PERTH MODERN SCHOOL
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Independent Public School

Year 10 Mathematics Course 2022 (SEMESTER TWO)

Note: This outline is subject to change.

The following program of work is designed to ensure that the students are prepared to attempt the Mathematics: Methods and Mathematics: Specialist courses in Year 11. This entails completing all of Methods Unit 1, and parts of Methods Unit 2 and Specialist Units 1 & 2 using Sadler Year 11 textbooks.

Weeks	WA Curriculum Descriptor UNIT TITLE	Learning Objectives	Extension	General Capabilities, Study Skills and 21st CLD	Assessments	Resources
Term 3 Week 1	**Methods UNIT 2 Indices**	**Indices and the Index Laws** 1.3.1 review indices (including fractional and negative indices) and the index laws 1.3.2 use radicals and convert to and from fractional indices 1.3.3 understand and use scientific notation and significant figures	Mathspace	General Capabilities: Persisting Thinking and communicating with clarity and precision Thinking flexibly Striving for accuracy Questioning and posing problems Applying past knowledge to new situations  **Habits of Mind:** Thinking flexibly		Sadler Unit 2 Methods Ch 1 Ex 1A – 1C
Week 2	**Methods UNIT 2 Exponential Functions**	**Exponential Functions** 2.1.1 establish and use the algebraic properties of exponential functions 2.1.2 recognise the qualitative features of the graph of $y = a^x$ $(a > 0)$, including asymptotes, and of its translations ($y = a^x + b$ and $y = a^{x-c}$) 2.1.3 identify contexts suitable for modelling by exponential functions and use them to solve practical problems 2.1.4 solve equations involving exponential functions using technology, and algebraically in simple cases	Mathspace	General Capabilities: Persisting Thinking and communicating with clarity and precision Thinking flexibly Striving for accuracy Questioning and posing problems Applying past knowledge to new situations **21CLD:** **Knowledge Construction (3),** **Self-Regulation (3),** **ICT Use for Learning (3)** **Activity: students use technologies such as Class-Pad and Desmos to solve equations involving exponential functions.**	**Inv 2 Week 3**	Sadler Unit 2 Methods Ch 2 Ex 2A – 2B

Week 3 - 4	**Methods UNIT 2 Sequences**	**Arithmetic sequences** 2.2.1 recognise and use the recursive definition of an arithmetic sequence: $t_{n+1} = t_n + d$ 2.2.2 develop and use the formula $t_n = t_1 + (n-1)d$ for the general term of an arithmetic sequence and recognise its linear nature 2.2.3 use arithmetic sequences in contexts involving discrete linear growth or decay, such as simple interest 2.2.4 establish and use the formula for the sum of the first n terms of an arithmetic sequence **Geometric sequences** 2.2.5 recognise and use the recursive definition of a geometric sequence: $t_{n+1} = t_n r$ 2.2.6 develop and use the formula $t_n = t_1 r^{n-1}$ for the general term of a geometric sequence and recognise its exponential nature 2.2.7 understand the limiting behaviour as $n \to \infty$ of the terms t_n in a geometric sequence and its dependence on the value of the common ratio r 2.2.8 establish and use the formula $S_n = t_1 \frac{r^n - 1}{r-1}$ for the sum of the first n terms of a geometric sequence 2.2.9 use geometric sequences in contexts involving geometric growth or decay, such as compound interest	Mathspace			Sadler Unit 2 Methods Ch 3 Ex 3A – 3C
Week 5 – 6	**Methods UNIT 2 Series**	**Arithmetic sequences** 2.2.1 recognise and use the recursive definition of an arithmetic sequence: $t_{n+1} = t_n + d$	Mathspace	**21CLD: Real World Problem Solving (4) ICT Use for Learning (3), Knowledge Construction (3).** **Activity: students apply**	**Test 3 Week 6**	Sadler Unit 2 Methods Ch 4 Ex 4A – 4C

		2.2.2 develop and use the formula $t_n = t_1 + (n-1)d$ for the general term of an arithmetic sequence and recognise its linear nature 2.2.3 use arithmetic sequences in contexts involving discrete linear growth or decay, such as simple interest 2.2.4 establish and use the formula for the sum of the first n terms of an arithmetic sequence **Geometric sequences** 2.2.5 recognise and use the recursive definition of a geometric sequence: $t_{n+1} = t_n r$ 2.2.6 develop and use the formula $t_n = t_1 r^{n-1}$ for the general term of a geometric sequence and recognise its exponential nature 2.2.7 understand the limiting behaviour as $n \to \infty$ of the terms t_n in a geometric sequence and its dependence on the value of the common ratio r 2.2.8 establish and use the formula $S_n = t_1 \frac{r^n - 1}{r-1}$ for the sum of the first n terms of a geometric sequence 2.2.9 use geometric sequences in contexts involving geometric growth or decay, such as compound interest		**geometric sequences in the context of financial mathematics such as compound interest**		
Week 7- 8	**Specialist UNIT 1 & 2 Counting Techniques**	**Permutations (ordered arrangements)** 1.1.1 solve problems involving permutations 1.1.2 use the multiplication and addition principle 1.1.3 use factorial notation and ${}^nP_r$ to solve problems involving permutations involving restrictions with or without repeated objects	Mathspace	Persisting Thinking and communicating with clarity and precision Thinking flexibly Striving for accuracy Questioning and posing problems Applying past knowledge to new situations  **Habits of Mind:**		Sadler Units 1&2 Specialist Ch 2 Ex 2A – 2F

