Wah Yan College Kowloon
F.5 Mathematics (Core&M2) Scheme of Work (2016-2017)

Textbook	1. New Progress in Senior Mathematics 5 (Compulsory Part) (with Public Exam Essentials and Student's Revision CD, WY) 2. New Progress in Senior Mathematics 6A (Compulsory Part) (with Public Exam Essentials and Student's Revision CD, 2nd) 3. New Progress in Senior Mathematics (Extended Part) Module 2 Book 1 (with Student's Handbook, Student's Bridging Handbook and Student's Revision CD, WY) 4. New Progress in Senior Mathematics (Extended Part) Module 2 Book 2 (with Student's Handbook and Student's Revision CD, 2nd)
Other Resources	

SL: Scheduled number of lessons
AL: Actual number of lessons

School Term	Weeks	Topics/ Extended Parts*	Learning Objectives/ Teaching Focus	SL/AL	Teaching and Learning Activities	Consolidation and Assessment	Values#
	1-3	**Chapter 14** **Trigonometry (1)** • To understand sine, cosine and tangent functions, and their graphs and properties, including maximum and minimum values and periodicity • To solve the trigonometric equations $a\sin\theta = b$, $a\cos\theta = b$ and $a\tan\theta = b$ (solutions in the interval from 0° to 360°) • To simplify expressions including sine, cosine and tangent of $-\theta$, $90° \pm \theta$, $180° \pm \theta$, etc	**Let's Review (p.160)** • Teachers can ask students to review trigonometric ratios in right-angled triangles, trigonometric ratios of special angles and trigonometric identities.	0.5 hour /0.5 hour	Demonstrating some examples and giving some classwork	• Worksheet 14.0 (Sets 1 & 2) • Test Bank 14.0	

School Term	Weeks	Topics/ Extended Parts*	Learning Objectives/ Teaching Focus	SL/AL	Teaching and Learning Activities	Consolidation and Assessment	Values#
		Non-foundation • To solve other trigonometric equations (solutions in the interval from 0° to 360°)					
			14.1 Introduction to Trigonometry (pp.161 – 164) • Teachers can remind students that angle of rotation is different from true bearings.	0.5 hour /0.5 hour	Demonstrating some examples and giving some classwork	• Worksheet 14.1 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 14.1 • Test Bank 14.1	
			14.2 Trigonometric Ratios of Arbitrary Angles (pp.164 – 170) • Teachers can introduce the definition of trigonometric ratios of arbitrary angles. • Teachers may remind students that the trigonometric ratios may be either positive or negative depending upon the quadrant in which the	1 hour /1 hour	Demonstrating some examples and giving some classwork	• Worksheet 14.2 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 14.2 • Test Bank 14.2	

			angle lies.				
			14.3 Finding Trigonometric Ratios Without Using a Calculator (pp.171 – 178) • Teachers can introduce the trigonometric ratios of the angles formed by coordinates axes. • Teachers can introduce the concept of reference angle and finding trigonometric ratios by using the reference angle. • Teachers may point out that if one of the trigonometric ratios is given, the other trigonometric ratios of the angle can be found by the definitions.	1 hour /1 hour	Demonstrating some examples and giving some classwork	• Additional Examples 14.1 – 14.2 • Worksheet 14.3 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 14.3 • Test Bank 14.3	
			14.4 Trigonometric Identities (pp.178 – 181) • Teachers may introduce the trigonometric identities to simply the	1 hour /1 hour	Demonstrating some examples and giving some classwork	• Additional Examples 14.3 – 14.5 • Worksheet 14.4 (Sets 1 & 2)	

			expressions.			• Ongoing Assessment Package: Quiz 14.4 • Test Bank 14.4	
			14.5 Trigonometric Equations (pp.181 – 186) • Students should make use of the reference angle to work out the solution of simple trigonometric equations in the interval of 0° to 360°. *Non-foundation* • Teachers can introduce the solving skills of some harder trigonometric equations.	1 hour /1 hour	Demonstrating some examples and giving some classwork	• Additional Examples 14.6 – 14.9 • Worksheet 14.5 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 14.5 • Test Bank 14.5	
			14.6 Graphs of Trigonometric Functions (pp.186 – 195) • Students should be able to sketch and recognize the graphs of sine, cosine and tangent and identify their periodicity and the ranges	1.5 hours /1.5 hours	Demonstrating some examples and giving some classwork	• Additional Examples 14.10 • Worksheet 14.6 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 14.6	

			of values of trigonometric functions. • Teachers may ask students to draw the graph using computer software. *Non-foundation* • Teachers can discuss the transformation on the graphs of trigonometric functions with students.			• Test Bank 14.6	
			14.7 Graphical Solutions of Trigonometric Equations (pp.196 – 203) • By reading graphs or adding a suitable straight line on a trigonometric graph, students are guided to find graphical solutions of trigonometric equations.	1 hour /1 hour	Demonstrating some examples and giving some classwork	• Additional Examples 14.11 – 14.12 • Worksheet 14.7 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 14.7 • Test Bank 14.7	
			Enrichment Mathematics – Development of Trigonometry (pp.216 – 217) • Teachers can introduce the method to find	0.5 hour /0.5 hour	Demonstrating some examples and giving some classwork		

			trigonometric ratios other than using a calculator.				
	3-4	*Non-foundation* **Chapter 15** **Trigonometry (2)** • To study and use the formula $\frac{1}{2}ab\sin C$ for calculating the areas of triangles • To study and use the sine and cosine formulas to solve oblique triangles • To understand and apply Heron's formula	**Let's Review (p.220)** • Teachers can help students review the arc length and the area of a sector. • Teachers can help students review the area of a triangle.	0.5 hour /0.5 hour	Demonstrating some examples and giving some classwork	• Worksheet 15.0 (Sets 1 & 2) • Test Bank 15.0	
			15.1 Area of Triangles (pp.221 – 227) • Teachers can introduce to students that the area of triangles can be found by the formula $\frac{1}{2}ab\sin C$.	1 hour /1 hour	Demonstrating some examples and giving some classwork	• Additional Examples 15.1 – 15.3 • Worksheet 15.1 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 15.1 • Test Bank 15.1	
			15.2 Sine Formula	2 hours	Demonstrating some	• Additional	

