

Renaissance College Hong Kong Mathematics Overview 2018/19

Our MYP mathematics programme is tailored to the needs of students, seeking to intrigue and motivate them to want to learn its principles. Students see authentic examples of how mathematics is useful and relevant to their lives and are encouraged to apply it to new situations. Mathematics provides the foundation for the study of sciences, engineering and technology. However, it is also evident in the arts and is increasingly important in economics, the social sciences and the structure of language. Our students are encouraged to use ICT tools to represent information, to explore and model situations, and to find solutions to various problems. These are skills that are useful in a wide range of arenas. The programme aims to equip all students with the knowledge, understanding and intellectual capabilities to address further courses in mathematics, as well as to prepare those students who will use mathematics in their studies, workplaces and lives in general.

Renaissance College Hong Kong Mathematics Overview 2018/19																								
Our MYP mathematics programme is tailored to the needs of students, seeking to intrigue and motivate them to want to learn its principles. Students see authentic examples of how mathematics is useful and relevant to their lives and are encouraged to apply it to new situations. Mathematics provides the foundation for the study of sciences, engineering and technology. However, it is also evident in the arts and is increasingly important in economics, the social sciences and the structure of language. Our students are encouraged to use ICT tools to represent information, to explore and model situations, and to find solutions to various problems. These are skills that are useful in a wide range of arenas. The programme aims to equip all students with the knowledge, understanding and intellectual capabilities to address further courses in mathematics, as well as to prepare those students who will use mathematics in their studies, workplaces and lives in general.																								
MYP 1					MYP 2					MYP 3					MYP 4					MYP 5				
Course name	Yr 7 Mathematics				Yr8 Mathematics					Yr9 Mathematics					Yr10 Mathematics (Standard)					Yr11 Mathematics (Standard)				
Unit title	1. Greater than the sum of its parts	2. Surrounded by angles	3. Class rules	4. How much is too much?	1. Something or nothing	2. The problem or the solution?	3. How much calcium should I consume?	4. Take a chance	5. Trilateration	1. Joe average	2. Trust your numbers	3. Representing the unknown	4. Measuring beyond our reach	5. Staying in line with the world	1. Your number's up	2. It might just happen	3. Give me a sine	4. Symbolic	5. Fill in the gaps	1. Who is the average student?	2. Off the straight and narrow	3. Where am I?	4. Spot the pattern	5. What's the point of a rigorous argument?
Strand	Number	Geometry and trigonometry	Algebra	Geometry and trigonometry	Number	Algebra	Number	Statistics and probability	Geometry and trigonometry	Statistics and probability	Number	Algebra	Geometry and trigonometry	Algebra	Number	Statistics and probability	Geometry and trigonometry	Algebra	Geometry	Statistics	Algebra	Geometry and trigonometry	Algebra	Algebra and Geometry
Key concept	Logic	Form	Relationships	Form	Communication	Relationships	Relationships	Logic	Form	Relationships	Logic	Relationships	Form	Relationships	Relationships	Form	Logic	Form	Relationships	Relationships	Form	Relationships	Relationships	Logic
Related concept (s)	Quantity and representation	Measurement and space	Patterns and representations	Space and quantity	Quantity and system	Generalisation, justification, pattern and representation	Equivalence, quantity, representation, simplification	Model, representation, system	Measurement, model, space	Model and representation	Equivalence, quantity, representation	System, model and generalization	Pattern and space	System and model	System and equivalence	Model and Systems	Measurement and pattern	Representation and equivalence	Measurement and representation	Pattern, representation	Model and representation	Space and measurement	Pattern, systems	Representation, equivalence
Global context	Identities and relationships	Scientific and technical innovation	Identities and relationships	Globalisation and sustainability	Personal and cultural expression	Scientific and technical innovation	Globalisation and sustainability	Identities and relationships	Orientation in time and space	Fairness and Development	Scientific and technical innovation	Scientific and technical innovation	Identities and relationships	Identities and relationships	Identities and relationships	Identities and Relationships	Personal and cultural expression	Identities and relationships	Scientific and technical innovation	Identities and relationships	Globalisation and sustainability	Orientation in time and space	Personal and cultural expression	Scientific and technical innovation
