

KIRWAN STATE HIGH SCHOOL: MATHEMATICS DEPARTMENT

YEAR 8 UNIT OVERVIEW

Term 1: UNIT 1 *Integers and Percentages*

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:

Through the sub-strands of **Number and place value**, **Real numbers** and **Money and financial mathematics**, students have opportunities to develop understandings of:

- the real number system - representing, comparing and ordering integers, place value
- calculations - problem solving involving the four operations and integers
- percentages - making connections between percentages, fractions and decimals and applying this to percentage increase or decrease situations, and problem solving in a range of contexts including financial situations.

Throughout this unit, provide daily practice to consolidate Year 7 concepts such as:

- number facts, mental computation strategies, rules and formulas, operations on number including integers, percentage, fractions, decimals, place value

Assessment Overview:

Task

Item [1] – Integers and Percentages – Part A (Exam)

Scheduled – Week 6

Length – 30 Minutes

Key Skill/s:

- Order of operations – Integers
- Worded problems
- Placing positive & Negative values on a number line
- Convert fractions, decimals and percentages
- Calculation with percentages
- Financial maths-profit and loss

Conditions:

Assessment is one in-class exam

Students will work **INDIVIDUALLY** following test protocols.

Refer to KSHS Test Protocol

Technology Free

Task

Item [1] – Integers and Percentages – Part B (Exam)

Scheduled – Week 6

Length – 30 Minutes

Key Skill/s:

- Order of operations – Integers
- Worded problems
- Placing positive & Negative values on a number line
- Convert fractions, decimals and percentages
- Calculation with percentages
- Financial maths-profit and loss

Conditions:

Assessment is one in-class exam

Students will work **INDIVIDUALLY** following test protocols.

Refer to KSHS Test Protocol

Technology Active

Guaranteed Vocabulary:	Design Question Four Strategy	Design Question Five Strategy	21 st Century Skill:
<p>Technical Vocabulary: Integer Positive Negative Faction Decimal Recurring Terminating Rational Number Irrational Number Profit Loss</p> <p>Procedural Vocabulary: Convert, increase, decrease, find, identify, calculate, evaluate, define, solve</p> <p>Conventions and Symbols: Percentage symbol, recurring decimal symbol, negative</p>	<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 in financial contexts. (Real world) • Students explain and justify different methods that could be used to arrive at the same answer. (Skilled communication) e.g. using both visual and numerical representations of percentages

Guaranteed Skills/Language Features:	Reading Comprehension Skill and Strategy	Cognitive Verbs	ICT to Enhance Learning:
<p>Compare, order, add and subtract integers</p> <p>Draw a number line and use a number sentence to solve problems</p> <p>Apply rules to multiply and divide integers</p> <p>State and apply the correct order of operations and integers</p> <p>Interpret and solve word problems involving integers</p> <p>Convert between fractions, decimals and percentages</p> <p>Simplify fractions</p> <p>Recognise Irrational Numbers</p> <p>Calculate the percentage of a quantity</p> <p>Calculate percentage increase/decrease</p> <p>Determine profit/loss</p> <p>Determine selling/retail prices involving mark-up and/or GST inclusions</p> <p>Identify where percentage is used in financial mathematics situations</p>	<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. 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 choosing the relevant stages in the working; ascertain/determine from given facts, figures or information</p> <p>Analytical Processes</p> <p><i>Apply</i> - use knowledge and understanding in response to a given situation or circumstance; carry out or 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); work out the answer or solution to (e.g. a mathematical problem); obtain the answer/s using algebraic, numerical and/or graphical methods</p>	<p>Interactive online games to engage with topics and deepen understanding of skills e.g. Hotmaths, SUMDOG, mathspace</p>

