	The form of a circle is represented as poligon with an infinite number of sides and pi has been invented to represent the measure of a circunference based on its diameter. Irrationality of pi: it's not a fraction! better to approximate or calculate exactly, using calculators?	**B: Investigating patterns** i. select and apply mathematical problem-solving techniques to discover complex patterns ii. describe patterns as relationships and/or general rules consistent with findings iii. verify and justify relationships and/or general rules **D: Applying mathematics in real-life contexts** i. identify relevant elements of authentic real-life situations ii. select appropriate mathematical strategies when solving authentic real-life situations iii. apply the selected mathematical strategies successfully to reach a solution iv. explain the degree of accuracy of a solution v. explain whether a solution makes sense in the context of the authentic real-life situation	Description **Learning Experiences:** **Communication:** In order fro students to *apply the selected mathematical strategies successfully to reach a solution* they must *make effective summary notes for studying* **Communication** • I. Communication skills • Reading, writing and using language to gather and communicate information • Take effective notes in class	definition of radius lenght of a circumnference pi area of a circle arc lenght area of a sector

Unit Title	Key Concepts	Related Concepts	Global Context & Explorations	Statement of Inquiry	Objectives	Approaches to Learning	Content
MYP3. Unit 2: Algebra, equations and functions	Relationships	Generalization, Model	Orientation in space and time Evolution	Models frame specific problems into the general broad picture, thus allowing one to understand relationships and	**A: Knowing and understanding** i. select appropriate mathematics when solving problems in both familiar and	Description	monomials and polynomials linear equations systems of linear equations and pure quadratic equations

predict the evolution of systems.

unfamiliar situations
ii. apply the selected mathematics successfully when solving problems
iii. solve problems correctly in a variety of contexts

B: Investigating patterns
i. select and apply mathematical problem-solving techniques to discover complex patterns
ii. describe patterns as relationships and/or general rules consistent with findings
iii. verify and justify relationships and/or general rules

C: Communicating
i. use appropriate mathematical language (notation, symbols and terminology) in both oral and written explanations
ii. use appropriate forms of mathematical representation to present information
iii. move between different forms of mathematical representation
iv. communicate complete and coherent mathematical lines of reasoning
v. organize information using a logical structure

D: Applying mathematics in real-

functions

Learning Experiences:

Communication:
Students must show that they understand the logicl steps they make when solving an equation, by explicitely writing down next to each step a brief description of what they are doing. This is new or challenging to most of the students in the class.

Self-management:
In order for students to *solve problems correctly in a variety of situations* they must *consider content: what did I learn about toady? What don't I yet understand? What questions do I have now?*

Thinking:
In order for students to *apply the selected mathematical strategy successfully to reach a solution* they must *interpret data*

Self-management
- V. Reflection skills
- (Re-)considering the process of learning; choosing and using ATL skills
- Consider content

life contexts
i. identify relevant elements of authentic real-life situations
ii. select appropriate mathematical strategies when solving authentic real-life situations
iii. apply the selected mathematical strategies successfully to reach a solution
iv. explain the degree of accuracy of a solution
v. explain whether a solution makes sense in the context of the authentic real-life situation

- What did I learn about today?
- What don't I yet understand?
- What questions do I have now?

Thinking
- VIII. Critical thinking skills
- Analysing and evaluating issues and ideas
- Interpret data

Unit Title	Key Concepts	Related Concepts	Global Context & Explorations	Statement of Inquiry	Objectives	Approaches to Learning	Content
Myp3 unit b: coordinates	Relationships	Model, Representation	Orientation in space and time Natural and human landscapes and resources	Relationship between values and exact positions of points allows to represent in a graph geometrical shapes and to communicate positions in order to be oriented in space and represent natural and human landscape	**A: Knowing and understanding** i. select appropriate mathematics when solving problems in both familiar and unfamiliar situations ii. apply the selected mathematics successfully when solving problems iii. solve problems correctly in a variety of contexts **D: Applying mathematics in real-life contexts** i. identify relevant elements of authentic real-life situations ii. select appropriate mathematical strategies when solving authentic real-life situations	**Self-management** III. Organization skills - Managing time and tasks effectively - Select and use technology effectively and productively	Cartesian coordinates Distance Between Two Points Formulae for the areas of triangles and quadrilaterals. Midpoint of a segment Equation of a Straight Line

iii. apply the selected mathematical strategies successfully to reach a solution
iv. explain the degree of accuracy of a solution
v. explain whether a solution makes sense in the context of the authentic real-life situation