Statement of inquiry	Decision making can be improved by using a model to represent relationships	Understanding form, measurement and space can help enhance creativity	Spotting patterns to construct general statements can enhance planning and sustainability	Using finite resources responsibly must be taken into consideration when designing structures	Something can be worth less than nothing	Rules in different contexts are both useful and powerful	Equivalent quantities can be represented in different forms	Situations involving chance can be modelled using logic	Measurement of physical properties allows us to model real-life phenomena	Analysing and Modelling data allows us to make logical arguments about our access to finite resources.	Simplifying quantities and understanding equivalent relationships between different forms of representations, can help me make logical decisions	Relationships can be expressed in a generalized form whose rules are used to problem solve	Spatial relationships are a means of understanding the physical and abstract world	Linear relationships can model many situations and systems in real life.	Discovering equivalence is a key element to the better understanding of mathematical systems	Combinations of statements and the relationships between them form systems and models	Measurement in trigonometry is enhanced by recurring patterns	Exercising prior knowledge allows us to express relationships as systems of equations	Finite resources should be considered when building new structures	Establishing patterns in the natural world can help us to understand relationships	Decision making can be improved by using a model to represent relationships.	Geometric representations of place and space help us to understand our world	Applying our knowledge of pattern when studying systems allows us to predict	Logic is a powerful tool for justifying what we discover through measurement and observation
Subject group objectives	A, B and C	A, C and D	B and C	C and D	A, B and C	A, B, C and D	D	A and D	A and B	A, C and D	A, C and D	A, B and C	A, C and D	A	A and B	B and C	A, B and C	A, B and C	A, B, C, D	A, C and D	A, B, C and D	A and B	A, B and C	A, B and C
ATL skills	Communication	Creative thinking	Collaboration	Research	Communication	Collaboration	Critical and creative thinking	Critical and creative thinking	Collaboration	Communication	Communication	Critical thinking	Communication	Transfer	Communication and transfer	Transfer	Collaboration	Communication	Creative thinking	Transfer, research	Communication, collaboration and critical thinking	Collaboration, critical thinking	Communication, collaboration	Creative thinking
Content summary	Basic operations with and applications of fractions, decimals and percentages.	Angle measurement, construction, facts and application. Identification of polygons and their properties.	Describe patterns using formulae, use inverse operations to solve one and two step equations. Construct and solve equations from word problems.	Units of measurement and converting between them. Perimeter, area of 2D shapes and 2D composite shapes. Volume and capacity.	HCFs, LCMs and prime factorisation. Operations with directed numbers and their representation on the number line. Plotting and working with points in all four quadrants.	Simplification, expansion, factorisation and substitution involving expressions. Solving two step equations and inequalities.	Operations with and applications of fractions, decimals and percentages. Percentages of amounts and percentage increase/decrease.	Experimental and theoretical probability. Sample spaces, tree diagrams and multiple events.	Interior and exterior angle properties, transformations and congruent figures.	Summarising data, stem and leaf plots, grouped data, measures of spread, box plots, scatter graphs, line of best fit.	Ratios and rates. Percentage increase, decrease. Profit and discount. Laws of indices, scientific notation and significant figures.	Algebraic expressions and their manipulation. Solving linear equations involving brackets and unknowns on both sides and those in word problems. Inequalities and using formulae.	Pythagoras' theorem and its applications. Similar figures. Trigonometric ratios, finding sides, angles and applications.	Gradient and direct proportion. Graphing straight lines using intercepts and gradient/ y - intercept. Finding the equation of a line. Midpoint and length of a line segment. Parallel/perpendicular lines, linear modelling and graphical solutions to simultaneous equations.	Defining rational and irrational numbers, working with surds and applying index laws.	Independent and multiple events, tree diagrams and conditional probability	Right angled trigonometry, applications and bearings. Similarity and congruence. Combining transformations	Algebraic fractions, inequalities, simultaneous equations, and further algebraic manipulation. Quadratic equations.	Perimeter/area and surface area/volume of composite shapes/objects.	Measures of central tendency and spread for discrete and continuous data. Cumulative frequency. Statistical graphs and diagrams, interpretation and analysis. Univariate and Bivariate data analysis.	Factorisation and completing the square of on quadratic expressions. Graphical representation and transformations of quadratic functions. Domain and range. Solving quadratic equations and their applications in optimisation.	Pythagoras theorem in 3D, working with bearings, sine and cosine laws, area of non-right angles triangles using trigonometry.	Describing number sequences. Recognise and express algebraically linear, quadratic sequences and geometric sequences. Analyse Patterns. Make and test conjectures.	Distance, midpoint and gradient between two points. Equations of straight lines, applications of coordinate geometry and distance from a point to a line.
