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| pact jpg1 | **Mathematics Methods Units 1 & 2 year 11**  **Teaching and Learning Program** | | |
| **Year: 2015**  **Term: 1** | **Course Texts /Resources:** |  |

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| **Time Line** | **AC Code** | **Content Description** | **Resources and references** | **Assessment**  **Tasks & Weighting**  **Date Due** |
| 1 - 3 | **Lines and linear relationships**  1.1.3 examine examples of direct proportion and linearly related variables  1.1.4 recognise features of the graph of , including its linear nature, its intercepts and its slope or gradient  1.1.5 determine the equation of a straight line given sufficient information; including parallel and perpendicular lines  1.1.6 solve linear equations, including those with algebraic fractions and variables on both sides  **Quadratic relationships**  1.1.7 examine examples of quadratically related variables  1.1.8 recognise features of the graphs of , and , including their parabolic nature, turning points, axes of symmetry and intercepts  1.1.9 solve quadratic equations, including the use of quadratic formula and completing the square  1.1.10 determine the equation of a quadratic given sufficient information  **Inverse proportion**  1.1.13 examine examples of inverse proportion  1.1.14 recognise features and determine equations of the graphs of and , including their hyperbolic shapes and their asymptotes.  **Powers and polynomials**  1.1.16 Identify the coefficients and the degree of a polynomial  1.1.17 expand quadratic and cubic polynomials from factors  1.1.19 factorise cubic polynomials in cases where a linear factor is easily obtained  1.1.20 solve cubic equations using technology, and algebraically in cases where a linear factor is easily obtained | **Equations and Polynomials**  - Linear and line relationships  - Review of quadratic relationships  - Inverse proportion  - Powers and polynomials  - Functions | **Nelson Methods 11** Chapter 1.01 – 1.02 (Review) 1.03 – 1.12 | **Take Home Investigation 1 (week 1)** (Quadratics)  **In Class Investigation 1 (week 2)** (Quadratics) |
| 4 - 5 | **Conditional probability and independence**  1.3.6 review the concepts and language of outcomes, sample spaces, and events, as sets of outcomes  1.3.13 understand the notion of a conditional probability and recognise and use language that indicates conditionality  1.3.14 use the notation and the formula  1.3.15 understand the notion of independence of an event *A* from an event *B*, as defined by  1.3.16 establish and use the formula for independent events and , and recognise the symmetry of independence  1.3.17 use relative frequencies obtained from data as estimates of conditional probabilities and as indications of possible independence of events | **Conditional Probability**  - Tree Diagrams  - Venn Diagrams  - Two way tables  - Conditional probability  - Dependent and independent events  - Calculating probabilities  - Applications | **Nelson Methods 11** Chapter 5.01 – 5.07 | **Test 1 (end of Week 5)**  - Equations, polynomials and conditional probability |
| 6 - 7 | **Indices and the index laws**   * + 1. review indices (including fractional and negative indices) and the index laws     2. use radicals and convert to and from fractional indices     3. understand and use scientific notation and significant figures | **Exponential Functions 1**  - Index laws  - Radical and fractional indices  - Scientific notation and accuracy | **Nelson Methods 11** Chapter 11.01 – 11.03 |  |
| 7 - 9 | **Cosine and sine rules**   * + 1. review sine, cosine and tangent as ratios of side lengths in right-angled triangles     2. understand the unit circle definition of and and periodicity using degrees     3. examine the relationship between the angle of inclination of a line and the gradient of that line     4. establish and use the cosine and sine rules, including consideration of the ambiguous case and the formula for the area of a triangle   **Circular measure and radian measure**   * + 1. define and use radian measure and understand its relationship with degree measure     2. calculate lengths of arcs and areas of sectors and segments in circles | **Trigonometry 1**  - Review of right angled triangles  - Area of a triangle  - Cosine and sine rules  - Applications of trigonometry  - Circular measure and radial measure | **Nelson Methods 11** Chapter 3.01 – 3.08  **(not 3.02)** | **Test 2 (end of week 9)**  - Exponential functions and trigonometry |

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| pact jpg1 | **Mathematics Methods Units 1 & 2 year 11**  **Teaching and Learning Program** | | |
| **Year: 2015**  **Term: 2** | **Course Texts /Resources:** |  |

