Knowledge Rich Curriculum Plan

Year 9 Core – 3D Shapes, Surface Area and Volume

Lesson objective	Intended Knowledge:	Tiered Vocabulary	Prior Knowledge:	Steps to Success	Feedback
To learn how to draw plans and elevations of 3D shapes.	• Students will know how to use isometric grids to sketch 3D solids. • Students will identify front, side and plan elevations of 3D solids. • Students will draw the front, side and plan elevations of 3D solids with cubes using a 1cm grid. • Students will draw the front, side and plan elevations of 3D solids with accurate measurements using a 1cm grid. **Opportunity for challenge:** • Students will know how to sketch a 3D solid using the front, side and plan elevations.	Plan – A drawing of something as viewed from above Elevation – the view of a 3D shape when it is looked at from the side or from the front.	• Students need to be able to identify 3D shapes and write the number of faces, edges and vertices they have.	**Steps to Success – Plans and Elevations** **Step 1:** Identify the direction that you are looking from. **Step 2:** Draw the face/view you can see of the object from that direction.	
To learn how to calculate the surface area of cubes, cuboids and triangular prisms.	• Students will know how to find the surface area of cubes. • Students will know how to find the surface area of cuboids. • Students will know how to find the surface area of triangular prisms. **Opportunity for challenge:** • Students will know how to solve problems involving the surface area of cubes, cuboids and triangular prisms.	Surface area - the total area of all of the faces of a 3D solid added together Prism – A solid object with two identical ends and flat sides	• Students need to know how to find the area of squares, rectangles and triangles.	**Steps To Success – Surface area of cubes** **Step 1:** Find the area of one face, to do this we calculate length by width **Step 2:** Multiply the area of one face by the number of faces the shape has. A cube has 6 identical faces **Steps To Success – Surface area of Cuboid** **Step 1:** Calculate the area of each of the faces of the shape. It is important to remember how many faces a cuboid has. **Step 2:** To find the total surface area add the area of each face together. ***Sometimes the faces can either be rectangles or squares, it is important to consider this when completing the calculations. *** **Steps To Success – Surface area of a Triangular Prism** **Step 1** – Begin by using the formula ½ base x height to work out the area of the triangular faces. **Step 2** – Find the area of all of the other faces by calculating length x width. **Step 3** – Add the area of all the faces together. Remember a triangular prism has 5 faces in total.	
To learn how to calculate the surface area of compound shapes and cylinders.	• Students will know how to find the surface area of compound solids involving prisms. • Students will know how to find the surface area of cylinders. **Opportunity for challenge:** • Students will know how to solve problems involving the surface area of prisms.	Compound Solid - a solid that is made up of 2 or more solids.	• Students need to know how to find the area and circumference of circles.	**Steps to Success – Surface Area of Prisms** **Step 1**: Write down the number of faces of the prism. **Step 2**: Calculate the area of each of the faces for the prism **Step 3**: Add the total areas for each of the shapes up. **Steps To Success – Surface area of cylinders** **Step 1:** Calculate the area of each circle using $A = \pi r^2$. **Step 2:** Calculate the area of the curved surface by finding the diameter and multiplying it by the length. Use $C = \pi d$ to find the circumference.	

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To learn how to calculate the volume of prisms.	• Students will know how to find the volume of cubes and cuboids. • Students will know how to find the volume of triangular prisms. • Students will know how to find the volume of compound shapes. • Students will know how to find the volume of cylinders. **Opportunity for challenge:** • Students will know how to solve problems involving the volume of prisms.	**Volume** – the amount of space inside a 3D object **Prism** – A solid object with two identical ends and flat sides	• Students need to know how to find the area of rectangles, triangles and circles.	**Steps To Success – Volume of Cube/Cuboids** **Step 1:** Find the area of the cross section – this is the square or rectangle at the front. **Step 2:** Multiple the area of the square or rectangle by the depth of the shape. **Step 3:** Write the units for volume. <u>Steps to Success – Volume of a prism:</u> Step 1: Write down the formula. Step 2: Calculate the area of the cross section. Step 3: Substitute the values into the formula. Step 4: Complete the calculation making sure the answer includes the units.	
To learn how to calculate with density, mass and volume.	• Students will know how to calculate density using the mass and volume. • Students will know how to calculate mass using the density and volume. • Students will know how to calculate volume using the density and mass. • Students will know how to calculate the mass, density or volume without converting any units. **Opportunity for challenge:** • Students will know how to calculate the mass, density or volume converting units when necessary.	**Density** – Density tells you how tightly packed matter (stuff) is in an object or substance. **Mass** – Mass is a measure of how much matter or stuff is in something, and it's usually measured in grams or kilograms. **Volume** - Volume refers to the amount of space the object takes up.	• Students need to know how to multiply and divide numbers. • Students need to know how to substitute values into formulae.	See Reading	
To learn how to calculate 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. **Opportunity for challenge:** • Students will know how to solve problems involving speed, distance and time.	**Speed** – measures how fast something is moving. **Distance** – measures how far something has travelled. **Time** – measures how long something takes.	• Students need to know how to make simple conversions time between minutes and hours. E.g. 30 minutes = 0.5 hours	$$Speed = \frac{distance}{time}$$ $$Time = \frac{distance}{speed}$$ $$Distance = Speed \times Time$$	
To learn how to interpret real-life graphs.	• Students will know how to use conversion graphs to do simple conversions with metric and imperial units. • Students will know how to use conversion graphs to carry out conversions that involve scaling up. • Students will know how to use linear graphs to in order to explore the relationships between costs and variables. • Students will know how to use linear graphs involving money to state a fixed cost. • Students will know how to draw a conversion graph.		• Students need to know how to use conversions graphs to convert currencies.		

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To learn how to interpret a distance-time graph.	• Students will know how to make simple interpretations from a distance-time graph. • Students will know how to find distances and times from a distance-time graph. • Students will know how to complete a distance-time graph from a worded scenario. • Students will know how to draw a complete distance-time graph from a worded scenario. • Students will know how to find the distance by finding the area under the graph. • Students will know how to interpret the speed within each section of the graph by looking at the steepness of the line. **Opportunity for challenge:** • Students will know how to find the speed within each section of a distance-time graph.		• Students need to know how to calculate speed, distance and time.		
	Mini-Assessment 11				