Stage 2 - General Mathematics Program 2

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|  | **Lesson 1 – Single Lesson** | **Lesson 2 – Single Lesson** | **Lesson 3 – Double Lesson** |
| **Term One****Week 1** | **Course Overview and Expectations**  | **TOPIC ONE: MODELLING WITH LINEAR RELATIONSHIPS**How to represent linear functions (Review from Stage 1)* Contextual description
* Numerical sequence
* Graph
* Algebraic formula
 | How to represent linear functions (Review from Stage 1)* Contextual description
* Numerical sequence
* Graph
* Algebraic formula
 |
| **Week 2** | Simultaneous equations* Trial by error solving
 | Simultaneous equations * Graphically
* Equation solver
 | Simultaneous equations* Non-unique solutions
 |
| **Week 3** | Introduction to linear programming (practical problem that students attempt to solve without using linear programming techniques) | Introduction to linear programming (practical problem that students attempt to solve without using linear programming techniques) | Going from solving by trial and error to using linear programming techniques* How to set up constraints
* How to graph constraints and the feasible region
* Vertices
* Creating the objective function
* Finding the optimal solution
 |
| **Week 4** | Linear programming problems | Wastage consideration | How to deal with a non-integer optimal solution |
| **Week 5** | Changes to parameters and the effect on the optimal solution | Putting everything together in linear programming | Putting everything together in linear programming**REVISION** |

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|  | **Lesson 1 – Single Lesson** | **Lesson 2 – Single Lesson** | **Lesson 3 – Double Lesson** |
| **Week 6** | **SAT 1 - MODELLING LINEAR RELATIONSHIPS** **Non – Calculator Section – 30 min****Calculator Section – 20 min** | **TOPIC TWO: MODELLING WITH MATRICES**Connectivity matrices* Creating a connectivity matrix from a network
* Creating a network from a matrix
 | Connectivity matrices * Powers of matrices and multi-stage connections
* Limitation of using higher powers
 |
| **Week 7** | Weighted sums of the powers of connectivity matrices* Measures of efficiency or redundancy
* Reasonableness and limitations
 | Weighted sums of the powers of connectivity matrices* Measures of efficiency or redundancy
* Reasonableness and limitations
 | Weighted sums of the powers of connectivity matrices* Dominance
* Reasonableness and limitations
 |
| **Week 8** | Weighted sums of the powers of connectivity matrices* Dominance
* Reasonableness and limitations
 | Transition matrix* 2 x 2 systems
* Predicting future trends
 | Transition matrix* 2 x 2 systems
* Predicting future trends
 |
| **Week 9** | Transition matrix* Steady state
 | Transition matrix* Do change of conditions effect the steady state
 | Transition matrix* 3 x 3 systems and higher
 |
| **Week 10** | Transition matrix* Putting it all together
* Limitations of transition matrix models
 | **REVISION** | **SAT 2 - MODELLING WITH MATRICES** |

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|  | **Lesson 1 – Single Lesson** | **Lesson 2 – Single Lesson** | **Lesson 3 – Double Lesson** |
| **Week 11** | **TOPIC FOUR: FINANCIAL MODELS**Compound interest review* Solving by graphic calculator for FV, PV, n, and I
 | Compound interest review* Solving by graphic calculator for FV, PV, n, and I
 | “What if …?” questions around solving for:* Future value
* Regular deposit
* Number of periods
* Interest rate
* Value of the accumulating savings after a given period
* Total interest earned
 |
| **Term Two****Week 1** | “What if …?” questions around solving for:* Future value
* Regular deposit
* Number of periods
* Interest rate
* Value of the accumulating savings after a given period
* Total interest earned
 | “What if …?” questions around solving for:* Future value
* Regular deposit
* Number of periods
* Interest rate
* Value of the accumulating savings after a given period
* Total interest earned
 | Factors to consider when looking at an investment* Interest as part of taxable income
* Institution and government charges
* Effects of inflation
 |
| **Week 2** | Comparing investments (effective rate) | Comparing investments (effective rate) | How can regular income be provided from savings?* Annuities
* Superannuation
 |
| **Week 3** | Costs associated with borrowing money | Interest only loans and sinking funds | Interest only loans and sinking funds**MATHEMATICAL INVESTIGATION ONE** |
| **Week 4** | Reducing balance loans * Finding the repayment needed
* Total interest paid
* Size of the debt after given time
 | How can the interest paid on a loan be reduced?* Increasing the value of the payments
* Reducing the term of the loan
 | How can the interest paid on a loan be reduced?* Increasing the frequency of payments
* Paying a lump sum off the principal owing
* Changing interest rates
* Offset accounts

