

Term 1: UNIT 3 *Algebra and linear functions*

See Unit [3] (C2Cs) for extra details and resources

Year 8 Australian Curriculum Achievement Standard: By the end of year 8, students solve everyday problems involving rates, ratios and percentages. **They recognise index laws and apply them to whole numbers.** They describe rational and irrational numbers. Students solve problems involving profit and loss. **They make connections between expanding and factorising algebraic expressions.** Students solve problems relating to volume of prisms. They make sense of time duration in real applications. They identify conditions for the congruence of triangles and deduce properties of quadrilaterals. Students model authentic situations with two-way tables and Venn diagrams. They choose appropriate language to describe events and experiments. They explain issues related to the collection of data and the effect of outliers on median and mean.

Students use efficient mental and written strategies to carry out the four operations with integers. **They simplify a variety of algebraic expressions. They solve linear equations and graph linear relationships on the Cartesian plane.** Students convert between units of measurement for area and volume. They perform calculations to determine perimeter and area of parallelograms, rhombuses and kites. They name the features of circles and calculate the areas and circumferences of circles. Students determine complementary events and calculate the sum of probabilities.

Unit Overview:

In this unit, students apply a variety of mathematical concepts in real-life, life-like and purely mathematical situations.

Through the sub-strand - **Patterns and algebra**, students have opportunities to develop understandings of:

- Algebraic definitions, substitution, like terms, using the four (4) operations with both positive and negative algebra terms & Distributive law.

-Apply a variety of mathematical concepts in real-life, life-like and purely mathematical situations.

-Solving linear equations.

-Make connections between expanding and factorising algebraic expressions

-Develop a formula to describe linear patterns

-Write expressions and equations from descriptions

Assessment Overview:

Task

Exam 1 (45 minutes) Week 6

Exam 2 (45 minutes) Week 10

Conditions:

Individual work.

Write all answers on the test papers.

Show all working.

Calculators allowed

Key Skill/s:

- Algebraic notation and conventions
- Identifying like terms
- Adding subtracting like terms
- Multiplication, Division, Powers of pronumerals
- Distributive Law - Expanding and simplifying expressions
- Substitution

| Guaranteed Vocabulary: | Design Question Four Strategy | Design Question Five Strategy | 21 st Century Skill: |
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| <p><i>Technical Vocabulary & Everyday Language used in Mathematical Contexts:</i></p> <ul style="list-style-type: none"> • Pronumeral • Formula • Equation • Coefficient • Expression • Term/s • Like terms • Substitution <p>Procedural Vocabulary</p> <ul style="list-style-type: none"> • Solve • Find / Determine • Calculate • Simplify • Evaluate • Show • Prove <p>Conventions & Symbols</p> <ul style="list-style-type: none"> • Pronumerals: a, b, x, y • Multiplication of pronumerals: $ab, a(2+b)$ | <p>Element 9: <i>Using structured practice sessions.</i></p> <ul style="list-style-type: none"> • Lessons will start structured with students learning the teacher devised sequence from teacher modelling. • Teacher will gradually move away from modelling to independent working. • Frequent structured practice • Varied practice • This will lead to students reflecting on their own skills, translating into a written exam. | <p>Element 12: <i>Engage Students in cognitively complex tasks.</i></p> <ul style="list-style-type: none"> • Inquiry tasks • Problem-solving tasks • This will lead students to engage in a problem-solving task, predicting how the new context or constraint will affect the situation. | <ul style="list-style-type: none"> • Real life scenarios involving algebra in measurement contexts. (Real world) • Students explain and justify different methods that could be used to arrive at the same answer. (Skilled Communication) • Students write their own questions with worked solutions and swap to assess elbow partner (Collaboration and Skilled Communication) |
| Guaranteed Skills/Language Features: | Reading Comprehension Skill and Strategy | Cognitive Verbs | ICT to Enhance Learning: |
| <ul style="list-style-type: none"> • Use the distributive law to expand a set of brackets • Recognise and work with like terms • Simplify expressions involving the four operations • Develop a basic understanding of index notation • Applying number laws to algebraic expressions and equations • Verify by substitution • Simplifying algebraic expressions with four operations • Solve linear equations using algebraic techniques • Extend and apply the distributive law to expand algebraic expressions using FOIL or alternate methods | <p>Reading as a Mathematician</p> <p>Students will complete the following steps when starting a problem:</p> <ol style="list-style-type: none"> 1. Scan the whole problem. 2. Identify the task. It could be a: 3. Reread the problem. What is important to help you solve the problem? 4. Translate - (create a mathematical model) 5. Solve the problem. | <p>Retrieval & Comprehension</p> <p><i>Calculate</i> – determine or find (e.g. a number, answer) by using mathematical processes; obtain a numerical answer showing the relevant stages in the working; ascertain/determine from given facts, figures or information</p> <p><i>Identify</i> - distinguish; locate, recognise and name; establish or indicate who or what someone or something is; provide an answer from a number of possibilities; recognise and state a distinguishing factor or feature</p> <p>Analytical Processes</p> <p><i>Apply</i> - use knowledge and understanding in response to a given situation or circumstance; carry out or</p> | <p>Interactive online games to engage with topics and deepen understanding of skills</p> |

