

 Iona College Mathematics department

Year 12 Mathematics

|  |  |
| --- | --- |
| UNIT TITLE | **91261 2.6 – Apply algebraic methods in solving problems** |
|  | 4 credits | External |
| Year 1 | Curriculum Level  | Duration: 6 weeks |

|  |
| --- |
| **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)
 |

|  |  |  |
| --- | --- | --- |
| **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

|  |
| --- |
| **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.
 |

|  |  |
| --- | --- |
| **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 methodsStudents 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 expressionsStudents 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 problemsStudents 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 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  |

|  |  |
| --- | --- |
| **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**

|  |  |
| --- | --- |
|  |  **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 |
|  |  |
| **Merit** | apply the above in context |
|  |
|  |  |
| **Excellence** | use extended abstract thinking |
| solve harder problems in context |

**Teaching Programme**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No of Lessons | Learning Outcomes | Theta | Nulake | Other |
| 2 | **Expanding Brackets:*** Linear combinations
* Quadratics
* Cubics
 | Ex 1.01 pg 2Ex 1.02 pg 3 Ex 1.03 pg 4Ex 1.04 pg 4 Ex 1.05 pg 4Ex 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 23Ex 3.03 pg 25Ex 3.04 pg 25 Ex 3.05 pg 26Ex 3.06 pg 27 | pg 5 - 10 | Mix and match cardsFlow map for factorising |
| 3 | **Simplifying Rational Expressions*** Simplifying
* x and ÷
* + and -
 | Ex 2.01 pg 17 Ex 3.07 pg 29Ex 2.02 pg 18 Ex 2.03 pg 18Ex 2.04 pg 18Ex 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 76Ex 8.03 pg 78Ex 8.04 pg 80Ex 8.05 pg 81Ex 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 88Ex 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 – 48pg 49 – 52pg 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 31Ex 4.03 pg 35Ex 4.04 pg 36 Ex 4.05 pg 37Ex 4.06 pg 37 | pg 15 - 19 |  |
| 2 | **Solving Simultaneous Equations*** 2 lines
* 1 and curve
 |  |  |  |
| 1 | Revision |  |  |  |
| 1 | Practice Assessment  |  |  |  |