**MATHEMATICAL INVESTIGATION ONE** |

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|  | **Lesson 1 – Single Lesson** | **Lesson 2 – Single Lesson** | **Lesson 3 – Double Lesson** |
| **Week 5** | How can the interest paid on a loan be reduced?* Increasing the frequency of payments
* Paying a lump sum off the principal owing
* Changing interest rates
* Offset accounts
 | **MATHEMATICAL INVESTIGATION ONE** | Nominal rate of interest quoted – what is really being paid?* Discussion of loan interest rates (fixed/variable)
* Interest paid
* Calculation to compare two or more loans
 |
| **Week 6** | **REVISION** | **SAT 3 – FINANCIAL MODELS** | **TOPIC FIVE: DISCRETE MODELS**Critical path analysis problems* Precedence tables
* What can we tell from precedence tables
 |
| **Week 7** | Critical path analysis problems* Drawing networks
 | Critical path analysis problems* Understanding dummy links
 | Forward and backward scan* Minimum completion time
* Critical path
 |
| **Week 8** | Forward and backward scan* Earliest and latest starting times
* Slack time
 | Forward and backward scan* Earliest and latest starting times
* Slack time
 | The effects of changing initial parameters on* Minimum completion time
* Critical path
 |
| **Week 9** | **MID YEAR EXAM WEEK** *(formative tasks and flexibility in program)* |
| **Week 10** | Assignment problems: The Hungarian algorithm* Finding minimum cost
 | Assignment problems: The Hungarian algorithm* Finding minimum cost
 | Assignment problems: The Hungarian algorithm* Finding maximum profit

**MATHEMATICAL INVESTIGATION TWO** |
| **Term Three****Week 1** | Assignment problems: The Hungarian algorithm* Finding maximum profit
 | Assignment problems: The Hungarian algorithm* Non-square arrays
 | Assignment problems: The Hungarian algorithm* Non-square arrays

**MATHEMATICAL INVESTIGATION TWO** |

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|  | **Lesson 1 – Single Lesson** | **Lesson 2 – Single Lesson** | **Lesson 3 – Double Lesson** |
| **Week 2** | Further practice with assignment problems | **REVISION** | **SAT 4 - DISCRETE MODELS****Non-Calculator test****MATHEMATICAL INVESTIGATION TWO** |
| **Week 3** | **TOPIC THREE: STATISTICAL MODELS**Review the statistical investigation process and work through an example of paired data | How do we model bivariate data?* Explanatory and response variables
* Scatterplots
* Association
 | Correlation coefficients  |
| **Week 4** | The effect of outliers | Causality | Linear regression* $y=ax+b$
* Interpretation of a and b
 |
| **Week 5** | Linear regression* Residual plots
 | Linear regression* Residual plots
 | Exponential regression* $y=a.b^{x}$
* Interpretation of a and b
 |
| **Week 6** | * Interpolation and extrapolation
 | Linear and exponential regression* Putting it all together
 | Linear and exponential regression* Putting it all together
 |
| **Week 7** | Linear and exponential regression* Putting it all together
 | The normal distribution* Parameters µ and σ
* Bell Shape
* Symmetry about the mean
 | The normal distribution* Building the spreadsheet
* Investigation of properties of the resulting distribution
 |
| **Week 8** | Area under the curve* 68%, 95%, 99.7% rule
* Calculations of one, two, and three standard deviations from the mean
 | Calculation of probabilities using electronic technology | Inverse normal calculations |
| **Week 9** | **REVISION** | **REVISION** | **SAT 3 - STATISTICAL MODELS** |
| **Week 10** | *Flexibility in program* | *Flexibility in program* | *Flexibility in program* |
| **Term Four****Week 1 and 2** | **Examination revision** |
| **Week 3** | **SWOT VAC** |
| **Week 4** | **EXAM** |