Unit Title	Key Concepts	Related Concepts	Global Context & Explorations	Statement of Inquiry	Objectives	Approaches to Learning	Content
Myp3 Unit c: solid shapes	Relationships	Generalization	Scientific and technical innovation	Generalizing relationships between measurement can help analyze and generate products, process and solutions	**A: Knowing and understanding** i. select appropriate mathematics when solving problems in both familiar and unfamiliar situations ii. apply the selected mathematics successfully when solving problems iii. solve problems correctly in a variety of contexts **C: Communicating** i. use appropriate mathematical language (notation, symbols and terminology) in both oral and written explanations ii. use appropriate forms of mathematical representation to present information iii. move between different forms of mathematical representation iv. communicate complete and coherent mathematical lines of	Description **Learning Experiences:** **Communication:** the students will learn how to create effective notes in order to learn geometry formulae. **Communication** • I. Communication skills • Exchanging thoughts, messages and information effectively through interaction • Give and receive meaningful feedback • Reading, writing and using language to gather and communicate information • Make effective summary notes for studying	Three-dimensional shapes, surface area and volume: Cube Rectangular Solids or Cuboids Prism Pyramid Cylinder Cone Sphere Composite shapes

Unit Title	Key Concepts	Related Concepts	Global Context & Explorations	Statement of Inquiry	Objectives	Approaches to Learning	Content
					reasoning v. organize information using a logical structure		
MYP 3. Unit 3: Probability	Logic	Pattern, Model	Globalization and sustainability Data-driven decision-making	The analysis of patterns in data can drive decision making towards logical solutions.	**B: Investigating patterns** i. select and apply mathematical problem-solving techniques to discover complex patterns ii. describe patterns as relationships and/or general rules consistent with findings iii. verify and justify relationships and/or general rules **D: Applying mathematics in real-life contexts** i. identify relevant elements of authentic real-life situations ii. select appropriate mathematical strategies when solving authentic real-life situations iii. apply the selected mathematical strategies successfully to reach a solution iv. explain the degree of accuracy of a solution v. explain whether a solution makes sense in the context of the authentic real-life situation	Description **Learning Experiences:** **Thinking:** In order for students to *explain whether a solution makes sense in the context of the authentic real-life situation* they must *evaluate and manage risk.* **Thinking** • VIII. Critical thinking skills • Analysing and evaluating issues and ideas • Evaluate and manage risk	Experimental VS theoretical probability Independent VS dependent events Calculating probability of combined events Using diagrams and charts to model and understand probability Statistics: measure of center and spread, graphs and charts

Mathematics (MYP 4)