			(pp.228 – 237) • Teachers can introduce the sine formula to students. • Teachers may point out that if two sides and one non-included angle of a triangle are given, then we can apply the sine formula to solve the triangle. • Teachers may ask students to construct various types of triangles by using a geometric software and conclude the number of triangles can be formed.	/2 hours	examples and giving some classwork	Examples 15.4 – 15.7 • Worksheet 15.2 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 15.2 • Test Bank 15.2	
			15.3 Cosine Formula **(pp.238 – 246)** • Teacher may point out that because of the limitations of sine formula, cosine formula is used as another tool to solve a triangle. • Teachers may point out that if two sides and the included angle of a	2 hours /2 hours	Demonstrating some examples and giving some classwork	• Additional Examples 15.8 – 15.9 • Worksheet 15.3 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 15.3 • Test Bank 15.3	

			triangle are given, then we can apply the cosine formula to find the remaining side. • Teachers may point out that if three sides of a triangle are given, we can apply the cosine formula to find the unknown angles.				
			15.4 Heron's Formula (pp.246 – 251) • Teachers may point out if three sides of a triangle are known, then we can apply Heron's Formula to find the area of the triangle.	1 hour /1 hour	Demonstrating some examples and giving some classwork	• Additional Examples 15.10 – 15.11 • Worksheet 15.4 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 15.4 • Test Bank 15.4	
			Enrichment Mathematics – An Alternative Proof of the Cosine Formula (pp.266 – 267) • Teachers can introduce an alternative proof of cosine formula. Also, teachers	0.5 hour /0.5 hour	Demonstrating some examples and giving some classwork		

			can find an alternative proof of sine formula				
	4-5	*Non-foundation* **Chapter 16** **Trigonometry (3)** • To apply trigonometric formulas in solving two-dimensional problems • To explore the angle between two straight lines, the angle between a straight line and a plane, the angle between two planes, the distance between a point and a line and the distance between a point and a plane in three-dimensional geometry • To apply trigonometric formulas in solving three-dimensional	**16.1 Applications in Two-dimensional Problems (pp.270 – 279)** • Teachers can point out that if a suitable numbers of angles and sides of a triangle are known, we can solve the triangles by using the sine formula and the cosine formula.	1.5 hours /1.5 hours	Demonstrating some examples and giving some classwork	• Additional Examples 16.1 – 16.3 • Worksheet 16.1 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 16.1 • Test Bank 16.1	
			16.2 Basic Terminology in Three-dimensional Figures (pp.279 – 295) • For a question related to three-dimensional space,	2 hours /2 hours	Demonstrating some examples and giving some classwork	• Additional Examples 16.4 – 16.9 • Worksheet 16.2 (Sets 1 & 2)	

			teachers should point out that students can solve some simple questions about angle between two straight lines first. • Teachers can remind students that finding an angle between a straight line and a plane can be treated as finding an angle between two straight lines. • Teachers may let students make some three-dimensional models, then find a specified angle of the model.			• Ongoing Assessment Package: Quiz 16.2 • Test Bank 16.2	
			16.3 Applications in Three-dimensional Problems (pp.295 – 301) • Teachers can point out that we can solve a three-dimensional problem by find a suitable triangle in the figure.	1 hour /1 hour	Demonstrating some examples and giving some classwork	• Additional Examples 16.10 – 16.11 • Worksheet 16.3 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 16.3 • Test Bank 16.3	

			Enrichment Mathematics – More Applications of Trigonometry (pp.318 – 319) • Teachers can introduce that there are a lot of applications of trigonometry such as surveying, navigation, astronomy, geography, etc.	0.5 hour /0.5 hour	Demonstrating some examples and giving some classwork		
	6-8	**Chapter 3 (M2)** **More about Trigonometric Functions** • To understand the concept of radian measure • To find arc lengths and areas of sectors using radian measure • To recognize the functions cosecant, secant and cotangent and their graphs • To understand the identities $1 + \tan^2 \theta = \sec^2 \theta$ and $1+ \cot^2 \theta = \text{cosec}^2 \theta$ • To understand compound	**3.1 Radian Measures (pp.56 – 63)** • Students should be able to identify the relationship between angles in radian measure and angles in degree measure.	1 hour /1 hour	Demonstrating some examples and giving some classwork	• Additional Examples 3.1 – 3.5 • Worksheet 3.1 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 3.1 • Test Bank 3.1	

