

 Iona College Mathematics department

Year 11 Mathematics

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| UNIT TITLE | **1.3 Graphs – Investigate relationships between tables, equations and graphs** |
|  | 4 credits | External |
| Year 11 | Curriculum Level 6 | Duration: 8 weeks |

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| **Achievement Objectives:**In a range of meaningful contexts, students will be engaged in thinking mathematically and statistically. They will solve problems and model situations that require them to:* find optimal solutions, using numerical approaches (L6)
* solve linear equations and inequations, quadratics and simple exponential equations and simultaneous equations with two unknowns
* relate graphs, tables, and equations to linear, quadratic and simple exponential relationships found in number and spatial patterns
* relate rate of change to the gradient of the graph
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| **Achievement** | **Achievement with Merit** | **Achievement with Excellence** |
| * Investigate relationships between tables, equations and graphs
 | * Investigate relationships between tables, equations and graphs, using relational thinking
 | * Investigate relationships between tables, equations and graphs, using extended abstract thinking
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“Investigating relationships” must involve, as described on page 4, making links between tables, equations and graph, demonstrating knowledge of concepts and terms and communicating using appropriate numeric, symbolic or graphical representations.

Relational thinking involves one or more of:

* selecting and carrying out a logical system of steps
* connecting different concepts and representations
* demonstrating understanding of concepts
* forming and using a model, and relating findings to a context or communicating thinking using appropriate mathematical statements

Extended abstract thinking involves one or more of:

* devising a strategy to investigate or solve a problem
* demonstrating understanding of abstract concepts
* developing a chain of logical reasoning or proof
* forming a generalization and using correct mathematical statements or communicating mathematical insight

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| **Assessment:**This is an external achievement standard to be sat in November.* Calculators are permitted.
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| **Key Competencies highlighted in this unit** | **How students will be encouraged to develop the selected competency or competencies during the unit** |
| **Thinking:**- create models, apply, make conjectures, seek patterns and generalizations, generalise, think logically, ask questions, solve problems in new situations, synthesise, select appropriate methods,  |  ✓ | Students will be practising questions, apply skills in context and make their own revision notesStudents will make connections with tables, equations and graphs |
| **Using language, symbols and texts:**- understand mathematics as a language, use variables, interpret and use mathematical symbols, know and use mathematic conventions, interpret word problems | ✓ | Students will draw and interpret graphs.Students will present ideas logically and set out working in sequential order when solving simultaneous equations |
| **Relating to others:**- co-operate, work together on problems, work in groups, listen actively, collaborate | ✓ | Students will collaborate together on problemsStudents will work in groups to solve problems |
| **Managing self:**- work independently, demonstrate resilience, manage time effectively, set goals, self assessment, reflect, be self-motivated, complete prep | ✓ | Students will complete prepStudents will work independently when requiredStudents will demonstrate perseverance |
| **Participating and contributing:**- works in groups with everyone contributing, assist others, build on prior knowledge, share equipment and resources | ✓ | Students will work together to develop understanding of the topic  |

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| **Iona values highlighted in this unit** | **How students will be encouraged to develop the selected value or values during the unit** |
| Compassion |  ✓ | - students will be encouraged to work cooperatively together understanding each others needs- asking questions, pursuing further investigation- aiming for personal best and showing perseverance- develop an understanding of how tables, graphs and equations are connected |
| Respect – for themselves, others and human rights | ✓ |
| Integrity – honesty, acting responsibly and ethically | ✓ |
| Curiosity | ✓ |
| Resilience | ✓ |
| Understanding | ✓ |

**Learning Objectives**

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| **Achievement Standard 1.3 - Graphs** |
| Investigate relationships between tables, equations and graphs 4 credits External |
| **Achievement:** | **I can** | **Gamma** | **Nulake** |
| graph coordinates |  |  |
| identify linear relationships | 3.02 | 71,95 |
| graph linear functions from plotting points and gradient-intercept method | 8.01-8.03 | 74-80 |
| graph functions of the form $ax+by=c$ | 8.04 | 82 |
| solve problems involving rate of change |  | 85-87 |
| solve simple simultaneous equations | 6.01-6.07 | 89-91 |
| Identify quadratic relationships | 3.03 | 102-103 |
| draw parabola including transformations and factored form | 9.01,9.04 | 105-116 |
| plot and draw exponential relationships |  | 137, 138 |
| **Merit:** | **I can** | **Gamma** | **Nulake** |
| form and solve simultaneous equations | 6.08 | 92 |
| use tables to determine whether patterns are linear and find rules | 3.02 | 96-100 |
| interpret graphs | 8.05 | 98, 99 |
| draw parabolae of the form $y=ax^{2}$ where $a\ne 1$ | 9.02 | 119 |
| draw parabolae of the form $y=x^{2}+bx+c$ where y has to be factorised | 9.04 | 122, 123 |
| find equations of parabolic graphs | 9.04, 9.06, 9.07 | 126, 127 |
| find rules for quadratic patterns | 3.03 | 129-135 |
| find rules for exponential patterns |  | 140 |
| **Excellence:** | **I can** | **Gamma** | **Nulake** |
| devise a strategy to investigate a situation |  |  |
| Identify relevant concepts in context |  |  |
| develop a chain of reasoning or proof |  |  |
| form a generalisation |  |  |

**Teaching Programme**

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| No of Lessons | Learning Outcomes | Gamma | Nulake EAS | Other |
| 1  | Interpreting points on a graph  |  |  | Human graphsGraphs worksheet |
| 1 | Plotting co-ordinates |  |  | WorksheetPuzzlesheets |
| 5 | Linear graphs y = number x = number plotting points to draw graphs y = mx + c (use GC to discover) x and y intercept method ax+by = c type Given graph, write equation | Pg 99 Ex 8.01Pg 100 Ex 8.02 + Ex 8.03Pg 106 Ex 8.04 | Pg 74Pg 77-80Pg 81 |  |

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| 1 | Linear Patterns | Pg 30 Ex 3.02 | Pg 93-100 |  |

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| 1 | Distance – time graphsOther practical graph situations interpreting gradient | Pg 108 Ex 8.05 | Pg 83-87 |  |
| 4 | Sketching quadratic graphs Plot points for y = x2  and y = -x2 Transformations: y = x2 ± c y = (x ± c)2 y = ax2 X and Y intercept method Given graph, write equation Applications | Pg 116 Ex 9.01Pg 119 Ex 9.02Pg 122 Ex 9.04Pg 124 Ex 9.06Pg 125 Ex 9.07 | Pg 103Pg 109Pg 117Pg 113Pg 124 |  |

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| 2 | Quadratic Patterns  | Pg 35 Ex 3.03 | Pg 129 |  |

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| 2 | Exponential Relationships:Filling in table and drawing graphExponential Patterns |  | Pg 136Pg 139 |  |
| 1 | Graphs Summary |  |  |  |
| 2 | Solving Simultaneous Equations  | Pg 77 Ex 6.01 – 6.09 | Pg 88-92 | GC – drawing graphsGC – solver mode (bubble diagrams to make y= equations)Substitution method |
| 1 | Revision  |  |  | Past NCEA papers |
| 0 | Assessment |  |  | Part of School End of Year Exam |