Unit Title	Key Concepts	Related Concepts	Global Context & Explorations	Statement of Inquiry	Objectives	Approaches to Learning	Content
20/21. MYP 4. Unit 1: Arithmetic and Algebra	Form	Model, Validity	Personal and cultural expression Metacognition and abstract thinking	The process of abstraction gives form to models which are able to validate a variety of situations.	**A: Knowing and understanding** i. select appropriate mathematics when solving problems in both familiar and unfamiliar situations ii. apply the selected mathematics successfully when solving problems iii. solve problems correctly in a variety of contexts **B: Investigating patterns** i. select and apply mathematical problem-solving techniques to discover complex patterns ii. describe patterns as general rules consistent with findings iii. prove, or verify and justify, general rules **D: Applying mathematics in real-life contexts** i. identify relevant elements of authentic real-life situations ii. select appropriate mathematical strategies when solving authentic real-life situations iii. apply the selected mathematical strategies successfully to reach a solution iv. justify the degree of accuracy of a solution	Description **Learning Experiences:** **Self-management:** In order for students to *select appropriate mathematics when solving problems in both familiar and unfamiliar situations,* they must *keep an organized and logical system of information/notebook.* In order for students to *apply the selected mathematical strategies successfully to reach a solution,* they will *use appropriate strategies for organizing complex information.* In order for students to *select appropriate mathematics when solving problems in both familiar and unfamiliar situations* they must *consider multiple alternatives, including those that might be unlikely or impossible.* **Self-management** • III. Organization skills • Managing time and tasks effectively	review of sets of numbers and properties of powers Integer and rational indexes radicals and surds (Extended: proof that square root of 2 is irrational) revision monomials and polynomials expansion laws factorization of polynomials algebraic fractions rearranging formulae Extended only: rational exponents divisions between polynomials complex numbers (hints) Ruffini's rule for factorization

v. justify whether a solution makes sense in the context of the authentic real-life situation

- Keep an organized and logical system of information files/notebooks
- Use appropriate strategies for organizing complex information

Thinking
- IX. Creative thinking skills
- Generating novel ideas and considering new perspectives
- Consider multiple alternatives, including those that might be unlikely or impossible

Unit Title	Key Concepts	Related Concepts	Global Context & Explorations	Statement of Inquiry	Objectives	Approaches to Learning	Content
20/21 MYP 4. Unit 2: Relations and functions	Relationships	Equivalence, Model	Orientation in space and time Evolution	Exploring and understanding the relationships between quantities may predict future evolution of different systems.	**C: Communicating** i. use appropriate mathematical language (notation, symbols and terminology) in both oral and written explanations ii. use appropriate forms of mathematical representation to present information iii. move between different forms of mathematical representation iv. communicate complete, coherent and concise mathematical lines of reasoning v. organize information using a logical structure **D: Applying mathematics in real-**	Description **Learning Experiences:** **Thinking:** In order for students to *justify whether a solution makes sense in the context of the authentic real-life situations* they must *identify trends and forecast possibilities* Skill category: Thinking Cluster: Critical thinking (how can students think critically?) The ATL skill will be the	Cartesian product of two sets Relations between quantities and their representations Domain and range of relations From relations to functions Function notation Composite functions Inverse function Special functions: constant, direct, linear, quadratic and inverse proportionality

life contexts

i. identify relevant elements of authentic real-life situations

ii. select appropriate mathematical strategies when solving authentic real-life situations

iii. apply the selected mathematical strategies successfully to reach a solution

iv. justify the degree of accuracy of a solution

v. justify whether a solution makes sense in the context of the authentic real-life situation

focus of several learning experiences (see below) as well as an important part of the summative assessment.

To investigate the content of this unit, students will start by analysing raw data; from this analysis they will be able to deduce how quantities are related to each other and, from this, they will be guided towards the concept of function. Therefore they will be able to identify trends through functions, which in turn will allow them to forecast the possible evolution of the systems under investigation. By comparison with known systems and by reflecting on their everyday experience, students will be able to justify whether their solutions make sense in real-life contexts.

Thinking
- VIII. Critical thinking skills
- Analysing and evaluating issues and ideas
- Identify trends and forecast possibilities