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| **Time Line** | **AC Code** | **Content Description** | **Resources and references** | **Assessment**  **Tasks & Weighting**  **Date Due** |
| 1-3 | **Functions**  1.1.23 understand the concept of a function as a mapping between sets and as a rule or a formula that defines one variable quantity in terms of another  1.1.24 use function notation; determine domain and range; recognise independent and dependent variables  1.1.25 understand the concept of the graph of a function  1.1.26 examine translations and the graphs of and  1.1.27 examine dilations and the graphs of and  1.1.28 recognise the distinction between functions and relations and apply the vertical line test  **Lines and linear relationships**   * + 1. determine the coordinates of the mid-point between two points     2. determine an end-point given the other end-point and the mid-point   1.1.4 recognise features of the graph of , including its linear nature, its intercepts and its slope or gradient  **Quadratic relationships**  1.1.7 examine examples of quadratically related variables  1.1.8 recognise features of the graphs of , and , including their parabolic nature, turning points, axes of symmetry and intercepts  1.1.9 solve quadratic equations, including the use of quadratic formula and completing the square  1.1.10 determine the equation of a quadratic given sufficient information  1.1.11 determine turning points and zeros of quadratics and understand the role of the discriminant  1.1.12 recognise features of the graph of the general quadratic  **Inverse proportion**  1.1.13 examine examples of inverse proportion  1.1.14 recognise features and determine equations of the graphs of and , including their hyperbolic shapes and their asymptotes.  **Powers and polynomials**  1.1.15 recognise features of the graphs of for , including shape, and behaviour as and  1.1.16 identify the coefficients and the degree of a polynomial  1.1.17 expand quadratic and cubic polynomials from factors  1.1.18 recognise features and determine equations of the graphs of , and , including shape, intercepts and behaviour as and  1.1.19 factorise cubic polynomials in cases where a linear factor is easily obtained  1.1.20 solve cubic equations using technology, and algebraically in cases where a linear factor is easily obtained  **Graphs of relations**  1.1.21 recognise features and determine equations of the graphs of and  , including their circular shapes, their centres and their radii  1.1.22 recognise features of the graph of , including its parabolic shape and its axis of symmetry | **Functions and graphs**  - Functions  - Lines and linear relationships  - Review of quadratic relationships  - Powers and polynomials  - Graphs of relations | **Nelson Methods 11** Chapter 4.01 - 4.08 |  |
| 4 - 5 | **Exponential functions**   * + 1. establish and use the algebraic properties of exponential functions     2. recognise the qualitative features of the graph of , including asymptotes, and of its translations ( and )     3. identify contexts suitable for modelling by exponential functions and use them to solve practical problems     4. solve equations involving exponential functions using technology, and algebraically in simple cases | **Exponential Functions 2**  - Exponential functions  - Exponential graphs  - Transformations of exponential graphs  - Exponential equations  - Exponential models | **Nelson Methods 11** Chapter11.04 – 11.08 | **Test 3 (end of week 5)**  - Functions and graphs  - Exponential functions |
| 6 |  | Revision (Assessment free week) |  |  |
| 7 |  | EXAM |  | **EXAM**  - Semester 1 |
| 8 | **Language of events and sets**  1.3.6 review the concepts and language of outcomes, sample spaces, and events, as sets of outcomes  1.3.7 use set language and notation for events, including:   * 1. (or for the complement of an event   2. and for the intersection and union of events and respectively   3. and for the intersection and union of the three events respectively   4. recognise mutually exclusive events.   1.3.8 use everyday occurrences to illustrate set descriptions and representations of events and set operations  **Combinations**   * + 1. understand the notion of a combination as a set of objects taken from a set of distinct objects     2. use the notation and the formula for the number of combinations of objects taken from a set of distinct objects     3. expand for small positive integers     4. recognise the numbers as binomial coefficients (as coefficients in the expansion of )     5. use Pascal’s triangle and its properties   **Review of the fundamentals of probability**  1.3.9 review probability as a measure of ‘the likelihood of occurrence’ of an event  1.3.10 review the probability scale: for each event with if is an impossibility and if is a certainty  1.3.11 review the rules: and  1.3.12 use relative frequencies obtained from data as estimates of probabilities | **Sets and Basic Probability**  - Set notation  - Binomial theorem  - Combinations  - Sample spaces  - Relative frequency  - Language of events and sets | **Nelson Methods 11** Chapter 2.01 – 2.09 | **Take Home Investigation 2 (week 8)** (Sequences)  **In class Investigation (week 8) (**Sequences) |
| 9-11 | **Arithmetic sequences**   * + 1. recognise and use the recursive definition of an arithmetic sequence:     2. develop and use the formula for the general term of an arithmetic sequence and recognise its linear nature     3. use arithmetic sequences in contexts involving discrete linear growth or decay, such as simple interest     4. establish and use the formula for the sum of the first terms of an arithmetic sequence   **Geometric sequences**   * + 1. recognise and use the recursive definition of a geometric sequence:     2. develop and use the formula for the general term of a geometric sequence and recognise its exponential nature     3. understand the limiting behaviour as of the terms in a geometric sequence and its dependence on the value of the common ratio     4. establish and use the formula for the sum of the first terms of a geometric sequence     5. use geometric sequences in contexts involving geometric growth or decay, such as compound interest | **Arithmetic and Geometric Sequences**  - Arithmetic sequences  - Sum of arithmetic sequences  - Geometric sequences  - Sum of geometric sequences | **Nelson Methods 11** Chapter 8.01 – 8.07  **(8.08 optional)** | **Test 4 (end of week 11)**  - Sets and basic probability  - Arithmetic and Geometric sequences |