		angle formulas, double angle formulas, the product-to-sum and sum-to-product formulas					
			3.2 Trigonometric Functions of General Angles (pp.64 – 76) • Students should be able to evaluate and simplify trigonometric functions of general angles.	2 hours /2 hours	Demonstrating some examples and giving some classwork	• Additional Examples 3.6 – 3.13 • Worksheet 3.2 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 3.2 • Test Bank 3.2	
			3.3 Graphs of Trigonometric Functions (pp.76 – 85) • Students should be able to sketch and recognize the graphs of sine, cosine, tangent, cosecant, secant and cotangent and identify their periods and the ranges of values of trigonometric functions.	1.5 hours /1.5 hours	Demonstrating some examples and giving some classwork	• Additional Examples 3.14 – 3.17 • Worksheet 3.3 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 3.3 • Test Bank 3.3	
			3.4 Compound Angle Formulas (pp.86 – 94) • Students should be able to	2 hours /2 hours	Demonstrating some examples and giving some classwork	• Additional Examples 3.18 – 3.23	

			apply the compound angle formulas to solve trigonometric equations, prove identities and solve maximization and minimization problems.			• Worksheet 3.4 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 3.4 • Test Bank 3.4	
			3.5 Double Angle Formulas (pp.94 – 100) • Teachers can ask students to derive the double angle formulas from the compound angle formulas.	2 hours /2 hours	Demonstrating some examples and giving some classwork	• Additional Examples 3.24 – 3.27 • Worksheet 3.5 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 3.5 • Test Bank 3.5	
			3.6 Sum and Product Formulas (pp.101 – 107) • Students should be able to apply the sum-to-product formulas and product-to-sum formulas.	2 hours /2 hours	Demonstrating some examples and giving some classwork	• Additional Examples 3.28 – 3.31 • Worksheet 3.6 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 3.6 • Test Bank 3.6	
			Enrichment Mathematics – Deriving the Compound	0.5 hour /0.5 hour	Demonstrating some examples and giving some		

			Angle Formulas Using the Euler Formula (p.119) • Teachers can ask students to derive all the compound angle formulas using the Euler formula.		classwork		
	9-11	**Chapter 4 (M2)** **Limits and Derivatives** • To understand the intuitive concept of the limit of a function • To find the limit of a function • To understand the concept of the derivative of a function	**4.1 Limits of Functions (pp.132 – 136)** • Students should understand the concepts of limits, discontinuous functions and continuous functions.	0.5 hour /0.5 hour	Demonstrating some examples and giving some classwork	• Worksheet 4.1 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 4.1 • Test Bank 4.1	
			4.2 Finding the Limit of a Function (pp.136 – 140) • Students should be able to evaluate the limits of functions with the use of rationalization.	1 hour /1 hour	Demonstrating some examples and giving some classwork	• Additional Examples 4.1 – 4.4 • Worksheet 4.2 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 4.2 • Test Bank 4.2	
			4.3 Infinity (pp.141 – 149) • Teachers may illustrate	2 hours /2 hours	Demonstrating some examples and giving some classwork	• Additional Examples 4.5 –	

			the concept of infinity in the following way: Let W be the weight of an object due to the Earth and r be the distance of the object from the centre of the Earth. By Newton's Law of Gravitation, we have $W = \frac{k}{r^2}$, where k is a constant. Then, teachers may guide students to observe that when r gets larger and larger, the weight W gets smaller and smaller and approaches zero. • Teachers can introduce the number e by showing the button on a calculator and further define e by using limits. • Students should be able to evaluate the limits of functions at infinity, evaluate the limits that			4.11 • Worksheet 4.3 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 4.3 • Test Bank 4.3	

			involve *e*, and solve equations that involve natural logarithms.				
			4.4 Limits of Trigonometric Functions (pp.150 – 153) • Teachers can point out that trigonometric functions are expressed in radian measure. • Students should be able to evaluate the limits of functions using the formula $\lim_{x\to 0}\frac{\sin x}{x}=1$.	1 hour /1 hour	Demonstrating some examples and giving some classwork	• Additional Examples 4.12 – 4.13 • Worksheet 4.4 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 4.4 • Test Bank 4.4	
			4.5 Derivatives (pp.154 – 159) • Students should understand the geometric meaning of derivatives. • Students should be able to find the slopes of tangents and the derivatives of functions from first principles.	1.5 hours /1.5 hours	Demonstrating some examples and giving some classwork	• Additional Examples 4.14 – 4.17 • Worksheet 4.5 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 4.5 • Test Bank 4.5	

			Enrichment Mathematics – Infinity as a Limit (p.165) • This enrichment introduces limits that tend to positive infinity or negative infinity when *x* approaches a certain value from the left or from the right. This may help students understand the concept of vertical asymptotes which will be taught under the topic of curve sketching in Chapter 7.	0.5 hour /0.5 hour	Demonstrating some examples and giving some classwork		
	11-12	**Chapter 5 (M2) Differentiation (1)** • To understand the concept of the derivative of a function • To understand the addition rule, power rule, product rule, quotient rule and chain rule of differentiation • To find the derivatives of functions by using implicit differentiation	**5.1 Rules of Differentiation (pp.168 – 176)** • Teachers may ask students to check whether the equality $\frac{d}{dx}(x+x^2)=\frac{dx}{dx}+\frac{dx^2}{dx}$ holds or not. Teachers may then ask students to verify the rule	2 hours /2 hours	Demonstrating some examples and giving some classwork	• Additional Examples 5.1 – 5.7 • Worksheet 5.1 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 5.1 • Test Bank 5.1	

