Stage 1 Mathematical Methods – Semester One

Topic 1: Functions and Graphs, Topic 2: Trigonometry & Topic 3: Counting and Probability

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|  | **Lesson 1 – Single Lesson** | **Lesson 2 – Single Lesson** | **Lesson 3 – Double Lesson** |
| **Term One****Week 1**Mon 27th Jan | **Course Overview & Expectations** * What to bring to class
* Appropriate calculators
 | **TOPIC ONE: FUNCTIONS AND GRAPHS**Introduction to linear relationships* Linear related variables
* Direct proportion
 | Finding equations of lines using* Two points
* A slope and a point
* An equation of a parallel or perpendicular line and a given point
 |
| **Week 2**Mon 3rd Feb | Distance between points | Midpoint | Graph features of linear functions * Slope & y intercept

Point of intersection of two lines* How do we determine if the lines are parallel or perpendicular
* Solving intersection points graphically
 |
| **Week 3**Mon 10th Feb | Point of intersection of lines * Solving intersection points algebraically
 | Introduction to quadratic relationships* Construction of quadratic relationships
 | Graph features of quadratic graphs(* How the above equations related
* Parabolic nature
* Intercepts
* Turning points
* Axes of symmetry
* The use of technology for quadratics
 |
| **Week 4**Mon 17th Feb | Factorization of quadratics to determine zeros | Quadratic formula to determine zeros | Completing the square to find turning pointsDiscriminant* Number of zeros
* Nature of the zeros
 |
| **Week 5**Mon 24th Feb | Using technology to find solutions to quadratics and graphing. | Connection between solutions of a quadratic equation, algebraic representation and the graph.* Sum and product of zeros (including surds revision)
 | Determining quadratic models from zeros and another piece of information* Algebraically
* By hand
* Discriminant
* Graphic Calculator
 |
| **Week6**Mon 3rd March | Introduction to inverse relationship and the features of the graph of , including horizontal and vertical asymptotes. | **MATHEMATICAL INVESTIGATION**  | Introduction to the cubic function* Terminology (leading coefficient, degree)
* Behaviour of cubic functions (shape, zeros)
* What happens as
* The effect when

Algebraic forms of a cubic (linear and quadratic, three linear) and the impact of these forms on shape and number of zeros. |
| **Week 7**Mon 10th March | Equations of circles in:* Center and radius form
* Expanded form
 | Graphs and features of of and * Axis of symmetry
* Parabolic shape
 | Functions * Functions verses relations
* Vertical line test
* Function notation
* Domain and range
 |
| **Week 8**Mon 17th March | What can we tell from points on a graph* Dependent and independent variables
* Labelling axis
* Domain and range
 | Translation or dilation of linear, quadratic and cubic graphs | **MATHEMATICAL INVESTIGATION****(CONTINUED)**REVISION |
| **Week 9**Mon 24th March | **FUNCTIONS AND GRAPHS TEST** | **TOPIC TWO: TRIGONOMENTRY**Revision of right angled problems involving Pythagoras theorem and trigonometric ratios | Cosine rule to solve non right angled problems * Unknown angle
* Unknown length
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| **Week 10**Mon 31st  March | Sine rule to solve non right angled problems* Unknown angle
* Unknown length
 | Non right angled problemsSine Rule for both unknown angle or length | Solving any triangle problems with multiple rulesArea of non-right angled triangle |
| **Week 11**Mon 7th April | Graphs of and  | Connection between unit circle and , and in degrees  | What is the radian measure and how to convert between degrees and radians Calculate lengths of arcs and areas of sectors of circle. |
| Term Two**Week 1**Mon 28th April | Connection between unit circle and , and in radians Determine the exact value of cosine and sine form multiple of and using unit circle or graphs | Making the connection that the functions and best describe the horizontal and vertical positions around a circle. | Graph the general functions* Recognise changes in amplitude, period and phase
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| **Week 2**Mon 5th May | Graph the general functionsRecognise changes in amplitude, period and phase | Using knowledge of and to draw graphs and solve practical problems. | Solving trigonometric equations* Using technology
* Using basic algebra
 |
| **Week 3**Mon 12th May | Solving basic trigonometric equations using algebra | Special relationships observed of sine and cosine functions , , ,  | Tangent functionGraphs of tan functions |
| **Week 4**Mon 19th May | Revision | **TRIGONOMETRY TEST** | **TOPIC THREE: COUNTING AND PROBABILITY**Introduction to counting* The multiplication principle
* Factorials and factorial notation
* Permutations
 |
| **Week 5**Mon 26th May | Combinations | Combinations | The connection between combinations and the coefficients of the expansion Connection between Pascals triangle and  |
| **Week 6**Mon 2nd June | Revision of probability (0 to 1)Review of probability terminologyRelative frequencies to estimate probability and graph the probability verses number of trials | Tree diagrams and multiplication principle | Independent and dependent events for probability. |
| **Week 7**Mon 9th June | Connection between tree diagrams and notations | Revision | **COUNTING AND PROBABLITY TEST** |
| **Week 8**Mon 16th June | EXAM REVISION | EXAM REVISION | **FORMATIVE MID YEAR EXAM** |

