



Essential Knowledge	Teaching Points
<ul style="list-style-type: none"> Understand and use compound measures: density, pressure and speed Convert between metric speed measures; Read values in km/h and mph from a speedometer; Calculate average speed, distance, time – in miles per hour as well as metric measures; Use kinematics formulae to calculate speed, acceleration (with formula provided and variables defined in the question); Change d/t in m/s to a formula in km/h, i.e. $d/t \times (60 \times 60)/1000$ – with support; Express a given number as a percentage of another number in more complex situations; Calculate percentage profit or loss; Make calculations involving repeated percentage change, not using the formula; Find the original amount given the final amount after a percentage increase or decrease; Use compound interest; Use a variety of measures in ratio and proportion problems: currency conversion; rates of pay; best value; Set up, solve and interpret the answers in growth and decay problems; Understand that X is inversely proportional to Y is equivalent to X is proportional to $\frac{1}{Y}$; Interpret equations that describe direct and inverse proportion. 	<ul style="list-style-type: none"> Make sure students have a solid understanding of what units a quantity can be measured in eg distance can be given as mm, cm, m, km etc When converting from m/s to km/h and vice versa, provide students with guided sheet so they can understand the multi-step process easily. Ensure students understand direct proportion as: as x increase, y increases. Ensure students understand inverse proportion as: as x increases, y decreases Encourage students to use a single multiplier. Include simple fractional percentages of amounts with compound interest and encourage use of single multipliers. Emphasise that amounts of money should be rounded to the nearest penny, but highlight 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. Introduce questions where units have to be converted to get students to understand the importance of reading a question and determining all units are uniform
Assumed Prior Knowledge/ Links / Interleaving	
<ul style="list-style-type: none"> Students should be able to interpret scales on a range of measuring instruments. 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. Students should know speed = distance/time, Students should know density = mass/volume. Students should be able to convert time eg minutes to hours Students should be able to convert metric units 	

Potential Barriers to Access /Misconceptions		Opportunities for Reasoning/Problem Solving/Proofs	
<ul style="list-style-type: none"> • Some students may think that compound interest and simple interest are the same method of calculating interest. • Incomplete methods when using multipliers, i.e. reduce £80 by 15% = 80×0.15 • When given a time of 2.4 hours on a calculator, students lack understanding of how to convert the time into hours and minutes. • Students use formulae triangles incorrectly and place units incorrectly • Students can't convert between mm, cm, m and km efficiently 		<ul style="list-style-type: none"> • 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. • Working out best value of items using different currencies given an exchange rate 	
Key Mathematical Vocabulary	Ratio, proportion, best value, proportional change, compound measure, density, mass, volume, speed, distance, time, density, mass, volume, pressure, acceleration, velocity, inverse, direct		