			$\frac{d}{dx}[f(x)+g(x)]$ $=\frac{d}{dx}f(x)+\frac{d}{dx}g(x).$ • Teachers may ask students to derive the rules of differentiation from first principles. • Students should be able to use the power rule, addition rule, product rule and quotient rule to find derivatives of functions.				
			5.2 Differentiation of Composite Functions (pp.176 – 181) • Students should be able to use the chain rule to find the derivatives of functions with or without given substitutions of 'intermediate' functions.	2.5 hours /2.5 hours	Demonstrating some examples and giving some classwork	• Additional Examples 5.8 – 5.10 • Worksheet 5.2 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 5.2 • Test Bank 5.2	
			5.3 Differentiation of Implicit Functions (pp.181 – 184) • Students should be able to	2 hours /2 hours	Demonstrating some examples and giving some classwork	• Additional Examples 5.11 – 5.13 • Worksheet 5.3	

			find the derivatives of implicit functions with the application of finding the slopes of tangents at given points.			(Sets 1 & 2) • Ongoing Assessment Package: Quiz 5.3 • Test Bank 5.3	
			Enrichment Mathematics – Newton's Method – Numerical Approximation of Roots (p.189) • This enrichment introduces Newton's method which gives the numerical approximation of roots of polynomial equations in one unknown. • Teachers may further explain the importance of Newton's method, as polynomial equations in one unknown with degree 5 or higher do not have general solutions in radicals (Abel's Impossibility Theorem).	0.5 hour /0.5 hour	Demonstrating some examples and giving some classwork		
	12-14	**Chapter 6 (M2)**	**6.1 Differentiation of**	2.5 hours	Demonstrating some	• Additional	

		Differentiation (2) • To find the derivatives of functions involving exponential and logarithmic functions • To find the derivatives of functions involving trigonometric functions • To find the second derivative of an explicit function	**Exponential and Logarithmic Functions (pp.192 – 198)** • Teachers may ask students to derive the formulas of the derivatives of exponential and logarithmic functions from first principles. • Students should be able to find the derivatives by taking logarithm.	/2.5 hours	examples and giving some classwork	Examples 6.1 – 6.6 • Worksheet 6.1 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 6.1 • Test Bank 6.1	
			6.2 Differentiation of Trigonometric Functions (pp.198 – 206) • Teachers may emphasize that when finding the derivatives of trigonometric functions, the unknown angles are in radian measure. • Teachers may ask students to derive the formulas of the derivatives of the six trigonometric functions	2.5 hours /2.5 hours	Demonstrating some examples and giving some classwork	• Additional Examples 6.7 – 6.13 • Worksheet 6.2 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 6.2 • Test Bank 6.2	

			from first principles. • Students should be able to find the derivatives of explicit trigonometric functions and implicit functions that involve trigonometric functions.				
			6.3 Second Derivatives (pp.206 – 209) • Students should be able to find the second derivatives of explicit functions. • Students can also learn to solve simple problems about differential equations.	1.5 hours /1.5 hours	Demonstrating some examples and giving some classwork	• Additional Examples 6.14 – 6.17 • Worksheet 6.3 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 6.3 • Test Bank 6.3	
			Enrichment Mathematics – Taylor's Series (p.215) • This enrichment introduces the use of Taylor's series to find approximate values of trigonometric functions at different points. • Teachers may further	0.5 hour /0.5 hour	Demonstrating some examples and giving some classwork		

			explain the importance of this approximation method, as trigonometric functions have exact values at only a few special angles.				
Second Term (2/1/2017-17/7/2017, Weeks 19 to 47)	19-20	**Chapter 18** **Arithmetic and geometric Sequences** *Non-foundation* • To understand the concepts and the properties of arithmetic and geometric sequences *Non-foundation* • To understand the general terms of arithmetic and geometric sequences *Non-foundation* • To find the sum of a finite number of terms of an arithmetic sequence and a geometric sequence *Non-foundation* • To find the sum to infinity for certain geometric sequences	**18.1 Introduction to Sequences (pp.2 – 8)** • Teachers can ask students to investigate, appreciate and observe the patterns of various number sequences such as polygonal numbers, arithmetic and geometric sequences, Fibonacci sequence, etc. • Teachers can generalize the general terms of some sequences with simple derivation. • Teachers can point out that some sequences do not have definite patterns, and give some corresponding examples.	1.5 hours /1.5 hours	Demonstrating some examples and giving some classwork	• Additional Examples 18.1 – 18.3 • Worksheet 18.1 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 18.1 • Test Bank 18.1	

		Non-foundation • To solve real-life problems relating to sequences					
			Non-foundation **18.2 Arithmetic Sequence (pp.8 – 17)** • Teachers can introduce the pattern of arithmetic sequences.	3 hours /3 hours	Demonstrating some examples and giving some classwork	• Additional Examples 18.4 – 18.8 • Worksheet 18.2 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 18.2 • Test Bank 18.2	
			Non-foundation **18.3 Geometric Sequence (pp.18 – 26)** • Teachers can introduce the pattern of geometric sequences. • Teachers can ask students to review the techniques for solving exponential equations.	3 hours /3 hours	Demonstrating some examples and giving some classwork	• Additional Examples 18.9 – 18.13 • Worksheet 18.3 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 18.3 • Test Bank 18.3	

