Course Overviews MYP Mathematics, UWC Thailand 2019-2020

All units taught in grades 6 to 10 are continuously being developed and improved to best meet the needs of the students at UWCT. Therefore, the following overview is only a reflection of current plans for the course. Some changes to these course overviews may occur as a result of planning done throughout the academic year.

Grade	Unit Number and Title	Key and Related Concepts	Global Context	Statement of Inquiry	Inquiry Questions	Approaches To learning skills taught / learnt / developed in this unit	Content (topics / knowledge/ subject specific skills)
6	1: Number Concepts	Logic Justification Representation	Scientific and technical innovation	Number skills are a powerful tool in allowing us to represent and justify outcomes	**Factual:** What do numerals represent? **Conceptual:** Is estimation more appropriate than finding an exact answer? **Debatable:** When is the "correct" answer not the best solution?	Communication skills Critical thinking skills	**Whole Numbers:** Addition, Subtraction Division Multiplication Two step Problems Index Notation Order of Operations Rounding Numbers Multiplying by powers of 10 Dividing by powers of 10 Multiplying and dividing by whole numbers **Number Properties:** Square and cubic numbers Divisibility rules Factors Prime Numbers Composite Numbers Multiples
6	2: Fractions	Relationships Equivalence Pattern	Scientific and technical innovation Processes and Solutions	The equivalence of fractions and other mathematical relationships require processing and solving to find patterns	**Factual:** How can we represent portions or parts of an amount? What are different ways to express parts of a total? **Conceptual:** Are fractions present in real life? **Debatable:** Can fractions help us in real life situations?	Communication skills Critical thinking skills	**Fractions:** Proper and improper fractions Fractions of quantities Fractions on a Number line Equal fractions Comparing fractions
6	3: Algebra Patterning	Form Models	Scientific and technical innovation	Number properties can be expressed in a generalised form (model) whose rules are used to problem solve.	**Factual:** Are patterns important in the world today? **Conceptual:** How can a variable transform itself? **Debatable:** What is the unknown?		**Online 1st edition textbook** Looking at arithmetic sequences, matchsticks, fish, and chairs around tables to try and predict how many pieces will be in a future picture
6	4: Statistics	Relationships Justification	Scientific and technical innovation	We can use Statistical tools to analyse data and draw conclusions.	**Factual:** How do you collect data? **Conceptual:**What information does a chart or table give? How do charts, tables, and graphs help you interpret data? **Debatable:** Do statistics always lie?		**Statistics:** Samples and populations Categorical Data Graphs of categorical data Number data (Discrete)
6	5: Points, Lines, and Angles	Form Generalisations Representations	Scientific and technical innovation	Points, angles and lines can be represented in a variety of forms	**Factual:** How are angles measured? **Conceptual:** How do coordinates and grid references relate? **Debatable:** Do grid references change as you get closer to the poles?		Points and lines Angles Angles at a point Vertically opposite angles Bisecting angles

6	6 Transformations	Pattern Space	Scientific and technical innovation	Understanding form,shape and patterns can help creativity in mathematics	**Factual** How can we determine what transformation has been performed on an object? **Conceptual:** How can transformations be viewed on different interactive programs? **Debatable** What transformation does not preserve congruence?		Reflections Rotations Enlargement/Reduction
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7	1: Number Fluency	Logic Justification, pattern	Scientific & technical innovation	We can calculate with confidence by recognising number patterns, by knowing the order of operations, following rules of logic, by understanding rounding and building estimation skills.	**Factual:** How can we perform complex calculations quickly and easily? **Conceptual:** When is it appropriate to use estimation? When should you use mental computation? **Debatable:** Are there other possible number systems? Can there be more than one correct answer to a mathematical problem?	Communication Self management: organisation	Rounding and Estimation Order of operations Index notation Square and cube numbers Divisibility Rules Factors and Multiples Prime and composite numbers Roots
7	2: Geometry	Form Justification, Representation, Space	Orientation in space & time	It is possible to define form and space using consistent rules and logic; we can measure, calculate and construct precise angles without using a protractor.	**Factual:** How are points, lines, line segments, rays, and angles related? **Conceptual:** Is there only one true geometrical system? **Debatable:** Which is more accurate, measurement or calculation?	Communication Thinking: creative thinking	Angles and lines Points and lines Angle properties Angle pairs Parallel lines Bisectors Polygons Triangles Angles of triangle Isosceles triangles Quadrilaterals Angles of quadrilaterals.
7	3: Measurement	Relationships Measurement, quantity, representation, space	Globalization & sustainability	We can use mathematical models to represent objects and relate quantity and space; these models can help design packaging that makes the best use of our natural resources.	**Factual:** How can patterns be used to determine standard formulas for area and perimeter? **Conceptual:** Where would you find symmetry? **Debatable:** Which designs are most suitable for a fixed volume?	Self management: affective (Self motivation & perseverance) Research & information literacy	Length and Area Perimeter Area of polygons Area of composite shapes Further Measurement Volume Capacity Mass Relationship between volume and capacity Relationship between units Area of circles
7	4: Probability	Logic & relationships Justification, representation	Identities & relationships	Probability theory uses logic and justification to predict likely outcomes; this is useful for representing real-world events especially in business or when allocating resources.	**Factual:** How is the likelihood of an event determined and communicated? **Conceptual:** How realistic is an expected value? **Debatable:** Can we justify decisions based on theoretical predictions?	Thinking: transfer Self management: organisation	Discrete probability Assigning numbers to probability Sample space Theoretical probability Complementary events Tree diagrams Relationship between theoretical and experimental probability
7	5: Expressions and Equations	Form Simplification Change,	Scientific & technical innovation	We can use algebra to simplify the representation of changing forms in real life situations.	**Factual:** Why do we use variables? **Conceptual:** What is the unknown? **Debatable:** Can we make reliable generalisations beyond the range of experience?	Self management: affective (perseverance) Thinking: transfer	Writing algebraic expressions Key-words in Algebra Equal expressions Collecting like terms Algebraic products Evaluating algebraic expressions