		The inclusion-exclusion principle for the union of two sets and three sets 1.1.5 determine and use the formulas for finding the number of elements in the union of two and the union of three sets **Combinations (unordered selections)** 1.1.7 solve problems involving combinations 1.1.8 use the notation $\binom{n}{r}$ or ${}^{n}C_{r}$ 1.1.9 derive and use associated simple identities associated with Pascal's triangle		Thinking flexibly **21CLD: Knowledge Construction (4), ICT Use for Learning (3), Collaboration (3).** **<u>Activity</u>: students apply the knowledge of Pascal's triangle in other contexts such as Binomial Expansion**		
Week 9 - 10	**Specialist UNIT 1 & 2 Vectors**	**Representing vectors in the plane by directed line segments** 1.2.1 examine examples of vectors, including displacement and velocity 1.2.2 define and use the magnitude and direction of a vector 1.2.3 represent a scalar multiple of a vector 1.2.4 use the triangle and parallelogram rules to find the sum and difference of two vectors	Mathspace	Persisting Thinking and communicating with clarity and precision Thinking flexibly Striving for accuracy Questioning and posing problems Applying past knowledge to new situations		Sadler Units 1&2 Specialist Ch 3 Ex 3A – 3D

TERM 4

Weeks	WA Curriculum Descriptor UNIT TITLE	Learning Objectives	Extension, Enrichment	General Capabilities, Study Skills and 21st CLD	Assessments	Resources
Term 4 Week 1 - 2	**Specialist UNIT 1 & 2 Vectors in Component Form**	**Algebra of vectors in the plane** 1.2.5 use ordered pair notation and column vector notation to represent a vector 1.2.6 define unit vectors and the perpendicular unit vectors **i** and **j** 1.2.7 express a vector in component form using the unit vectors **i** and **j** 1.2.8 examine and use addition and subtraction of vectors in component form 1.2.9 define and use multiplication of a vector by a scalar in component form	Mathspace	 **Habits of Mind:** Thinking flexibly		Sadler Units 1&2 Specialist Ch 4 Ex 4A – 4C
Week 3	**Specialist UNIT 1 & 2 Conjectures and Proof**	**The Nature of Proof** 1.3.1 use implication, converse, equivalence, negation, inverse, contrapositive 1.3.2 use proof by contradiction 1.3.3 use the symbols for implication (⇒), equivalence (⇔) 1.3.4 use the quantifiers 'for all' ∀ and 'there exists' ∃. 1.3.5 use examples and counter-examples	Mathspace		**Test 4 Week 3**	Sadler Units 1&2 Specialist Ch 1 Ex 1A
Week 4 - 5	**Specialist UNIT 1 & 2 Geometric Proofs**	**Circle properties, including proof and use** 1.3.6 an angle in a semicircle is a right angle 1.3.7 the size of the angle at the centre subtended by an arc of a circle is twice the size of the		**21CLD: Knowledge Construction (4)** **Activity: Students apply similarity/congruence of triangles to angles in circles.**		Sadler Units 1&2 Specialist Ch 5 Ex 5A – 5B

		angle at the circumference subtended by the same arc 1.3.8 angles at the circumference of a circle subtended by the same arc are equal 1.3.9 the opposite angles of a cyclic quadrilateral are supplementary 1.3.10 chords of equal length subtend equal angles at the centre, and conversely, chords subtending equal angles at the centre of a circle have the same length 1.3.11 the angle in the alternate segment theorem 1.3.12 when two chords of a circle intersect, the product of the lengths of the intervals on one chord equals the product of the lengths of the intervals on the other chord 1.3.13 when a secant (meeting the circle at *A* and *B*) and a tangent (meeting the circle at *T)* are drawn to a circle from an external point *M*, the square of length of the tangent equals the product of the lengths to the circle on the secant ($AM \times BM = TM^2$) 1.3.14 suitable converses of some of the above results 1.3.15 solve problems determining unknown angles and lengths and prove further results using the results listed above				
Week 6		**EXAM REVISION**				
Weeks 7 - 8		**EXAMS**	Mathspace Exam Practice Papers		**Semester 2 Exam**	

Week 9 - 10	**Specialist UNIT 1 & 2 Matrices**	**Matrix arithmetic** 2.2.1 apply matrix definition and notation 2.2.2 define and use addition and subtraction of matrices, scalar multiplication, matrix multiplication, multiplicative identity, and inverse 2.2.3 calculate the determinant and inverse of 2 × 2 matrices and solve matrix equations of the form $AX = B$, where A is a 2 × 2 matrix and X and B are column vectors	Mathspace			Sadler Units 1&2 Specialist Ch 10 Ex 10A – 10D

ASSESSMENT OUTLINE

SEMESTER 2

Assessment Item	Weighting	Timing
Inv 2	20%	Term 3 Week 3
Test 3	25%	Term 3 Week 6
Test 4	25%	Term 4 Week 3
Semester 2 Exam	30%	Term 4 Week 7 - 8 (Exact Date TBA)