Unit Title	Key Concepts	Related Concepts	Global Context & Explorations	Statement of Inquiry	Objectives	Approaches to Learning	Content
20/21 MYP 4. Unit 3: Geometry	Logic	Model, Representation	Scientific and technical innovation Processes and solutions	Efficient theoretical models represent the problem and organize the process to reach a solution in a logic and rigorous way.	**A: Knowing and understanding** i. select appropriate mathematics when solving problems in both familiar and unfamiliar situations ii. apply the selected mathematics successfully when solving problems iii. solve problems correctly in a variety of contexts **B: Investigating patterns** i. select and apply mathematical problem-solving techniques to discover complex patterns ii. describe patterns as general rules consistent with findings iii. prove, or verify and justify, general rules **C: Communicating** ii. use appropriate forms of mathematical representation to present information iv. communicate complete, coherent and concise mathematical lines of reasoning v. organize information using a logical structure **D: Applying mathematics in real-life contexts** i. identify relevant elements of authentic real-life situations	Description **Learning Experiences:** **Thinking:** In order for students to *identify relevant elements of authentic real-life situations* and *select appropriate mathematics strategies when solving authentic real-life situations,* they will *create novel solutions to authentic problems* and *apply existing knowledge to generate new ideas, products and processes.* Students will have several opportunities to explore, strengthen and refine their ability of creating novel solutions to real-life problems. The main teaching strategies are cooperative learning and GRASPS activities. During each activity, students will be clearly instructed about what the goal of the activity is, what their role is during the activity itself, the audience they are	knowledge of the 2D coordinate system distance between two points midpoint, gradient, intercept equation of a line parallel and perpendicular lines ~~distance between a point and a line~~ ~~Vectors: definition, properties and operations.~~

iii. apply the selected mathematical strategies successfully to reach a solution
ii. select appropriate mathematical strategies when solving authentic real-life situations

referring to when reporting results, the scenario in which they carry their investigation, the characteristics of the solution they must produce and the indicators that will allow them to test the validity of their product.

Many autenthic problems will be proposed to the students (see below for a more detailed despcription). On the one hand, this strategy will offer students opportunities to conduct independent research and develop responsibility for their own learning. On the other hand, it will require the students to make use of the mathematical techniques and skills acquired during the first stage of the unit. Moreover, students will have the opportunity to compare novel solutions within peer, thus being able to identify strengths and possible improvements in their own thinking process.

Thinking
- IX. Creative thinking skills

- Generating novel ideas and considering new perspectives
- Create novel solutions to authentic problems
- Apply existing knowledge to generate new ideas, products or processes

Unit Title	Key Concepts	Related Concepts	Global Context & Explorations	Statement of Inquiry	Objectives	Approaches to Learning	Content
MYP 4 IDU Sciences Math 2020/21: Air Pollution **Interdisciplinary Unit** Mathematics	Global interaction	**Sciences - Sciences** Consequences, Environment **Mathematics - Mathematics** Representation	Globalization and sustainability Human impact on the environment	The impact of human action in a globalized world can be represented using mathematical models to understand and predict its consequences on the environment.	**Mathematics - Mathematics** **A: Knowing and understanding** i. select appropriate mathematics when solving problems in both familiar and unfamiliar situations ii. apply the selected mathematics successfully when solving problems iii. solve problems correctly in a variety of contexts	Description **Learning Experiences:** **Communication:** In order for students to *select appropriate mathematics when solving problems in both familiar and unfamiliar situations* they must *make inferences and draw conclusions.* **Research:** In order for students to *solve problems correctly in a variety of contexts* they must *understand and use technology systems.* **Communication** - I. Communication skills - Reading, writing and using language to gather and communicate	Mathematics: discrete and continuous data data representation evaluating centre and error of a distribution cumulative data spread and standard deviation five-number summary and box-and-whisker plot Science: Combustion and fossil fuels Production of sulphuric oxides, Nitric Oxides and acid rain Carbon Cycle and global warming Carbon and nitrogen footprint

information
- Make inferences and draw conclusions

Research
- VI. Information literacy skills
- Finding, interpreting, judging and creating information
- Understand and use technology systems

Mathematics (MYP 5)