							Equations Solving simple equations Maintaining balance Inverse operations Solving equations Equations with repeated unknowns Word problems
7	6: Statistics	Relationships Representation & patterns	Identities & relationships	Establishing patterns in the natural world can help in understanding relationships.	**Factual:** How can we present data? What determines whether two events are independent? **Conceptual:** How do we select & interpret statistics calculations? **Debatable:** Are statistics reliable ? Can we trust statistics?	Critical thinking Social: Communication	Types of data Organization & display of data Frequency tables Frequency graphs Measures of centre: mean, median, mode Choosing the appropriate measure Grouped data Measuring the spread of data - range, St Dev, IQR Box plots Cumulative frequency
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8	1: Number Fluency	Logic Quantity	Scientific and Technical Innovation	Number skills allow us to logically justify arithmetic problems	**Factual:** How can we understand numbers and their properties better by decomposing them? **Conceptual:**How do I demonstrate the relationship between numbers, quantities and place value for whole numbers up to 1,000? **Debatable:**When is the “correct” answer not the best solution?	Communication ☑ Understand and use mathematical notation ☑ Take effective notes in class Critical Thinking ☑ Identify obstacles and challenges	BIDMAS, factors, prime factors, LCM, HCF, negative numbers, multiplying and dividing by powers of ten, fractions, equivalent fractions, mixed numbers and improper fractions, adding and subtracting fractions, multiplying and dividing fractions, ratio
8	2: Transformations	Aesthetics Pattern	Personal and cultural expression	Geometric transformations are used in world art	**Factual:** What is a transformation? **Conceptual:**How is geometric transformations supporting tribal art forms? **Debatable:**Why are geometric transformations so appealing?	Creative Thinking	Transformations, rotation, reflection, enlargement, translation
8	3: Coordinate Geometry	Identity Space	Identities and relationships	Understanding our place in time and space gives us a base on which to focus	**Factual:** What notation do we use to represent coordinates in 2d and 3d space? **Conceptual:** Why is this useful? **Debatable:** How are position words useful?	Communication	Identify points on a cartesian plane, gradient, rate of change, y = mx + c, draw a straight line graph, find the line equation, apply to real world problems
8	4: Pythagoras and Radicals	Form Measurement	Orientation in space and time	Understanding the underlying form of right triangles allows us to measure and solve geometric problems	**Factual:**Investigate how the lengths of sides in a right angled triangle are always consistently related **Conceptual:**What arithmetic operations work with radicals? **Debatable:** Was the hypotenuse found or discovered? Who invented the $\sqrt{}$sign?	Communication - make inferences and draw conclusions Organisation - plan short and long-term assignments	Right-angled triangles, square numbers, square roots, Pythagoras, problem solving
8	5: Linear Algebra	Communication Representation	Scientific and technical innovation	Linear algebra allows us to communicate and represent real life problems	**Factual:**What are the tools needed to solve linear equations and inequalities? **Conceptual:**What information and strategies would you use to solve a multi-step word problem? **Debatable:** What is the unknown?	Self management - affective	Factorising linear expressions, rearrange simple formula, derive a rule for an arithmetic sequence, solve (two-step) equations, solve linear equations with fractional coefficients, expand brackets Chaps 7, 8 and 19 (includes index laws), simultaneous equations
8	6: Statistics	Relationships Measurement Quantity	Identities and relationships	Practice improves performance	**Factual:** How can you collect, organize, and display data? **Conceptual:** How do you interpret the data you have collected? **Debatable:** Do statistics always lie?	Self management - organisation (plan short and long term assessments). The summative is a 3-lesson project, ensure time is allocated wisely.	Data collection, constructing and interpreting graphs, calculating mean, median and mode, calculating the interquartile range