Learning Goals

Strands and Sub-Strands	Australian Curriculum Content Descriptors	Kirwan High Learning Goals
Number and Algebra Number and place value	<ul style="list-style-type: none"> Carry out the four operations with rational numbers and integers, using efficient mental and written strategies and appropriate digital technologies (ACMNA183) 	I can... <ul style="list-style-type: none"> describe integers as components of the real number system position integers on a number line apply the order of operations and carry out the four basic operations in questions involving integers
Real numbers Money and financial mathematics	<ul style="list-style-type: none"> Solve problems involving the use of percentages, including percentage increases and decreases, with and without digital technologies (ACMNA187) 	I can... <ul style="list-style-type: none"> identify and use the connections between percentages, decimals and fractions. convert between decimal, percentage and fractions calculate a percentage of an amount with and without a calculate
	<ul style="list-style-type: none"> Solve problems involving profit and loss, with and without digital technologies (ACMNA189) 	I can... <ul style="list-style-type: none"> apply % in financial situations including % increase and decrease. solve problems involving discounts. solve problems involving profit and loss.
	<ul style="list-style-type: none"> Investigate terminating and recurring decimals (ACMNA184) 	I can... <ul style="list-style-type: none"> represent fractions and percentages as recurring decimals as appropriate

Possible Habit of Mind:				
<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>
<p>General Capabilities: This unit provides opportunities for students to engage in following capabilities:</p>				
<p>Literacy <input checked="" type="checkbox"/> Comprehending texts through listening, reading and viewing <input checked="" type="checkbox"/> Composing texts through speaking, writing and creating <input type="checkbox"/> Text knowledge <input type="checkbox"/> Grammar knowledge <input checked="" type="checkbox"/> Word knowledge <input type="checkbox"/> Visual knowledge</p> <p>Numeracy <input checked="" type="checkbox"/> Estimating and calculating with whole numbers <input type="checkbox"/> Recognising and using patterns and relationships <input checked="" type="checkbox"/> Using fractions, decimals, percentages, ratios and rates <input type="checkbox"/> Using spatial reasoning <input type="checkbox"/> Interpreting statistical information <input type="checkbox"/> Using measurement</p>	<p>ICT <input type="checkbox"/> Applying social and ethical protocols and practices when using ICT <input type="checkbox"/> Investigating with ICT <input type="checkbox"/> Creating with ICT <input type="checkbox"/> Communicating with ICT <input type="checkbox"/> Managing and operating ICT</p> <p>Critical and creative thinking <input checked="" type="checkbox"/> Inquiring - identifying, exploring and organising information and ideas <input type="checkbox"/> Generating ideas, possibilities and actions <input type="checkbox"/> Reflecting on thinking and processes <input checked="" type="checkbox"/> Analysing, synthesising and evaluating reasoning and procedures</p>		<p>Personal and social capability <input checked="" type="checkbox"/> Self-awareness <input checked="" type="checkbox"/> Self-management <input type="checkbox"/> Social awareness <input type="checkbox"/> Social management</p> <p>Ethical understanding <input type="checkbox"/> Understanding ethical concepts and issues <input type="checkbox"/> Reasoning in decision making and actions <input type="checkbox"/> Exploring values, rights and responsibilities</p> <p>Intercultural understanding <input type="checkbox"/> Recognising culture and developing respect <input type="checkbox"/> Interacting and empathising with others <input type="checkbox"/> Reflecting on intercultural experiences and taking responsibility</p>	
<p>Cross Curriculum Priorities:</p>				
<p><input type="checkbox"/> Aboriginal and Torres Strait Islander histories and cultures</p>	<p><input type="checkbox"/> Asia and Australia's engagement with Asia</p>	<p><input type="checkbox"/> Sustainability</p>		
<p>Differentiation [for small groups or individuals]:</p>				
<p>The learning experiences within this unit can be differentiated by increasing:</p> <ul style="list-style-type: none"> • The frequency of exposure for some students • The intensity of teaching by adjusting the group size • The duration needed to complete tasks and assessment <p>Teachers are encouraged to use hands on, visual approaches or real life where necessary. This provides clear links to the outside world and provides concrete examples for students. Increasing the complexity of problems will also allow an opportunity for higher order thinking and for students to solve problems with multiple steps.</p>				