Unit Title	Key Concepts	Related Concepts	Global Context & Explorations	Statement of Inquiry	Objectives	Approaches to Learning	Content
2020/2021 - MYP5: Mathematics - Unit 1 - Geometry	Form	Pattern **Other**: Creativity	Personal and cultural expression Beauty	Understanding form and shape patterns enhance creativity and gives access to Nature's beauty.	**A: Knowing and understanding** i. select appropriate mathematics when solving problems in both familiar and unfamiliar situations ii. apply the selected mathematics successfully when solving problems iii. solve problems correctly in a variety of contexts **C: Communicating** i. use appropriate mathematical language (notation, symbols and terminology) in both oral and written explanations ii. use appropriate forms of mathematical representation to present information iii. move between different forms of mathematical representation iv. communicate complete, coherent and concise mathematical lines of reasoning v. organize information using a logical structure **D: Applying mathematics in real-life contexts** i. identify relevant elements of authentic real-life situations ii. select appropriate	Description **Learning Experiences:** **Self-management:** In order for students to be able to reach the objective of Criterion A students have to submit a number of activities meeting different deadlines. **Thinking:** In order for students to identify relevant elements of authentic real-life situations and select appropriate mathematical strategies when solving authentic real-life situations they will make unexpected or unusual connections between objects and/or ideas. **Self-management** • III. Organization skills • Managing time and tasks effectively • Plan short- and long-term assignments; meet deadlines **Thinking** • IX. Creative thinking skills • Generating novel ideas and considering new	**Part One - TRIGONOMETRY** Unit Circle: definition of sine, cosine and tangent of an angle and First Fundamental Identity; sine, cosine and tangent of some special acute angles (30°, 45°, 60°) and associated arcs; inverse trigonometric functions using GDC (only in degrees) resolution of right triangles (SOH, CAH and TOA) both with and without GDC; applying SOH, CAH and TOA to figures that can be decomposed into right triangles; 2D trigonometry (direct and inverse) problems involving perimeter, area, inradius, circumradius and angle bisectors; 3D trigonometry (direct and inverse) problems. **Part Two - PARABOLAS IN THE CARTESIAN PLANE** Definition of a parabola as a conic section; definition of a parabola as a geometric locus of points; standard equation of a *parabola with axis*

mathematical strategies when solving authentic real-life situations
iii. apply the selected mathematical strategies successfully to reach a solution
iv. justify the degree of accuracy of a solution
v. justify whether a solution makes sense in the context of the authentic real-life situation

perspectives
• Make unexpected or unusual connections between objects and/or ideas

parallel to the y-axis in the Cartesian plane
concavity of a parabola,
coordinates of the focus of a parabola,
coordinates of the vertex of a parabola,
equation of the directrix of a parabola,
equation of the axis of symmetry of a parabola,
coordinates of the point of intersection of a parabola and the y-axis,
coordinates of the point(s) of intersection of a parabola and the x-axis
graphing a parabola in the Cartesian plane
quadratic inequalities: a graphical approach;
mutual position of a straight line and a parabola:
condition of tangency
equation of the two straight lines tangent to a parabola and passing through a point external to the parabola itself,
equation of the straight line tangent to a parabola at a point of the parabola itself
families of parabolas;
coordinate geometry direct and inverse problems involving parabolas/ straight lines;
real-world applications of parabolas.

Part Three - CIRCUMFERENCES IN THE CARTESIAN PLANE

Definition of a circumference as a geometric locus of points;
equation of a circumference in the Cartesian plane:
center-radius equation of a circumference, general equation of a circumference, intersections of a circumference with the axes;
mutual position of a straight line and a circumference:
condition of tangency: equation of the straight line tangent to a circumference at a point of the circumference itself;
families of circumferences;
coordinate geometry direct and inverse problems involving circumferences/ parabolas/straight lines.
real-world applications of circumferences.

