The Sutton Academy

Knowledge Rich Curriculum Plan

Year 11 Higher+ Compound Measures, Bounds and Velocity Time Graphs

Lesson/Learning Sequence	Intended Knowledge: *Students will know that…*	Tiered Vocabulary	Steps to Success	Prior Knowledge: *In order to know this…*	Feedback
To learn how to calculate speed, distance and time	• Students will know that $Speed = \frac{distance}{time}$ • Students will know that $Time = \frac{distance}{speed}$ • Students will know that $Distance = Speed \times Time$ • Students will know the formula triangle for speed, distance and time • Students will know how to calculate speed, distance or time given the two other variables including where the time needs to be converted into a decimal number of minutes or hours • Students will know how to calculate speed, distance or time using two variables where they need to convert time written in hours and minutes to a decimal • Students will know how to calculate average speed given distance and time for multi-stage journeys • Students will need to know how to solve more complex problems involving speed, distance and time	**Speed –** the rate at which someone or something moves or operates or is able to move or operate.	•	• Students should already know how to solve basic SDT problems where the time is an integer number of hours and all units correspond • Students should already know simple conversions for minutes to decimal hours - they will know that 30 minutes is 0.5 hours and 15 minutes is 0.25 hours • Students should already know how to convert from minutes to hours and minutes	Exam Prep 2
To learn how to solve more complex speed, distance, time problems	• Students will know how to calculate average speed given distance and time for multi-stage journeys • Students will need to know how to solve more complex problems involving speed, distance and time		•	• Students should already know how to convert time and calculate speed, distance or time	
To learn how to find upper and lower bounds and write error intervals	• Students will know how to find the upper and lowers bounds of numbers that have been rounded • Students will know how to use inequality notation to specify simple error intervals due to rounding • Students will know how to use inequality notation to specify simple error intervals due to truncation	**Upper bound** – an element greater than or equal to all the elements in a given set **Lower bound** – an element less than or equal to all the elements in a given set **Error interval** – an expression written using inequalities that shows the range of possible values that a number could have been before it was rounded or truncated. Error intervals are written in the form LB $\leq$ x < UB **Truncated** – cut off. In maths, if a number has been truncated it has been cut off without considering	•	• Students will need to know how to round to decimal places and significant figures • Students will need to know how to use the inequality symbols	Exam Prep 2

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		how the number should be rounded.			
To learn how to calculate with upper and lower bounds	• Students will know and understand that to calculate the upper bound for a problem involving the addition of two rounded numbers you need to add the upper bounds • Students will know and understand that to calculate the lower bound for a problem involving the subtraction of two rounded numbers you need to subtract the upper bound from the lower bound • Students will know and understand that to calculate the upper bound for a problem involving the subtraction of two rounded numbers you need to subtract the lower bound from the upper bound • Students will know and understand that to calculate the lower bound for a problem involving the multiplication of two rounded numbers you need to multiply the lower bounds • Students will know and understand that to calculate the upper bound for a problem involving the multiplication of two rounded numbers you need to multiply the upper bounds • Students will know and understand that to calculate the lower bound for a problem involving the division of two rounded numbers you need to divide the lower bound by the upper bound • Students will know and understand that to calculate the upper bound for a problem involving the division of two rounded numbers you need to divide the upper bound by lower bound • Students will know how to calculate the upper and lower bounds for more complex calculations including those involving substitution, mass, density, volume, speed, distance, time etc.		**Steps to Success – Calculating with Bounds** **Step 1:** Write down the upper and lower bounds for everything in the question that has been rounded **Step 2:** Decide whether your calculation involves addition, subtraction, multiplication or division **Step 3:** Select and use the correct bounds in the calculation to work out the answer. **If you are asked to calculate the lower bound remember:** When adding the lower bound is calculated by adding the two lower bounds (LB + LB) When subtracting the lower bound is calculated by subtracting the upper bound from the lower bound (LB – UB) When multiplying the lower bound is calculated by multiplying the two lower bounds (LB x LB) When dividing the lower bound is calculated by dividing the lower bound by the upper bound (LB ÷ UB) **If you are asked to calculate the upper bound remember:** When adding the upper bound is calculated by adding the two upper bounds (UB + UB) When subtracting the upper bound is calculated by subtracting the upper bound from the lower bound (UB – LB) When multiplying the upper bound is calculated by multiplying the two upper bounds (UB x UB) When dividing the upper bound is calculated by dividing the upper bound by the lower bound (UB ÷ LB)	• Students will need to know how to find the upper and lower bound of a number	

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To learn how to calculate to a suitable degree of accuracy	• Students will know how to calculate the upper and lower bounds for more complex calculations including those involving substitution, mass, density, volume, speed, distance, time etc. • Students will need to know that to calculate an answer to a 'suitable degree of accuracy' for a question involving numbers that have been rounded, they need to calculate both the upper and lower bound and then compare the two answers to see to what degree of accuracy the bounds are the same		•	• Students need to know how to calculate with upper and lower bounds	Exam Prep 2
To learn how to interpret real life graphs	• Students will know how to interpret the gradient of a real-life graph e.g. financial contexts, rate of change of graphs of containers filling and emptying etc. • Students will know how to interpret the area under a graph formed by line segments linear graph in real-life contexts. Students will know that the area under the graph represents the product of the two axes. • Students will know that for velocity time graphs the area represents distance and the gradient represents acceleration • Students will know that the units for acceleration are given in distance/time^2	**Velocity -** the speed of something in a given direction. **Acceleration -** the rate of change of velocity per unit of time.	•	• Students will know how to interpret a distance-time graph • Students will know how to calculate speed from a distance time graph • Students will know how to complete a distance-time graph given information • Students will need to know how to calculate gradient	Exam Prep 2
To learn how to estimate area under a curve	• Students will know how to estimate area under a curve by dividing it into triangles and trapezia • Students will know whether or not their estimate is an underestimate or overestimate for the area under the curve and why • Students will know that the area under a velocity-time graph represents distance		•	• Students need to be able to calculate the area of triangles and trapezia	Exam Prep 2
To learn how to estimate the gradient of a curve	• Students will know how to estimate the gradient at a point on a curve by drawing a tangent • Students will know that the gradient of a tangent at a point on a velocity-time graph tells them the acceleration of the vehicle at that point • Students will know that the units for acceleration are given in distance/time^2 • Students will know how to solve problems involving velocity-time graphs	**Tangent –** A line that just touches a curve but doesn't go through it.	•	• Students will need to know how to calculate gradient	Exam Prep 2