			Non-foundation **18.4 Summing an Arithmetic Sequence (pp.27 – 34)** • Teachers can deduce the formula for summing an arithmetic sequence.	4 hours /4 hours	Demonstrating some examples and giving some classwork	• Additional Examples 18.14 – 18.17 • Worksheet 18.4 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 18.4 • Test Bank 18.4	
			Non-foundation **18.5 Summing a Geometric Sequence (pp.34 – 47)** • Teachers can deduce the formula for summing a geometric sequence. • Teachers may ask students to investigate the property of geometric series when $r = 1$. • Teachers can ask students to investigate the formula for sum to infinity.	5 hours /5 hours	\ Demonstrating some examples and giving some classwork	• Additional Examples 18.18 – 18.24 • Worksheet 18.5 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 18.5 • Test Bank 18.5	
			Enrichment Mathematics – Analysis on the Spreading	0.5 hour	Demonstrating some examples and giving some		

			of Disease Using Geometric Series (pp.60 – 61) • The applications of the formulas of sequences in solving real-life problems should be discussed.	/0.5 hour	classwork		
	20-21	Non-foundation **Chapter 19** **Permutation and Combination** • To understand the addition rule and multiplication rule in the counting principle • To understand the concept and notation of permutation • To solve problems on the permutation of distinct objects without repetition • To understand the concept and notation of combination • To solve problems on the combination of distinct objects without repetition	**19.1 Counting Principle (pp.64 – 75)** • Teachers may ask student to draw a diagram to illustrate all the possible ways.	4 hours /4 hours	Demonstrating some examples and giving some classwork	• Additional Examples 19.1 – 19.5 • Worksheet 19.1 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 19.1 • Test Bank 19.1	
			19.2 Permutation (pp.75 – 86) • Teachers can introduce	3.5 hours /3.5 hours	Demonstrating some examples and giving some classwork	• Additional Examples 19.6 – 19.9 • Worksheet 19.2	

			the definition of factorial. • Teachers can introduce the concept of permutation.			(Sets 1 & 2) • Ongoing Assessment Package: Quiz 19.2 • Test Bank 19.2	
			19.3 Combination (pp.86 – 93) • Teachers can introduce the concept of combination.	3 hours /3 hours	Demonstrating some examples and giving some classwork	• Additional Examples 19.10 – 19.12 • Worksheet 19.3 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 19.3 • Test Bank 19.3	
			Enrichment Mathematics – More about Permutation (pp.106 – 107) • Teachers can point out that the permutation of *n* distinct objects and *n* indistinct objects are different.	0.5 hour /0.5 hour	Demonstrating some examples and giving some classwork		
	21-22	*Non-foundation* **Chapter 20**					

		More about Probability • To recognize the notation of set language including union, intersection and complement • To understand the addition law of probability and the concepts of mutually exclusive events and complementary events • To understand the multiplication law of probability and the concept of independent events • To recognize the concept and notation of conditional probability • To use permutation and combination to solve problems relating to probability	**20.1 Basic Concepts of probability (pp.110 – 117)** • Teachers can teach the concept of sets, elements, union, intersection and complement. • Teachers can teach the notation of set language. • Teachers can teach the concept and definition of probability. • Teachers can point out the difference between theoretical probability and experimental probability.	1.5 hours /1.5 hours	Demonstrating some examples and giving some classwork	• Additional Examples 20.1 – 20.2 • Worksheet 20.1 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 20.1 • Test Bank 20.1	
			20.2 Addition Law of probability (pp.118 – 130) • Teachers can use a Venn diagram to illustrate this formula.	2 hours /2 hours	Demonstrating some examples and giving some classwork	• Additional Examples 20.3 – 20.7 • Worksheet 20.2 (Sets 1 & 2) • Ongoing	

			• Teachers can demonstrate the concepts of probability by tossing coins, throwing dice and drawing cards.			Assessment Package: Quiz 20.2 • Test Bank 20.2	
			20.3 Multiplication Law of Probability and Independent Events (pp.130 – 140) • Teachers can explore with students about the property of independent events and explore the multiplication law of probability. • Teachers can help students distinguish independent events.	2 hours /2 hours	Demonstrating some examples and giving some classwork	• Additional Examples 20.8 – 20.10 • Worksheet 20.3 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 20.3 • Test Bank 20.3	
			20.4 Multiplication Law of Probability and Dependent Events (pp.140 – 149) • Teachers may give some real-life examples of two dependent events.	2 hours /2 hours	Demonstrating some examples and giving some classwork	• Additional Examples 20.11 – 20.14 • Worksheet 20.4 (Sets 1 & 2) • Ongoing Assessment Package: Quiz	

						20.4 • Test Bank 20.4	
			20.5 Further Problems in Probability (pp.150 – 155) • Teachers may have more discussions on various cases involving probability in real-life situations.	2 hours /2 hours	Demonstrating some examples and giving some classwork	• Additional Examples 20.15 – 20.18 • Worksheet 20.5 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 20.5 • Test Bank 20.5	
			Enrichment Mathematics – A Paradox in Probability – The Monty Hall Problem (pp.172 – 173) • Teachers can introduce other game problems involving probability.	0.5 hour /0.5 hour	Demonstrating some examples and giving some classwork		
	24-25	**Chapter 21** **Measures of Dispersion** • To understand the concept of dispersion • To understand the concepts of range and inter-quartile range • To construct and interpret	**Let's Review (pp.176 – 177)** • Teachers may ask students to review the techniques for collecting and organizing data, and use statistical graphs to	0.5 hour /0.5 hour	Demonstrating some examples and giving some classwork	• Worksheet 21.0 (Sets 1 & 2)	

		box-and-whisker diagrams and use them to compare the distributions of different sets of data • To understand the concept of standard deviation • To compare the dispersion of different sets of data using appropriate measures *Non-foundation* • To understand the applications of the standard deviation in real-life problems *Non-foundation* • To explore and make conjecture on the effects of dispersion in different situations	represent frequency distribution and different measures of central tendency.				
			21.1 Range and Inter-quartile Range (pp.178 – 188) • Teachers can remind students the difference in calculating range and inter-quartile range of grouped and ungrouped	2 hours /2 hours	Demonstrating some examples and giving some classwork	• Additional Examples 21.1 – 21.5 • Worksheet 21.1 (Sets 1 & 2) • Ongoing Assessment Package: Quiz	