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| pact jpg1 | **Mathematics Methods Units 1 & 2 year 11**  **Teaching and Learning Program** | | |
| **Year: 2015**  **Term: 3** | **Course Texts /Resources:** |  |

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| **Time Line** | **AC Code** | **Content Description** | **Resources and references** | **Assessment**  **Tasks & Weighting**  **Date Due** |
| 1-2 | **Rates of change**   * + 1. interpret the difference quotient as the average rate of change of a function     2. use the Leibniz notation and for changes or increments in the variables and     3. use the notation for the difference quotient where     4. interpret the ratios and as the slope or gradient of a chord or secant of the graph of   2.3.8interpret the derivative as the instantaneous rate of change  2.39interpret the derivative as the slope or gradient of a tangent line of the graph of | **Rates of change**  - Average rates of change  - Instantaneous rates of change  - Average change of a function  - Instantaneous rates of change of a function  - Approximation of rates of change  - Rate of change functions | **Nelson Methods 11** Chapter 7.01 – 7.06 | **Take Home Investigation 3 (week 1)** (Applications of differentiation)  **In Class Investigation 3 (week 2)** (Applications of differentiation) |
| 3-5 | **The concept of the derivative**   * + 1. examine the behaviour of the difference quotient as as an informal introduction to the concept of a limit     2. define the derivative as     3. use the Leibniz notation for the derivative: and the correspondence   where   * + 1. interpret the derivative as the instantaneous rate of change     2. interpret the derivative as the slope or gradient of a tangent line of the graph of     3. estimate numerically the value of a derivative for simple power functions   2.3.21 solve optimisation problems arising in a variety of contexts involving polynomials on finite interval domains | **Derivatives**  -Introduction to limits  - The derivative  - Derivatives of simple functions  - The derivative of a power  - Instantaneous rate of change  - The slope of a curve  - Applications of derivatives | **Nelson Methods 11** Chapter 9.01 – 9.07 | **Test 5 (end of week 5)**  - Rates of change  - The concept of the derivative |
| 6-7 | **Computation of derivatives**  2.3.10 estimate numerically the value of a derivative for simple power functions   * + 1. examine examples of variable rates of change of non-linear functions     2. establish the formula for non-negative integers expanding or by factorising   **Properties of derivatives**   * + 1. understand the concept of the derivative as a function     2. identify and use linearity properties of the derivative     3. calculate derivatives of polynomials   **Applications of derivatives**   * + 1. determine instantaneous rates of change     2. determine the slope of a tangent and the equation of the tangent   2.3.19 recognise velocity as the first derivative of displacement with respect to time  **Anti-derivatives**  2.3.22 calculate anti-derivatives of polynomial functions | **Properties of derivatives**  - The gradient function  - The derivative of a sum  - Linear products and combinations  - Tangents  - Applications of derivatives | **Nelson Methods 11** Chapter 10.01 – 10.07 |  |
| 8-10 | **Applications of derivatives**  2.3.16 determine instantaneous rates of change  2.3.17 determine the slope of a tangent and the equation of the tangent   * + 1. construct and interpret position-time graphs with velocity as the slope of the tangent     2. recognise velocity as the first derivative of displacement with respect to time     3. sketch curves associated with simple polynomials, determine stationary points, and local and global maxima and minima, and examine behaviour as and     4. solve optimisation problems arising in a variety of contexts involving polynomials on finite interval domains   **Anti-derivatives**   * + 1. calculate anti-derivatives of polynomial functions | **Application of derivatives**  - Instantaneous rate of change  - Straight line motion  - Using anti derivatives  - Stationary points  - Curve sketching  - Extremes on an interval  - Optimisation problems | **Nelson Methods 11** Chapter 12.01 – 12.07 | **Test 6 (end of week 10)**  -Properties of derivatives  - Applications of derivatives |