Stage 1 Mathematical Methods – Semester Two

Topic 4: Statistics, Topic 5: Growth and Decay & Topic 6: Introduction to Differential Calculus

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|  | **Lesson 1 – Single Lesson** | **Lesson 2 – Single Lesson** | **Lesson 3 – Double Lesson** |
| **Term 2****Week 10** | **TOPIC FOUR: STATISTICS**Discrete verses continuous random variables | Revision of mean, median, mode. | Measures of Spread* Review range
* Review interquartile range
* Standard Deviation (including calculating for small data sets)
* Strengths and Weaknesses of measures of spread
* Use of technology to calculate
 |
| Term Three**Week 1** | Comparing data sets with mean and standard deviation (including undertaking the calculations) | Using a spreadsheet to understand why normal distributions occur. | Using a spreadsheet to see features of a normal distribution* Bell
* Position of mean
* Symmetry about mean
* Characteristics of spread
* Standard deviation
* 68%
* Examples of real life normal distributions
 |
| **Week 2** | Use normal distribution models to make predictions and answer questions. | Use normal distribution models to make predictions and answer questions. | Revision |
| **Week 3** | **STATISTICS TEST** | **TOPIC FIVE: GROWTH AND DECAY**Where are indices used in the real world to solve problems?Review of indices and index laws*Ex 2D.1 Functions Textbook* | Converting to and from radical and exponent form.Review operations with both surds and fractional indices.*Ex 2D.2 Functions Textbook* |
| **Week 4** | Scientific Notation* Express large and small numbers in scientific notation.
* How does the calculator express these numbers
 | Significant figures | Exponential Relationships* Examples
* Behaviours
* Features of exponential graphs
 |
| **Week 5** | Exponential graph translations | Exponential graph translations | Solving exponential problems* Algebraically
 |
| **Week 6** | Solving exponential problems* Graphically
 | Logarithms* Understanding we need logarithms to find exact solutions
* Definition of a logarithm of a numbers
* Logarithm rules
 | **INVESTIGATION**  |
| **Week 7** | Solving exponential equations using logarithms (base 10) | Solving exponential equations using logarithms (base 10) | REVISION |
| **Week 8** | **MATHEMATICAL INVESTIGATION** **(CONTINUED)** | **GROWTH AND DECAY TEST** | **TOPIC SIX: INTRODUCTION TO DIFFERENTIAL CALCULUS**What is a rate of change  |
| **Week 9** | How can we find the rate of change over a non-linear interval:* Average Rate of change
 | How can we find the rate of change over a non-linear interval:* Average Rate of change
 | Connection between average rate of change and the slope of the chordNotation of for  |
| **Week 10** | How do we approximate the rate of change at a point (instantaneous rate of change) | Understanding what a limit is? | Instantaneous rate of change using derivatives from first principles at a point  |
| Term Four**Week 1** | Finding the derivative from first principles | Finding the derivative from first principles | Derivative Rule: |
| **Week 2** | Rules that apply to derivatives | Practising differentiation rules | Equation of tangent |
| **Week 3** | Review of Sign Diagrams | Review of Sign Diagrams | Displacement and velocity |
| **Week 4** | Increasing and decreasing functions | Maximum, minimum, (local and global) | Optimisation |
| **Week 5** | Further application of derivatives | Further application of derivatives | REVISION |
| **Week 6** | **INTRODUCTION TO DIFFERENTIATIAL CALCULUS TEST** | EXAM REVISION | EXAM REVISION |
| **Week 7** | **EXAM WEEK: FORMATIVE EXAM**  |