			data.			21.1 • Test Bank 21.1	
			21.2 Box-and-whisker Diagrams (pp.189 – 198) • Teachers can illustrate the general configuration of a box-and-whisker diagram. • Teachers can teach students how to use box-and-whisker diagrams to compare different sets of data. • Teachers can help students develop their information technology skills in drawing the box-and-whisker diagram by using a spreadsheet.	3 hours /3 hours	Demonstrating some examples and giving some classwork	• Additional Examples 21.6 – 21.7 • Worksheet 21.2 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 21.2 • Test Bank 21.2	
			21.3 Standard Deviation (pp.198 – 209) • Teachers can use two sets of data with the same mean but different dispersions to point out the meaning of standard	3 hours /3 hours	Demonstrating some examples and giving some classwork	• Additional Examples 21.8 – 21.11 • Worksheet 21.3 (Sets 1 & 2) • Ongoing Assessment	

			deviation of the data.			Package: Quiz 21.3 • Test Bank 21.3	
			Non-foundation **21.4 Applications of Standard Deviation (pp.210 – 218)** • Teachers can tell students to use the formula for standard score to find the standard deviation. • Teachers can ask students what a standard deviation of 0 represents.	2.5 hours /2.5 hours	Demonstrating some examples and giving some classwork	• Additional Examples 21.12 – 21.15 • Worksheet 21.4 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 21.4 • Test Bank 21.4	
			21.5 Effects on the Dispersion with a Change in Data Non-foundation **- 227)** • Teachers can discuss with students about the change on the dispersion of data after making different changes to data values.	2 hours /2 hours	Demonstrating some examples and giving some classwork	• Additional Examples 21.16 – 21.17 • Worksheet 21.5 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 21.5 • Test Bank 21.5	

			Enrichment Mathematics – Applications of the Coefficient of Variation (pp.246 – 247) • Teachers can point out that the standard deviation is commonly used to compare different sets of data in daily life.	0.5 hour /0.5 hour	Demonstrating some examples and giving some classwork		
	25-26	**Chapter 22** **Uses and Abuses of Statistics** • To recognize different techniques in survey sampling and the basic principles of questionnaire design • To discuss and recognize the uses and abuses of statistical methods in various daily-life activities or investigations • To assess statistical investigations presented in different sources such as the news media, research reports, etc	**Let's Review (p.250)** • Teachers can ask students to review sampling techniques and different methods of data collection.	0.5 hour /0.5 hour	Demonstrating some examples and giving some classwork		
			22.1 Statistical Surveys (pp.250 – 255)	2 hours /2 hours	Demonstrating some examples and giving some classwork	• Worksheet 22.1 (Sets 1 & 2)	

			• Teachers can ask students to discuss in groups about the strengths and weaknesses of various methods of surveys.				
			22.2 Sampling Methods (pp.256 – 264) • Teachers can discuss with students about the reasons of using sampling method as a statistical method. • Teachers can point out the difference between probability sampling and non-probability sampling.	3 hours /3 hours	Demonstrating some examples and giving some classwork	• Additional Examples 22.1 – 22.3 • Worksheet 22.2 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 22.2 • Test Bank 22.2	
			22.3 Statistical Investigations (pp.265 – 273) • Through reading various statistical reports, teachers can discuss the credibility of the reports with students. • Teachers can also ask the students to assess the statistical investigations	2 hours /2 hours	Demonstrating some examples and giving some classwork	• Additional Examples 22.4 – 22.5 • Worksheet 22.3 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 22.3 • Test Bank 22.3	

			in groups.				
			Enrichment Mathematics – Population Census and By-census in Hong Kong (pp.286 – 287) • Teachers can ask students to find out some data from population census and do a project.	0.5 hour /0.5 hour	Demonstrating some examples and giving some classwork		
	27-29	**Chapter 7 (M2) Applications of Differentiation** • To find the equations of tangents and normals to a curve • To find maxima and minima • To sketch curves of polynomial functions and rational functions • To solve the problems relating to rate of change, maximum and minimum	**7.1 Tangents and Normals (pp.218 – 222)** • Students should be able to find the equations of normal and/or tangent of curves at a given point or under certain conditions.	2 hours /2 hours	Demonstrating some examples and giving some classwork	• Additional Example 7.1 – 7.4 • Worksheet 7.1 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 7.1 • Test Bank 7.1	
			7.2 Local Extrema and Derivative Tests (pp.222 – 232)	3 hours /3 hours	Demonstrating some examples and giving some classwork	• Additional Examples 7.5 – 7.9	

			• Students should be able to identify the points of local maximum and local minimum through the following steps. For a function $f(x)$, (a) find a such that $f'(a) = 0$; (b) test the sign of $f''(a)$ or test for the change of sign of $f'(x)$ in a neighbourhood of a. • Teachers may remind students of the following points. (a) Local or relative extrema are not necessarily the global or absolute extrema. (b) Turning points may occur at points where the derivatives do not exist. (c) Stationary points are points whose derivatives are zero. (d) $f'(a) = 0$ is NOT			• Worksheet 7.2 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 7.2 • Test Bank 7.2	

			sufficient to conclude that $f(x)$ attains a local extremum at $x = a$.				
			7.3 Curve Sketching (pp.232 – 247) • Students should be able to identify the points of inflexion through the following steps. For a function $f(x)$, (a) find a such that $f''(a) = 0$; (b) test for the change of sign of $f''(x)$ around a. • Teachers may remind students of the following points. (a) At points of inflexion, the first derivative may not be equal to zero. (b) $f''(a) = 0$ is NOT sufficient to conclude the occurrence of a point of inflexion at	3 hours /3 hours	Demonstrating some examples and giving some classwork	• Additional Examples 7.10 – 7.14 • Worksheet 7.3 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 7.3 • Test Bank 7.3	