8	7: Length, Area, Volume	Change Measurement	Scientific and technical innovation	Packaging can be optimised by finding efficient shapes for various products	**Factual:** What tools and units are used to measure the attributes of an object? **Conceptual:** How do you decide which unit of measurement to use? **Debatable:** What makes efficient packaging?	Social - collaboration	Finding the perimeter and circumference, area and volume of regular and irregular two dimensional and three dimensional shapes. Focus on prisms in 3D. Compound shapes. Nets
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9	1: Number fluency	Form Quantity Systems	Scientific and technical innovation	Numbers can be written (and applied) in different forms	**Factual:**What number or symbol is needed to make number sentences true? **Conceptual:**How do I demonstrate the relationship between numbers, quantities and place value for whole numbers up to 1,000? **Debatable:**When is the “correct” answer not the best solution?	Communication ☑ Understand and use mathematical notation ☑ Organize and depict information logically Critical Thinking ☑ Apply skills and knowledge in unfamiliar situations	Basic rules of indices, standard form, operations with numbers in standard form, prime factorisation
9	1(a): Measurement	Form Quantity Measurement	Globalisation and sustainability	Understanding the form of packaging develops relationships between volume and surface area	**Factual:**What units are used to measure length, area and volume? **Conceptual:**is there a difference between volume and capacity? **Debatable:** why might producers choose packaging which is extreme in quantity?	Thinking	Length, area, surface and volume of a range of 2D and 3D shapes
9	2: Algebra	Logic Representation Model	Scientific and technical innovation	Algebra enables us to give a logical representation of the world	**Factual:**What is the unknown? **Conceptual:**What information and strategies would you use to solve a multi-step word problem? **Debatable: C**an the patterns or relationships support your predictions?	Critical thinking	Expanding brackets, combining like terms, solving linear equations, solving equations with algebraic fractions, solving linear inequalities. Factorising linear and quadratic expressions.
9	3: Straight Line Graphs	Logic Representation Model	Scientific and technical innovation -Models	Straight line graphs can model and represent the physical world	**Factual:**Why are graphs helpful? How can you find the gradient of a straight line graph? **Conceptual:**Are you able to solve a linear inequality by graphing? **Debatable:** Do mathematical models conceal as much as they reveal?	Communication ☑ Interpret and use effectively modes of non-verbal communication (graphs and tables) -E3 ☑ Use and interpret a range of discipline-specific terms and symbols (y=mx+c, meaning of each component, Ax + By = C) Thinking -Transfer skills ☑ Combine knowledge, understanding and skills to create products or solutions	Parallel and perpendicular lines, the relationship between their gradients, measuring (and calculating) the distance between two points, understanding and using the cartesian plane, finding the midpoint of two points, the linear function f(x) = mx + c, its graph gradient and y-intercept. Graphing linear inequalities
9	4: Probability	Communication Model Representation	Scientific and technical innovation -Models	We can use theoretical probability to model and represent real (simplified) life situations.	**Factual:**How is the probability of an event determined and communicated? **Conceptual:** How is the probability of an event described? **Debatable:** Are probabilities ever accurate?	Critical thinking ☑ Gather and organize relevant information to formulate an argument ☑ Identify trends and forecast possibilities Students will be taught how to present the problem Communication ☑ Use and interpret a range of discipline-specific terms and symbols ☑ Understand and use mathematical notation Specific probability symbols will be taught, used in class and in final assessment (in place of words)	Calculating probabilities of simple events, with and without replacement. Solving problems using tree diagrams and venn diagrams. Number sets, notation, union and intersection
9	5: Trigonometry	Time, place and space Measurement Representation	Scientific and technical innovation -Processes and solutions	Trigonometry uses scientific innovation to represent and solve measurement problems in space	**Factual:** What measures of angle are used? **Conceptual:** How can objects be represented and compared using geometric attributes? **Debatable:** Was trigonometry found or invented?	Communication	Solving problems using the properties of angles in triangles/angles in intersecting and parallel lines/angles in regular and irregular polygons/angles in circles. Using Pythagoras’ theorem. Relating angles and sides of right-angled triangles using sine, cosine and tangent. Solving problems in right-angled triangles using trigonometric ratios

