



Essential Knowledge	Teaching Points
<ul style="list-style-type: none"> Express a multiplicative relationship between two quantities as a ratio or a fraction, e.g. when $A:B$ are in the ratio 3:5, A is $\frac{3}{5}B$. When $4a = 7b$, then $a = \frac{7b}{4}$ or $a:b$ is 7:4; Solve proportion problems using the unitary method; Work out which product offers best value and consider rates of pay; Work out the multiplier for repeated proportional change as a single decimal number; Represent repeated proportional change using a multiplier raised to a power, use this to solve problems involving compound interest and depreciation; Understand and use compound measures and: <ul style="list-style-type: none"> convert between metric speed measures; convert between density measures; convert between pressure measures; Use kinematics formulae from the formulae sheet to calculate speed, acceleration, etc (with variables defined in the question); Calculate an unknown quantity from quantities that vary in direct or inverse proportion; Recognise when values are in direct proportion by reference to the graph form, and use a graph to find the value of k in $y = kx$; Set up and use equations to solve word and other problems involving direct proportion (this is covered in more detail in unit 19); Relate algebraic solutions to graphical representation of the equations; Recognise when values are in inverse proportion by reference to the graph form; Set up and use equations to solve word and other problems involving inverse proportion, and relate algebraic solutions to graphical representation of the equations. 	<ul style="list-style-type: none"> Provide structured scaffolds to help students change g/cm^3 to kg/m^3, kg/m^2 to g/cm^2, m/s to km/h. Then remove the scaffold when students become confident in method. Students need to solve word problems involving direct and inverse proportion simultaneously so they understand and recognise the difference between the two. Students must understand direct proportion as: as x increases, y increases. Students must understand inverse proportion as: as x increases, y decreases Include fractional percentages of amounts with compound interest and encourage use of single multipliers. Amounts of money should be rounded to the nearest penny, but emphasise the importance of not rounding until the end of the calculation if doing in stages. Use a formula triangle to help students see the relationship for compound measures – this will help them evaluate which inverse operations to use. Help students to recognise the problem they are trying to solve by the unit measurement given, e.g. km/h is a unit of speed as it is speed divided by a time. Be aware kinematics formulae involve a constant acceleration (which could be zero). Encourage students to write down the initial equation of proportionality and, if asked to find a formal relating two quantities, the constant of proportionality must be found.
Assumed Prior Knowledge/ Links / Interleaving	
<ul style="list-style-type: none"> Students should be able to find a percentage of an amount and relate percentages to decimals. Students should be able to rearrange equations and use these to solve problems. Knowledge of speed = distance/time, density = mass/volume. 	

Potential Barriers to Access / Misconceptions	Opportunities for Reasoning/Problem Solving/Proofs
	<ul style="list-style-type: none"> • Working out best value of items using different currencies given an exchange rate • Speed/distance type problems that involve students justifying their reasons why one vehicle is faster than another. • Calculations involving value for money are a good reasoning opportunity that utilise different skills.
Key Mathematical Vocabulary	Ration, proportion, best value, unitary, proportional change, compound measure, density, mass, volume, speed, distance, time, density, mass, volume, pressure, acceleration, velocity, inverse, direct, constant of proportionality