			$x = a$. • Besides axes of symmetry, *x*- and *y*-intercepts, turning points and points of inflexion, students should be able to find the vertical, horizontal and oblique asymptotes to a curve when sketching it. • Teachers may ask students to sketch curves featuring each one of the important characteristics before working on curves that bear all the characteristics.				
			7.4 Optimization Problems (pp.247 – 257) • Teachers can post the following question as an introduction: 'How can we find the most economical design for a cylindrical can to hold a fixed volume, say, 72π cm^3?'	2.5 hours /2.5 hours	Demonstrating some examples and giving some classwork	• Additional Examples 7.15 – 7.19 • Worksheet 7.4 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 7.4 • Test Bank 7.4	

			• Students should be able to find the extremum of functions and solve practical optimization problems.				
			7.5 Rates of Change (pp.258 – 265) • The meaning of $\frac{dy}{dx}$ as the rate of change of y with respect to x should be introduced and thoroughly discussed with reference to some common quantities like velocity and acceleration.	3 hours /3 hours	Demonstrating some examples and giving some classwork	• Additional Examples 7.20 – 7.23 • Worksheet 7.5 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 7.5 • Test Bank 7.5	
			Enrichment Mathematics – How to Throw the Javelin Farthest? (p.277) • Students can learn that when there is no air resistance, a javelin should be thrown out at an angle of 45° in order to achieve the best result.	0.5 hour /0.5 hour	Demonstrating some examples and giving some classwork		
	30-35	**Chapter 8 (M2)**	**8.1 Concepts of Indefinite**	2 hours	Demonstrating some	• Additional	

		Indefinite Integrals • To recognize the concept of indefinite integration • To understand the properties of indefinite integrals • To use the integration formulas of algebraic functions, trigonometric functions and exponential functions to find indefinite integrals • To understand the applications of indefinite integrals in real-life or mathematical contexts • To use integration by substitution to find indefinite integrals	**Integrals (pp.2 – 11)** • Teachers may mention that integration is the reverse process of differentiation. • Students should be able to find indefinite integrals of simple algebraic functions, exponential functions and trigonometric functions.	/2 hours	examples and giving some classwork	Examples 8.1 – 8.6 • Worksheet 8.1 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 8.1 • Test Bank 8.1	
			8.2 Indefinite Integration of Functions (pp.11 – 19) • Teachers may ask students to derive the integration formulas for more complicated functions from the	3.5 hours /3.5 hours	Demonstrating some examples and giving some classwork	• Additional Examples 8.7 – 8.16 • Worksheet 8.2 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 8.2	

			formulas of differentiation. • Students should be able to find indefinite integrals of more complicated functions involving the expression ($ax + b$) or trigonometric functions.			• Test Bank 8.2	
		• To use trigonometric substitution to find the indefinite integrals involving $\sqrt{a^2 - x^2}$, $\sqrt{x^2 - a^2}$ or $\sqrt{a^2 + x^2}$ • To use integration by parts to find indefinite integrals	**8.3 Integration by Substitution (pp.20 – 33)** • The substitution formula $\int f(u)du = \int f[g(x)]g'(x)dx$ need not be proved rigorously. Teachers can start with simple and obvious examples. • Teachers may mention that integration by substitution without the use of dummy variables can help students master the method of integration by parts which will be discussed in the next section.	4.5 hours /4.5 hours	Demonstrating some examples and giving some classwork	• Additional Examples 8.17 – 8.29 • Worksheet 8.3 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 8.3 • Test Bank 8.3	

			• Students should be able to find indefinite integrals using integration by substitution, find indefinite integrals involving powers of trigonometric functions, and find indefinite integrals using trigonometric substitution.				
			8.4 Integration by Parts (pp.33 – 39) • Typical examples for illustrating the technique of integration by parts include $\int xe^x dx$, $\int x\sin x dx$ and $\int \ln x dx$. • Students should be able to find indefinite integrals by using substitution and integration by parts.	3 hours /3 hours	Demonstrating some examples and giving some classwork	• Additional Example 8.30 – 8.35 • Worksheet 8.4 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 8.4 • Test Bank 8.4	
			8.5 Applications of Indefinite Integrals (pp.39 – 45)	2.5 hours /2.5 hours	Demonstrating some examples and giving some classwork	• Additional Example 8.36 – 8.39	