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| <ul style="list-style-type: none"> Factorise algebraic expressions by identifying numerical factors and algebraic factors Connecting and investigating patterns to develop an algebraic rule | | <p>use a procedure in a given or particular situation</p> <p>Knowledge Utilisation</p> <p><i>Evaluate</i> - make an appraisal by weighing up or assessing strengths, implications and limitations; make judgments about ideas, works, solutions or methods in relation to selected criteria; examine and determine the merit, value or significance of something, based on criteria</p> <p><i>Solve</i> - find an answer to, explanation for, or means of dealing with (e.g. a problem);</p> <p>work out the answer or solution to (e.g. a mathematical problem); obtain the answer/s using algebraic, numerical and/or graphical methods</p> | |
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Learning Goals:

| Strands and Sub-Strands | Australian Curriculum Content Descriptors | Kirwan High Learning Goals |
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| <p>Number and Algebra</p> <p>Number and place value</p> <p>Patterns and algebra</p> | <ul style="list-style-type: none"> Simplify algebraic expressions involving the four operation Extend and apply the distributive law to the expansion of algebraic expressions (ACMNA190) Factorise algebraic expressions by identifying numerical factors Use index notation with numbers to establish the index laws with positive integer indices and the zero index (ACMNA182) | <p>I can ...</p> <ul style="list-style-type: none"> Recognise like terms Simplify an algebraic expression by collecting like terms and applying basic index laws. <p>I can</p> <ul style="list-style-type: none"> Apply the distributive law to expand brackets <p>I can</p> <ul style="list-style-type: none"> Factorise algebraic expressions by identifying numerical factors Understand the connection between factorising and expanding Justify the reasonableness of results through expansion. <p>I can....</p> <ul style="list-style-type: none"> Understand the use of index notation Apply the multiplication, division, zero, and power of a power index laws to simplify algebraic expressions. |
| | <ul style="list-style-type: none"> Solve linear equations using algebraic and graphical techniques. Verify solutions by substitution | <p>I can...</p> <ul style="list-style-type: none"> Apply inverse operations to solve single step and two step linear equations Evaluate a linear equation using substitution Justify the reasonableness of solutions using substitution Solve a linear equation using the graph of its equation |
| | <ul style="list-style-type: none"> Plot linear relationships on the Cartesian Plane with and without the use of digital technologies | <p>I can...</p> <ul style="list-style-type: none"> Recognise key characteristics of linear functions Apply knowledge of substitution to complete a table of values Sketch linear functions using a table of values and the gradient-intercept method Calculate the gradient of a linear function Determine the equation of a linear function |

Possible Habit of Mind:

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| <p>Exploring Meaning of the HOM By the end of this unit students will be able to:</p> <ul style="list-style-type: none"> • Teacher provides examples of well known characters and guides students to identify how well they use the habit • Y charts of what a person who displays this habit is like • Distil a definition using key words and phrases. • Students complete comparison charts (eg. Venn diagrams) of good and bad eggs. | <p>Expanding Capacity for using the HOM By the end of this unit students will be able to:</p> <ul style="list-style-type: none"> • Create checklist and teach students how to use them • Refine checklists for different situations (homework, class work, tests etc) • Get students to compare checklists and determine the effectiveness and appropriateness of each | <p>Increasing Alertness for the HOM By the end of this unit students will be able to:</p> <ul style="list-style-type: none"> • Teacher introduces a sign / symbol for when habit should be used in class • Students explore transference opportunities for this habit into different, but familiar activities. • Teacher slowly reduces prompting to use habit and rewards spontaneous checking | <p>Extending Values of the HOM By the end of this unit students will be able to:</p> | <p>Building Commitment towards the HOM By the end of this unit students will be able to:</p> |
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General Capabilities: This unit provides opportunities for students to engage in following capabilities:

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| <p>Literacy</p> <ul style="list-style-type: none"> ✓ Comprehending texts through listening, reading and viewing ✓ Composing texts through speaking, writing and creating □ Text knowledge □ Grammar knowledge ✓ Word knowledge □ Visual knowledge <p>Numeracy</p> <ul style="list-style-type: none"> □ Estimating and calculating with whole numbers □ Recognising and using patterns and relationships □ Using fractions, decimals, percentages, ratios and rates □ Using spatial reasoning □ Interpreting statistical information □ Using measurement | <p>ICT</p> <ul style="list-style-type: none"> □ Applying social and ethical protocols and practices when using ICT □ Investigating with ICT □ Creating with ICT □ Communicating with ICT □ Managing and operating ICT <p>Critical and creative thinking</p> <ul style="list-style-type: none"> ✓ Inquiring - identifying, exploring and organising information and ideas □ Generating ideas, possibilities and actions □ Reflecting on thinking and processes □ Analysing, synthesising and evaluating reasoning and procedures | <p>Personal and social capability</p> <ul style="list-style-type: none"> ✓ Self-awareness ✓ Self-management □ Social awareness □ Social management <p>Ethical understanding</p> <ul style="list-style-type: none"> □ Understanding ethical concepts and issues □ Reasoning in decision making and actions □ Exploring values, rights and responsibilities <p>Intercultural understanding</p> <ul style="list-style-type: none"> □ Recognising culture and developing respect □ Interacting and empathising with others □ Reflecting on intercultural experiences and taking responsibility |
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Cross Curriculum Priorities:

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| <ul style="list-style-type: none"> □ Aboriginal and Torres Strait Islander histories and cultures | <ul style="list-style-type: none"> □ Asia and Australia's engagement with Asia | <ul style="list-style-type: none"> □ Sustainability |
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Differentiation [for small groups or individuals]:

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