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| pact jpg1 | **Mathematics Methods Units 1 & 2 year 11**  **Teaching and Learning Program** | | |
| **Year: 2015**  **Term: 4** | **Course Texts /Resources:** |  |

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| **Time Line** | **AC Code** | **Content Description** | **Resources and references** | **Assessment**  **Tasks & Weighting**  **Date Due** |
| 1-4 | **Trigonometric functions**   * + 1. understand the unit circle definition of and periodicity using radians     2. recognise the exact values of at integer multiples of and     3. recognise the graphs of on extended domains     4. examine amplitude changes and the graphs of and     5. examine period changes and the graphs of and     6. examine phase changes and the graphs of and     7. examine the relationships and     8. prove and apply the angle sum and difference identities     9. identify contexts suitable for modelling by trigonometric functions and use them to solve practical problems     10. solve equations involving trigonometric functions using technology, and algebraically in simple cases | **Trigonometric functions and graphs**  - Trigonometric graphs  - Amplitude changes  - Period changes  - Phase changes  - Angle sums  - Trigonometric equations  - Modelling periodic phenomena | **Nelson Methods 11** Chapter 6.01 – 6.07 | **Take Home Investigation 4 (week 1)** (Trigonometry Applications)  **In Class Investigation 4 (week 2)** (Trigonometry Applications)  **Test 7 (end of week 4)**  - Trigonometric functions and graphs |
| 5 |  | Revision (Assessment free week) |  |  |
| 6 |  | EXAM |  | **EXAM**  - Semester 1 & 2 |

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| pact jpg1 | **Mathematics Methods Unit 1 & 2**  **Assessment Outline 2015** |

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| **Assessment Type** | **Assessment Type Weighting** | **Assessment Task**  **Weighting** | **Issue & Submission Dates** | **Assessment Tasks** |
| Response | 40% | 4% | **Term 1 Week 5** | **Test 1 Equations Polynomials ans conditional probability** |
| 6% | **Term 1 Week 9** | **Test 2 Exponential functions and Trigonometry** |
| 6% | **Tem 2 Week 5** | **Test 3 Functions and Graphs, Exponential Functions** |
| 6% | **Term 2 Week 11** | **Test 4 Sets and Probability**  **Arithmetic and geometric sequences** |
| 6% | **Term 3 Week 5** | **Test 5 Rates of Change , Derivatives** |
| 6% | **Term 3 Week 10** | **Test 6 Applications of Derivatives** |
| 6% | **Term 4 Week** | **Test 7 Trig Functions and graphs** |
| Investigation | 20% | 5% | **Term 3 week 1 Issue**  **Validation Test week 2** | **Investigation 1 - Quadratics** |
| 5% | **Term 2 week 8 Issue**  **Validation Test week 9** | **Investigation2 - Sequences** |
| 5% | **Term 3 week 1Issue**  **Validation Test week 2** | **Investigation 3 -Applications of differentiation** |
| 5% | **Term 3 week 1 Issue**  **Validation Test week 2** | **Investigation 4 - Trig Applications** |
| Examination | 40% | 15 % | **Term 2 Week 7** | **EXAM on Unit 1** |
| 25 % | **Term 4 Week 5** | **Exam on Units 1 & 2 content** |
| Total | 100% | 100% |  |  |