

**Term 1: Unit 2 Ratios and Rates**

**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, through the sub-strand **Real numbers**, students solve every day problems involving ratios and rates. They are able to convert to the same units in order to express a situation in ratio form and can differentiate between a ratio and a rate.

The focus of this unit is on working with ratios and rates incorporating the unitary method and the equivalent fraction method into problem solving.

**Assessment Overview:**

**Task:** Exam – 50 minutes (technology allowed)

**Key Skill/s:**

- Identify the features of a ratio
- Write ratios using the correct mathematical convention
- Convert values to the same units
- Simplify a ratio
- Partitioning a quantity into a ratio using **either** the unitary method or the equivalent fraction method
- Find a total quantity from a given ratio using **either** the unitary method or using fractions
- Identify the features of a rate
- State rates using the correct mathematical convention
- Simplify a rate
- Finding unknown quantities using rates
- Differentiate between a rate and a ratio

**Conditions:**

Write all answers on test paper  
 Show all working  
 Include unit if required  
 Calculators allowed

Guaranteed Vocabulary:	Design Question Four Strategy	Design Question Five Strategy	21 <sup>st</sup> Century Skill:
<p><i>Technical Vocabulary &amp; Everyday Language used in Mathematical Contexts:</i></p> <ul style="list-style-type: none"> <li>- Rate , Ratio, Proportion, Unitary</li> </ul> <p><i>Procedural Vocabulary</i></p> <ul style="list-style-type: none"> <li>- Convert, Record, Solve</li> <li>- Find / Determine, Simplify</li> <li>- Evaluate, Show, Prove</li> </ul>	<p><b>Element 9: Using structured practice sessions.</b></p> <ul style="list-style-type: none"> <li>• Lessons will start structured with students learning the teacher devised sequence from teacher modelling.</li> <li>• Teacher will gradually move away from modelling to independent working.</li> <li>• Frequent structured practice</li> <li>• Varied practice</li> <li>• This will lead to students reflecting on their own skills, translating into a written exam.</li> </ul>	<p><b>Element 12: Engage Students in cognitively complex tasks.</b></p> <ul style="list-style-type: none"> <li>• Inquiry tasks</li> <li>• Problem-solving tasks</li> <li>• This will lead students to engage in a problem-solving task, predicting how the new context or constraint will affect the situation.</li> </ul>	<ul style="list-style-type: none"> <li>• Real-life rates and ratio questions in measurement and financial contexts (Real World)</li> <li>• Students monitor their own progress using learning goals, proficiency scales and worked solutions. (Self regulation)</li> <li>• Justify solutions with digital technologies. (ICT) e.g. simplifying ratios</li> </ul>
Guaranteed Skills/Language Features:	Reading Comprehension Skill and Strategy	Cognitive Verbs	ICT to Enhance Learning:
<ul style="list-style-type: none"> <li>• Identify a ratio</li> <li>• Write a ratio</li> <li>• Simplify a ratio</li> <li>• Use equivalence to complete a ratio</li> <li>• Share a quantity using a given ratio</li> <li>• Understand the difference between rate and ratio</li> <li>• Identify a rate</li> <li>• Represent a rate and solve problems</li> <li>• Use RAAM</li> </ul>	<p>Reading as a Mathematician</p> <p>Students will complete the following steps when starting a problem:</p> <ol style="list-style-type: none"> <li>1. Scan the whole problem.</li> <li>2. Identify the task.</li> <li>3. Reread the problem. What is important to help you solve the problem?</li> <li>4. Translate - (create a mathematical model)</li> <li>5. Solve the problem.</li> </ol>	<p><b>Retrieval &amp; Comprehension</b></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><b>Analytical Processes</b></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><b>Knowledge Utilisation</b></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</p>

**Learning Goals:**

<b>Strands and Sub-Strands</b>	<b>Australian Curriculum Content Descriptors</b>	<b>Kirwan High Learning Goals</b>
Number and Algebra  Real numbers	<ul style="list-style-type: none"><li>• Solve a range of problems involving rates and ratios, with and without digital technologies (<a href="#">ACMNA188</a>)</li></ul>	I can..... <ul style="list-style-type: none"><li>• Identify and write a ratio</li><li>• Express a situation as a ratio in simplest terms</li><li>• Use equivalence to complete a ratio</li><li>• Share a quantity using a given ratio</li><li>• Understand the difference between rate and ratio</li><li>• Determine a unit rate</li><li>• Solve problems involving rates and ratios without digital technologies</li><li>• Interpret and solve problems written in words by identifying the appropriate strategy involving rates and ratios.</li><li>• Solve problems involving rates and ratios using digital technologies.</li></ul>

