Cross2

Iona College Mathematics department

Year 12 Mathematics

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| UNIT TITLE | **91261 2.6 – Apply algebraic methods in solving problems** | |
|  | 4 credits | External |
| Year 1 | Curriculum Level | Duration: 6 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:   * manipulate rational, exponential and logarithmic algebraic expressions (L7) * form and use linear and quadratic equations (L7) |

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| **Achievement** | **Achievement with Merit** | **Achievement with Excellence** |
| * Apply algebraic methods in solving problems | * Apply algebraic methods, using relational thinking, in solving problems | * Apply algebraic methods, using extended abstract thinking, in solving problems |

“Apply algebraic methods in solving problems’ must involve selecting and use a range of methods (at least three) in solving problems, demonstrating knowledge of algebraic concepts and terms and communicating using appropriate 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.   * MAT1 will sit the external assessment in October/ November * Calculators are permitted. * A formula sheet will be provided. |

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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 use algebraic methods  Students will think algebraically |
| **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 use mathematical symbols and expressions  Students will present ideas logically and set out working in sequential order |
| **Relating to others:**  - co-operate, work together on problems, work in groups, listen actively, collaborate | ✓ | Students will collaborate together on problems  Students will work in groups to solve word problems |
| **Managing self:**  - work independently, demonstrate resilience, manage time effectively, set goals, self assessment, reflect, be self-motivated, complete prep | ✓ | Students will complete prep  Students will work independently when required  Students 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 algebra shows a representation of patterns and numbers |
| Respect – for themselves, others and human rights | ✓ |
| Integrity – honesty, acting responsibly and ethically | ✓ |
| Curiosity | ✓ |
| Resilience | ✓ |
| Understanding | ✓ |

**Learning Objectives**

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|  | **Achievement Standard 2.6 – Algebra** |
|  | Apply algebraic methods in solving problems 4 credits External |
|  | Students can |
| **Achievement** | expand expressions |
| factorise expressions including quadratics |
| simplify expressions including exponents |
| change the subject of a formula including rational expressions |
| use logs and log rules including solving equations |
| simplify rational expressions |
| solve linear equations and inequations |
| solve quadratic equations |
| use quadratic formula |
| determine the nature of the roots of a quadratic |
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| **Merit** | apply the above in context |
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| **Excellence** | use extended abstract thinking |
| solve harder problems in context |

**Teaching Programme**

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| No of Lessons | Learning Outcomes | Theta | Nulake | Other |
| 2 | **Expanding Brackets:**   * Linear combinations * Quadratics * Cubics | Ex 1.01 pg 2  Ex 1.02 pg 3 Ex 1.03 pg 4  Ex 1.04 pg 4 Ex 1.05 pg 4  Ex 1.06 pg 5 | pg 2 - 4 | Mix and match cards |
| 5 | **Factorising**   * Common factor * x2 + bx + c * ax2 + bx + c * difference of 2 squares | Ex 3.01 pg 22 Ex 3.02 pg 23  Ex 3.03 pg 25  Ex 3.04 pg 25 Ex 3.05 pg 26  Ex 3.06 pg 27 | pg 5 - 10 | Mix and match cards  Flow map for factorising |
| 3 | **Simplifying Rational Expressions**   * Simplifying * x and ÷ * + and - | Ex 2.01 pg 17 Ex 3.07 pg 29  Ex 2.02 pg 18 Ex 2.03 pg 18  Ex 2.04 pg 18  Ex 2.05 pg 20 Ex 2.06 pg 21 | pg 28 - 35 |  |
| 4 | **Indices**   * Recap Rules * Negative indices * Fractional Indices (Surds) | Ex 8.01 pg 75  Ex 8.02 pg 76  Ex 8.03 pg 78  Ex 8.04 pg 80  Ex 8.05 pg 81  Ex 8.06 pg 83 | pg 11 – 14 | Dominoes + other card activities |
| 4 | **Logarithms**   * Introduction * Converting index equations into log equations * Log laws * Solving exponential equations * applications | Ex 9.01 pg 84  Ex 9.02 pg 88  Ex 9.03 pg 90  Ex 9.04 pg 92 | pg 20 - 27 |  |
| 1 | **Solving Linear Equations**   * Brackets * X on both sides * fractions | Ex 1.08 pg 8  Ex 1.07 pg 8  Ex 1.09 pg 8 Ex 1.10 pg 9 | pg 35 - 40 |  |
| 1 | Solving Linear Inequations | Ex 1.11 pg 10 | pg 41 - 43 |  |
| 1 | Applications to linear situations | Ex 1.12 pg 11 |  |  |
| 3 | **Solving Quadratic Equations**   * Make = 0 and factorise * Quadratic formula * Discriminant and nature of roots |  | pg 44 – 48  pg 49 – 52  pg 53 - 55 |  |
| 2 | **Changing the subject of an equation**   * Linear rearrangements * Rational expressions rearrangements * Square root and square rearrangements * Applications | Ex 4.01 pg 31 Ex 4.02 pg 31  Ex 4.03 pg 35  Ex 4.04 pg 36 Ex 4.05 pg 37  Ex 4.06 pg 37 | pg 15 - 19 |  |
| 2 | **Solving Simultaneous Equations**   * 2 lines * 1 and curve |  |  |  |
| 1 | Revision |  |  |  |
| 1 | Practice Assessment |  |  |  |