Subject group objectives	The objectives of any MYP subject state the specific targets that are set for learning in the subject. They define what the student will be able to accomplish as a result of studying the subject. The objectives of MYP mathematics encompass the factual, conceptual, procedural and metacognitive dimensions of knowledge and relate directly to the assessment criteria.										Our MYP mathematics courses help specifically to prepare students for the study of group 5 courses in the IB Diploma Programme (DP). As students progress from the MYP to the DP or IBCC, the emphasis on understanding increases as students work towards developing a strong mathematical knowledge base that will allow them to study a wide range of topics. The knowledge, skills and attitudes that students develop in all the IB mathematics courses provide a meaningful foundation for further study and career pursuits.													
A: Knowing and understanding	Knowledge and understanding are fundamental to studying mathematics and form the base from which to explore concepts and develop skills. This objective assesses the extent to which students can select and apply mathematics to solve problems in both familiar and unfamiliar situations in a variety of contexts.																							
B: Investigating patterns	Investigating patterns allows students to experience the excitement and satisfaction of mathematical discovery. Working through investigations encourages students to become risk-takers, inquirers and critical thinkers.																							
C: Communicating	Mathematics provides a powerful and universal language. Students are expected to use appropriate mathematical language and different forms of representation when communicating mathematical ideas, reasoning and findings, both orally and in writing.																							
D: Applying mathematics in real-life contexts	MYP mathematics encourages students to see mathematics as a tool for solving problems in an authentic real-life context. Students are expected to transfer theoretical mathematical knowledge into real-world situations and apply appropriate problem-solving strategies, draw valid conclusions and reflect upon their results.																							
Key Concepts	These promote the development of a broad curriculum. They represent big ideas that are relevant both within and across disciplines and subjects. Inquiry into key concepts can facilitate connections between and among courses within the mathematics subject group (intra-disciplinary learning) and other subject groups (interdisciplinary learning).																							
Relationships	Relationships allow students to identify and understand connections and associations between properties, objects, people and ideas—including the human community's connections with the world in which we live. Any change in relationships brings consequences—some of which may occur on a small scale, while others may be far-reaching, affecting large systems like human societies and the planet as a whole. Relationships in MYP mathematics refers to the connections between quantities, properties or concepts and these connections may be expressed as models, rules or statements. Relationships provide opportunities for students to explore patterns in the world around them. Connections between the student and mathematics in the real world are important in developing deeper understanding.																							
Logic	Logic is a method of reasoning and a system of principles used to build arguments and reach conclusions. Logic in MYP mathematics is used as a process in making decisions about numbers, shapes, and variables. This system of reasoning provides students with a method for explaining the validity of their conclusions. Within the MYP, this should not be confused with the subfield of mathematics called "symbolic logic".																							
Form	Form is the shape and underlying structure of an entity or piece of work, including its organization, essential nature and external appearance. Form in MYP mathematics refers to the understanding that the underlying structure and shape of an entity is distinguished by its properties. Form provides opportunities for students to appreciate the aesthetic nature of the constructs used in a discipline.																							