9	6: Quadratics	Logic Representation	Scientific and technical innovation -methods -processes and solutions	Quadratic functions use scientific methods to logically represent problems and to reach solutions	**Factual:** What is a quadratic? **Conceptual:**Why are they so important? **Debatable:** How can you tell the difference between a catenoid and a parabola?	Self-management - managing time and self motivation in the final assessment For communication - looking specifically at how graphs can show maxima/minima (optimisation type problems) For self-management - managing time (in an online learning situation)	Factorising quadratic equations, graphing quadratic functions. Using different forms of the quadratic function to sketch graphs (x and y intercepts and vertex). Find the quadratic function from the graph.
9	7: Simultaneous Equations	Relationships Models Representation	Scientific and Technical innovation	Decision making can be improved by using a model to represent relationships	**Factual:** What does simultaneous mean? **Conceptual:**How do you know if there is a solution graphically? **Debatable:** Can there be an infinite number of solutions? Or none? How do we know?	Critical thinking skills: which method of solving is most appropriate	Solving equations graphically and algebraically
9	7: Pot Pourri	Justification	Identity	Financial planning is important	**Debatable:** Planning for the future: what will my future be?	Self-management Communication	A mixture of mini topics to try and cover the whole Grade 9 text book which includes • Inequalities • Perimeter, area, volume • Statistics • Financial Maths • Transformations • Congruence and similarity • Exponential and rational functions • Proportion
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10	1: Sequences and Series	Form Generalisation Pattern	Scientific and technical innovation	Sequences and series form patterns that can be generalised (to infinity and beyond)	**Factual:**What are the different ways to represent the patterns or relationships? **Conceptual:**How can you identify a quadratic sequence? **Debatable:** Why do Fibonacci numbers appear in the natural world so often?	Communication	Predicting the next term in a number sequence (linear, quadratic, triangular, Fibonacci). Finding and justifying general rules. Finding sums of series (including infinite series)
10	2: Measurement	Form Model Measurement	Globalisation and sustainability -consumption	Mensuration can be used to optimise and model relationships linking length area and volume	**Factual:**How do you calculate area and volume? What are the different types of 3-D models? **Conceptual:**What does optimisation mean? **Debatable:** Why is dimension theory important?	Communication -organise and depict information logically	Finding the perimeter, area (surface area) and volume of 2D and 3D shapes. Including prisms and pyramids. The effects of enlargements on dimensions. Include spheres, pyramids and prisms - and compound shapes.
10	3: Algebra and Equations	Logic Equivalence Justification	Identities and relationships	Decision making can be improved by using logic to justify solutions	**Factual:**Why do we use variables? **Conceptual:**What are the tools needed to solve linear equations and inequalities? **Debatable:**Do mathematical models conceal as much as they reveal?	Self-management	Solving linear and quadratic equations by a range of methods, solving simultaneous equations. Expanding and simplifying algebraic expressions. Factorising linear and quadratic expressions. Changing the subject of an equation.
10	4: Statistics	Relationships Measurement Quantity	Scientific and technical innovation	Statistics can be used to quantify and measure relationships	**Factual:** How can you collect, organize, and display data? **Conceptual:** How do you interpret the data you have collected? **Debatable:** Do statistics always lie?	Communication ATL - presenting information in variety of tables, draw conclusions ☑ Make inferences and draw conclusions ☑ Organize and depict information logically	Graphical analysis and representation. Measures of central tendency. Measures of dispersion. Standard deviation. Regression coefficient r
10	5: Geometry	Logic Measurement	Scientific and technical innovation -mathematical puzzles	Mathematical puzzles can be solved logically by using measurement	**Factual:**How are angles classified? **Conceptual:**How are points, lines, line segments, rays, and angles related? **Debatable:**How are angles measured?	Critical thinking -observe carefully to recognise problems (and identify key information)	Congruent triangles. Similarity. Solving problems using the properties of angles in triangles/angles in intersecting and parallel lines/angles in regular and irregular polygons/angles in circles. Use of Pythagoras' Theorem in 2 and 3D. Converting angles between degrees and radians
10	6: Trigonometry	Time, place and space Measurement	Scientific and technical innovation	The methods of trigonometry aid us in measuring place in our universe	**Factual:** What measures of angle are used?	Communication - organise and depict information logically ☑ Organize and depict information logically	Solving problems in right-angled triangles using trigonometric ratios. Advanced trigonometry using non right-angled triangles.Using radians or degrees when solving problems.

		Space	-methods		**Conceptual:** How can objects be represented and compared using geometric attributes? How do the angles in a triangle affect which trigonometric rule is applicable? **Debatable:** Was trigonometry found or invented?	Thinking - critical thinking ☑ Gather and organize relevant information to formulate an argument ☑ Use models and simulations to explore complex systems and issues Transfer skills ☑ Apply skills and knowledge in unfamiliar situations	
10	7: Head Start	Other	Scientific and technical innovation	How can I be ready for the DP course			