Possible Habit of Mind:				
<p><b>Exploring Meaning of the HOM</b> By the end of this unit students will be able to:</p> <ul style="list-style-type: none"> <li>• Teacher provides examples of well known characters and guides students to identify how well they use the habit</li> <li>• Y charts of what a person who displays this habit is like</li> <li>• Distil a definition using key words and phrases.</li> <li>• Students complete comparison charts (eg. Venn diagrams) of good and bad examples.</li> </ul>	<p><b>Expanding Capacity for using the HOM</b> By the end of this unit students will be able to:</p> <ul style="list-style-type: none"> <li>• Create checklist and teach students how to use them</li> <li>• Refine checklists for different situations (homework, class work, tests etc)</li> <li>• Get students to compare checklists and determine the effectiveness and appropriateness of each</li> </ul>	<p><b>Increasing Alertness for the HOM</b> By the end of this unit students will be able to:</p> <ul style="list-style-type: none"> <li>• Teacher introduces a sign / symbol for when habit should be used in class</li> <li>• Students explore transference opportunities for this habit into different, but familiar activities.</li> <li>• Teacher slowly reduces prompting to use habit and rewards spontaneous checking</li> </ul>	<p><b>Extending Values of the HOM</b> By the end of this unit students will be able to:</p>	<p><b>Building Commitment towards the HOM</b> By the end of this unit students will be able to:</p>
General Capabilities: This unit provides opportunities for students to engage in following capabilities:				
<p><b>Literacy</b></p> <ul style="list-style-type: none"> <li>✓ Comprehending texts through listening, reading and viewing</li> <li>✓ Composing texts through speaking, writing and creating</li> <li><input type="checkbox"/> Text knowledge, Grammar knowledge</li> <li>✓ Word knowledge</li> <li><input type="checkbox"/> Visual knowledge</li> </ul> <p><b>Numeracy</b></p> <ul style="list-style-type: none"> <li>✓ Estimating and calculating with whole numbers</li> <li><input type="checkbox"/> Recognising and using patterns and relationships</li> <li>✓ Using fractions, decimals, percentages, ratios and rates</li> <li><input type="checkbox"/> Using spatial reasoning</li> <li><input type="checkbox"/> Interpreting statistical information</li> <li><input type="checkbox"/> Using measurement</li> </ul>	<p><b>ICT</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Applying social and ethical protocols and practices when using ICT</li> <li><input type="checkbox"/> Investigating with ICT</li> <li><input type="checkbox"/> Creating with ICT</li> <li><input type="checkbox"/> Communicating with ICT</li> <li><input type="checkbox"/> Managing and operating ICT</li> </ul> <p><b>Critical and creative thinking</b></p> <ul style="list-style-type: none"> <li>✓ Inquiring - identifying, exploring and organising information and ideas</li> <li><input type="checkbox"/> Generating ideas, possibilities and actions</li> <li><input type="checkbox"/> Reflecting on thinking and processes</li> <li><input type="checkbox"/> Analysing, synthesising and evaluating reasoning and procedures</li> </ul>	<p><b>Personal and social capability</b></p> <ul style="list-style-type: none"> <li>✓ Self-awareness</li> <li>✓ Self-management</li> <li><input type="checkbox"/> Social awareness</li> <li><input type="checkbox"/> Social management</li> </ul> <p><b>Ethical understanding</b></p> <ul style="list-style-type: none"> <li>✓ Understanding ethical concepts and issues</li> <li><input type="checkbox"/> Reasoning in decision making and actions</li> <li><input type="checkbox"/> Exploring values, rights and responsibilities</li> </ul> <p><b>Intercultural understanding</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Recognising culture and developing respect</li> <li><input type="checkbox"/> Interacting and empathising with others</li> <li><input type="checkbox"/> Reflecting on intercultural experiences and taking responsibility</li> </ul>		
Cross Curriculum Priorities:				
<input type="checkbox"/> <a href="#">Aboriginal and Torres Strait Islander histories and cultures</a>	<input type="checkbox"/> <a href="#">Asia and Australia's engagement with Asia</a>	<input type="checkbox"/> <a href="#">Sustainability</a>		
Differentiation [for small groups or individuals]:				