Mathematics department 2017/18	Mr Matthew Lacey, Head of Department. Yr8, Yr10 Extended and DP Standard Level coordinator. Current teaching: Yr08, Yr10 Extended, Yr12 AASL, Yr13 Standard Level Mr Steve Smyth, Curriculum Project Leader. Yr7 and DP Higher Level coordinator. Current teaching: Yr07, Yr09 Extended, Yr11 Standard, Yr12 AAHL, Yr13 Standard Level Ms Shobha Sanker, Yr11 Extended coordinator. Current teaching: Yr10 Standard, Yr11 Standard, Yr11 Extended, Yr12 AASL, Yr13 Standard Level Mr Ray Chang, Yr09 coordinator. Current teaching: Yr09, Yr11 Standard, Yr11 Extended, Yr12 AIHL, Yr13 Higher Level Mr Chris Payne, Head of Year 11. Yr08 coordinator. Current teaching: Yr08, Yr10 Extended, Yr12 AASL, Yr13 Standard Level Ms Lynne Wilson, CAS coordinator. Current teaching: Yr07, Yr09 Extended, Yr12 AASL, Yr13 Mathematical Studies Ms Cat Townsend, Yr11 Standard coordinator. Current teaching: Yr07, Yr08, Yr11 Standard, Yr12 AISL, Yr13 Standard Level Ms Jennifer Dentry, Head of Year 12. Current teaching: Yr08, Yr09 Standard, Yr12 AISL, Yr13 Standard Level Ms Nicolene Kuyper, Current teaching: Yr07 Ms Julie More, Yr10 Standard coordinator. Current teaching: Yr08, Yr9 Standard, Yr12 Mathematical Studies, Yr13 Mathematical Studies																							
Course name											Yr10 Mathematics (Extended)					Yr11 Mathematics (Extended)								
Unit title											1. Going straight	2. Square curves	3. The power of the absurd	4. Probably not	5. Sine of the times	1. A Dose of logarithms	2. The return of Pascal	3. A series of sequential patterns	4. Transforming functions	5. Radian or degree?				
Strand											Algebra	Algebra	Number	Probability and statistics	Geometry and trigonometry	Number	Algebra	Algebra	Algebra	Geometry and trigonometry				
Key concept											Relationships	Relationships	Form	Logic	Relationships	Logic	Form	Relationships	Form	Form				
Related concept (s)											Pattern, system	Model, representation	System, representation	System, quantities	Space, measurement	Justification and model	Patterns and representation	Simplification and generalization	Patterns and space	Patterns and model				
Global context											Scientific and technical innovation	Identities and relationships	Scientific and technical innovation	Identities and relationships	Orientation in space and time	Globalisation and sustainability	Personal and cultural expression	Scientific and technical innovation	Personal and cultural expression	Scientific and technical innovation				
Statement of inquiry											Mathematical relationships lead to a better understanding of how patterns observed geometrically can be expressed algebraically	Seemingly complex relationships can be described concisely	Symbolic representation can cross cultures and countries	Outcome likelihoods are not always black and white	Repeating phenomena can be modelled using circular relationships	Logic is a powerful tool for justifying what we discover through measurement and observation.	Appreciating the patterns found through exploring various forms and representations of the Pascal's triangle.	Describing patterns and making generalisations helps to simplify the process in making predictions.	Understanding form and shape enhances creativity.	Patterns can be generalised when we extend ideas and examine form				
Subject group objectives											A, B and C	B, C and D	A and C	A and D	A, B and C	A, C and D	A, B and C	A	A, B and C	A, C and D				
ATL skills											Collaboration	Transfer	Communication	Creative thinking	Collaboration	Critical-thinking	Communication	Collaboration	Creative thinking	Transfer				
Content summary											Algebraic fractions, linear equations and their graphs, simultaneous equations, coordinate geometry, piecewise functions.	Quadratic equations, their graphs and properties, quadratic sequences.	Scientific notation, surds, indices and exponential equations.	Mutually exclusive events, tree diagrams, venn diagrams and conditional probability	The trigonometric ratios, sine and cosine laws, the unit circle and trigonometric graphs.	Laws of logarithms, solving equations using logarithms and their applications.	The relationship between the Pascal's triangle and the binomial theorem.	Linear recursions, arithmetic and geometric sequences and series.	Types of functions, domain and range, composite functions, and graphical transformations	Trigonometric identities and equations.				