EXTENDED ONLY - VECTORS

Directed line segment representation
Vector equality
Vector addition

Vector subtraction
Vectors in component form
Scalar Multiplication
Parallel vectors
Perpendicular vectors
Scalar Product of two vectors
3-dimensional vectors
applications of vectors

Unit Title	Key Concepts	Related Concepts	Global Context & Explorations	Statement of Inquiry	Objectives	Approaches to Learning	Content
2020/2021 - MYP5: Mathematics - Unit 2 - Algebra	Relationships	Equivalence, Generalization	Scientific and technical innovation Models	Models represent generalizations of the relationships between variables.	**A: Knowing and understanding** i. select appropriate mathematics when solving problems in both familiar and unfamiliar situations ii. apply the selected mathematics successfully when solving problems iii. solve problems correctly in a variety of contexts **B: Investigating patterns** i. select and apply mathematical problem-solving techniques to discover complex patterns ii. describe patterns as general rules consistent with findings iii. prove, or verify and justify, general rules **C: Communicating** i. use appropriate mathematical language (notation, symbols and terminology) in both oral and written explanations	Description **Communication:** In order for students to use appropriate mathematical language (notations, symbols and terminology) in oral or written explanations they will use and interpret a range of discipline-specific terms and symbols. Communication	**Part One - QUADRATIC EQUATIONS (in R)** Discriminant (delta) of a quadratic trinomial and real solutions of a quadratic equation via quadratic formula; solutions of special polynomial equations of degree higher than two via null product law; real-life applications of quadratic equations (see Unit 1, Part Two). **Part Two - REAL INTERVALS, INEQUALITIES AND SETS OF SIMULTANEOUS INEQUALITIES, DOMAINS OF FUNCTIONS** Real Intervals: formal definition of interval: examples and counterexamples; classification of intervals (left/right open/closed, bounded/unbounded);

ii. use appropriate forms of mathematical representation to present information
iii. move between different forms of mathematical representation
iv. communicate complete, coherent and concise mathematical lines of reasoning
v. organize information using a logical structure

set-builder notation vs interval notation; graphical representation of intervals on the real line;
union and intersection of (two or more) intervals.
Inequalities in R: addition, subtraction, multiplication and division properties of inequalities; equivalent inequalities.
linear inequalities: algebraic and graphical approach;
quadratic inequalities: algebraic and graphical approach (see Unit 1, Part Two);
inequalities of degree higher than two via signs diagram.
Systems of (two or more) simultaneous inequalities.
Domain of functions of one real variable: conditions of existence for rational functions; conditions of existence for irrational functions; conditions of existence for logarithmic functions.

Part Three - EXPONENT AND LOGARITHMS:

Rational exponents (review); definition of logarithm and conditions of

existence on its base and argument; properties of logarithms (product rule, quotient rule, power rule and change of base formula); exponential and logarithmic equations;

Unit Title	Key Concepts	Related Concepts	Global Context & Explorations	Statement of Inquiry	Objectives	Approaches to Learning	Content
2020/2021 - MYP5: Mathematics - Unit 3 - Statistics and Probability	Logic	Model, Validity	Globalization and sustainability Data-driven decision-making	Both through the validity of a model and logic the process of data-drive decision making is facilitated.	**D: Applying mathematics in real-life contexts** i. identify relevant elements of authentic real-life situations ii. select appropriate mathematical strategies when solving authentic real-life situations iii. apply the selected mathematical strategies successfully to reach a solution iv. justify the degree of accuracy of a solution v. justify whether a solution makes sense in the context of the authentic real-life situation	Description **Learning Experiences:** **Thinking:** In order for students to justify whether a solution makes sense in the context of the authentic real-life situation they will use models and simulations to explore complex systems and issues. **Thinking** • VIII. Critical thinking skills • Analysing and evaluating issues and ideas • Use models and simulations to explore complex systems and issues	**Part One - BIVARIATE STATISTICS** Graphical representation of bivariate data: 2D Scatterplots; linear correlation Pearson's Correlation Coefficient: strength and direction of a linear correlation; locus of means; equation of the line of best fit using GDC; interpolation and extrapolation. **Part Two - THEORETICAL PROBABILITY (*)** Sample space and definition of theoretical probability of an event; Venn diagrams and probability tree diagrams; conditional probability and Law of total probability.

(*) This could be the last part of the MYP5 Mathematics program but it is possible it will not be addressed in class due to lack of time.