			• Students should be able to solve geometrical application problems of indefinite integrals, application problems of indefinite integrals in physics, and other application problems of indefinite integrals.			• Worksheet 8.5 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 8.5 • Test Bank 8.5	
			Enrichment Mathematics – Technique of Integration - Reduction Formula (p.55) • This enrichment introduces the technique of reduction formula to find indefinite integrals of trigonometric functions with high degree. • Teachers may ask students to try to apply the technique of reduction formula on integrands with exponential or logarithmic functions. • Students should understand that the technique of reduction	0.5 hour /0.5 hour	Demonstrating some examples and giving some classwork		

			formula helps us lower the degree of the integrand and thus simplify the calculation.				
	36-38	**Chapter 9 (M2)** **Definite Integrals** • To recognize the concept of definite integration • To understand the properties of definite integrals • To find definite integrals of algebraic functions, trigonometric functions and exponential functions • To use integration by substitution to find definite integrals • To use integration by parts to find definite integrals • To understand the properties of the definite integrals of even, odd and periodic functions	**9.1 Concepts of Definite Integrals (pp.58 – 66)** • Teachers may first explain to students that the area under a curve is approximately equal to the sum of all areas of the strips. Then, teachers may ask students to discuss how to obtain a more accurate value. The result may relate to the idea of the 'limit sum'. Follow from that, teachers may define the definite integral by the idea of the limit sum. • Students should be able to find definite integrals from geometrical interpretation, from definition, and by using	1.5 hours /1.5 hours	Demonstrating some examples and giving some classwork	• Additional Examples 9.1 – 9.3 • Worksheet 9.1 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 9.1 • Test Bank 9.1	

			the basic properties.				
			9.2 Finding Definite Integrals of Functions (pp.66 – 73) • Teachers may introduce the Fundamental Theorem of Calculus by areas under a curve. • Students should be able to find definite integrals by the Fundamental Theorem of Calculus. Cases that also require double angle formulas and compound angle formulas may be included.	3 hours /3 hours	Demonstrating some examples and giving some classwork	• Additional Examples 9.4 – 9.9 • Worksheet 9.2 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 9.2 • Test Bank 9.2	
			9.3 Further Techniques of Definite Integration (pp.73 – 82) • Students should understand that the method of integration by substitution for definite integrals is the same as that for indefinite integrals, except that the	3 hours /3 hours	Demonstrating some examples and giving some classwork	• Additional Examples 9.10 – 9.16 • Worksheet 9.3 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 9.3 • Test Bank 9.3	

			upper and lower limits need to be changed. • Students should understand that the method of integration by parts for definite integrals is very similar to the case of indefinite integrals, except lower and upper limits are now required. • Students should be able to find definite integrals by integration by substitution, trigonometric substitution and integration by parts.				
			9.4 Definite Integrals of Special Functions (pp.82 – 91) • Students should be able to find definite integrals of even functions, odd functions and periodic functions.	3 hours /3 hours	Demonstrating some examples and giving some classwork	• Additional Examples 9.17 – 9.22 • Worksheet 9.4 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 9.4 • Test Bank 9.4	
			Enrichment Mathematics –	0.5 hour	Demonstrating some examples and giving some		

			Method of Numerical Integration – Trapezoidal Rule (p.101) • This enrichment introduces the trapezoidal rule which helps us find numerical approximations of definite integrals. • Teachers can ask students to try integrating e^{-x^2}, and then introduce the trapezoidal rule to find the definite integrals. • Students should understand that there are some integrands whose primitive function cannot be found using the integration formulas.	/0.5 hour	classwork		
	39-40	**Chapter 10 (M2)** **Applications of Definite Integrals** • To understand the application of definite integrals in finding the area of a plane figure • To understand the application of definite integrals in finding	**10.1 Finding Plane Areas by Integration (pp.104 – 118)** • Students should be able to find the area of the region bounded by a curve and the *x*-axis, the *y*-axis and	2.5 hours /2.5 hours	Demonstrating some examples and giving some classwork	• Additional Examples 10.1 – 10.8 • Worksheet 10.1 (Sets 1 & 2) • Ongoing Assessment	

		the volume of solids of revolution about a coordinate axis or a line parallel to a coordinate axis	other lines. • Students should be able to find the area of the region bounded by two curves.			Package: Quiz 10.1 • Test Bank 10.1	
			10.2 Volume of Solids of Revolution (pp.118 – 137) • Since students should be familiar with the formula of the volume of a right circular cone, teachers may start the lesson by pointing out that such formula can be established by using definite integrals. • Students should be able to find the volume of the solid of revolution about the *x*-axis, the *y*-axis or the lines parallel to the *x*-axis or *y*-axis. • Students should be able to apply both the disc method and the shell method.	4 hours /4 hours	Demonstrating some examples and giving some classwork	• Additional Examples 10.9 – 10.20 • Worksheet 10.2 (Sets 1 & 2) • Ongoing Assessment Package: Quiz 10.2 • Test Bank 10.2	

			Enrichment Mathematics – Arc Length (p.149) • This enrichment introduces the formula for the arc length of a curve. • Teachers may explain the mean value theorem to students as the theorem is required for the derivation of the formula for arc length.	0.5 hour /0.5 hour	Demonstrating some examples and giving some classwork		

* The extended parts should be marked with asterisks. These parts should be more challenging and can be covered when the students can master the knowledge and skills covered in the conventional topics.

Core Values of Wah Yan College, Kowloon

I. Love and care	1. Accept & feel positive about himself 2. Appreciation & Gratitude 3. Empathy & Compassion	4. Forgiveness & Reconciliation 5. Service 6. Family as a basic unit of society; marriage is the foundation of a family
II. Strive for excellence	7. Reflective 8. Commitment 9. Perseverance	10. Curiosity & willingness to learn 11. Value imagination and creativity
III. Respect and Justice	12. Life is valuable and respectable 13. Openness to good in all things 14. Respect for himself & others	15. Integrity 16. Faithfulness
IV. Responsibility	17. Freedom & Self-discipline	19. Social Identities: citizen identity, national identity

	18. Care for the environment	and global citizen identity
V. Faith	20. Experience of God 21. Explore & practise one's faith	22. Appreciate religious liturgies