Unit Title: *Algebra*

Duration: *7 Lessons*

Purpose: Algebra is used to some extent throughout our daily lives. People are solving equations (usually mentally) when, for example, they are working out the right quantity of something to buy, or the right amount of an ingredient to use when adapting a recipe. Algebra requires, and its use results in, learning how to apply logical reasoning and problem-solving skills. It is used more extensively in other areas of mathematics, the sciences, business, accounting, etc. The widespread use of algebra is readily seen in the writing of formulas in spreadsheets.

Outcomes:

A student:

- communicates and connects mathematical ideas using appropriate terminology, diagrams and symbols MA4-1WM
- recognises and explains mathematical relationships using reasoning MA4-3WM
- generalises number properties to operate with algebraic expressions MA4-8NA

Continuum of learning:

Stage 3	Stage 4	Stage 5
Analyses and creates geometric and number patterns, constructs and completes number sentences, and locates points on the cartesian plane **MA3-8NA**	Generalises number properties to operate with algebraic expressions **MA4-8NA** Uses algebraic techniques to solve simple linear and quadratic equations **MA4-10NA**	Solves linear and simple quadratic equations, linear inequalities and linear simultaneous equations, using analytical and graphical techniques **MA5.2-8NA**

Key language:

Variables	Pronumerals	Expressions	Constant	Sum
Product	Equivalent	Simplifying	'Like Terms'	Substitution
Associative	Commutative	Grouping Symbols	Terms	

Sequence of Unit:

#	Content	Teaching and Learning
1	Introduce the concept of variables as a way of representing numbers using letters (ACMNA175) • develop the concept that pronumerals (letters) can be used to represent numerical values ▸ recognise that pronumerals can represent one or more numerical values (when more than one numerical value, pronumerals may then be referred to as 'variables') (Communicating, Reasoning) • model the following using concrete materials or otherwise: – expressions that involve a pronumeral, and a pronumeral added to a constant, eg a, $a + 1$ – expressions that involve a pronumeral multiplied by a constant, eg $2a$, $3a$ – sums and products, eg $2a + 1$, $2(a + 1)$ – equivalent expressions, eg $x+x+y+y+3 = 2x+2y+3 = 2(x+y)+3$ - simplifying expressions, eg $(a+2)+(2a+3) = (a+2a)+(2+3) = 3a+5$	**Strategies/Activities:** - Discuss the purpose of algebra – a problem solving tool with examples. - Go through key language of algebra. - Model, with concrete materials/visual images, algebraic terms and expressions – a is the number of apples in a basket or if c is the number of chocolates in a tin then $2c + 1$ is 2 tins of chocolates (with the same number of chocolates) plus 1 loose chocolate. Or use paper clips in envelope, counters in cups, apples in baskets as examples. **Resources:** - G Drive: Folder - Any relevant Stage 4 Textbook. **Adjustments** L: Create a more scaffolded worksheet to help students draw pictures/ model given expressions. H: Have students create their own visual models for their own expressions.

#	Content	Teaching and Learning
2	• use algebraic symbols to represent mathematical operations written in words and vice versa, eg the product of x and y is xy, $x+y$ is the sum of x and y • translate from everyday language to algebraic language and vice versa ▸ use algebraic symbols to represent simple situations described in words, eg write an expression for the number of cents in x dollars (Communicating) ▸ interpret statements involving algebraic symbols in other contexts, eg cell references when creating and formatting spreadsheets (Communicating)	**Strategies/Activities:** - Create a list of words that mean ADD, SUBTRACT, MULTIPLY & DIVIDE. **Resources:** - G Drive: Folder - Any relevant Stage 4 Textbook. **Adjustments** L: Scaffolded work. H: Harder problems. Student create their own worded questions and have test their peer to see if they can write the expression.
3 4	Extend and apply the laws and properties of arithmetic to algebraic terms and expressions (ACMNA177) • recognise like terms and add and subtract them to simplify algebraic expressions, eg $2n+4m+n=4m+3n$ ▸ verify whether a simplified expression is correct by substituting numbers for pronumerals (Communicating, Reasoning) ▸ connect algebra with the commutative and associative properties of arithmetic to determine that $a+b=b+a$ and $(a+b)+c=a+(b+c)$ (Communicating)	**Strategies/Activities:** - This content is to be covered across two lessons. 1. Like terms and simply adding and subtracting. 2. More complex adding and subtracting. - Go through examples of 'like terms' and not like terms. - Play 'like terms' rob the nest game. - Use visual aids to demonstrate rules. **Resources:** - G Drive: Folder - Any relevant Stage 4 Textbook. **Adjustments** L: Scaffolded work. H: Harder problems.

#	Content	Teaching and Learning
5	• simplify algebraic expressions that involve multiplication, eg $4x \times 3$, $2ab \times 3a$, ► recognise the equivalence of algebraic expressions involving multiplication, eg $3bc = 3cb$ (Communicating) ► connect algebra with the commutative and associative properties of arithmetic to determine that $a \times b = b \times a$ and $(a \times b) \times c = a \times (b \times c)$ (Communicating)	**Strategies/Activities:** - Start by looking at $a = 1a = 1 \times a$, $2a = 2 \times a$ and $ab = a \times b$. Then looker at slightly more complex questions. **Resources:** - G Drive: Folder - Any relevant Stage 4 Textbook. **Adjustments** L: Scaffolded work. H: Harder problems.
6	• simplify algebraic expressions that involve division, eg $12a \div 3$, $\frac{8a}{2}$, $\frac{2a}{8}$, $\frac{12a}{9}$ ► recognise whether particular algebraic expressions involving division are equivalent or not, eg $a \div bc$ is equivalent to $\frac{a}{bc}$ and $a \div (b \times c)$, but is not equivalent to $a \div b \times c$ or $\frac{a}{b} \times c$ (Communicating)	**Strategies/Activities:** - Remind students fractions are division (numerator divided by denominator). **Resources:** - G Drive: Folder - Any relevant Stage 4 Textbook. **Adjustments** L: Scaffolded work. H: Harder problems.
7	Simplify algebraic expressions involving the four operations (ACMNA192) • simplify a range of algebraic expressions, including those involving mixed operations ► apply the order of operations to simplify algebraic expressions (Problem Solving) ► recognise the role of grouping symbols and the different meanings of expressions, such as $2a + 1$ and $2(a + 1)$	**Strategies/Activities:** - Review the skills learnt and apply more than one operation in a question. **Resources:** - G Drive: Folder - Any relevant Stage 4 Textbook. **Adjustments** L: Scaffolded work. H: Harder problems.

Reflection and Evaluation:

Question	Yes or No	Comment
1. Was the time allocated for this unit appropriate?		
2. Were the aims of this unit appropriate?		
3. Do the unit outcomes adequately reflect the syllabus?		
4. Do the unit outcomes assist in determining whether students have met the objectives of the course?		
5. Does the unit cater for a variety of student needs, interests and abilities?		
6. Does the unit include a variety of teaching and learning activities?		
7. Does the unit adequately integrate QT/Literacy/Numeracy/ICT strategies?		
8. Are the resources for this unit adequate?		
9. Are the assessment tasks adequate for this unit?		
10. Do the assessment tasks assess a range of knowledge and skills?		
11. Did you enjoy teaching this unit?		
12. Did the students enjoy learning throughout this unit?		
13. Were there opportunities for student reflection in this unit?		

14. Are there any changes that you would like to make to the program?