The Sutton Academy

Knowledge Rich Curriculum Plan

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

Lesson/Learning Sequence	Intended Knowledge: *Students will know that…*	Tiered Vocabulary	Prior Knowledge:	Steps to Success	Feedback
To learn how to identify 3D shapes.	• Students will know the names of prisms, pyramids and spheres. • Students will know how to determine the number of faces, edges and vertices from 3D solids. • Students will know how to sketch 3D shapes. **Opportunity for challenge:** • Students will know how to identify a 3D shape based on the properties given in a worded description.	Prism – A solid object with two identical ends and flat sides Pyramid - a 3D solid where the sides are triangles meeting at the apex and the base is a polygon. Vertex (plural vertices) – corner Face – in maths, a face is a flat surface of a solid object Polygon – a closed shape with straight sides Edge – a line segment where two faces meet The Fryer model can be used here.	• Students need to identify 2D shapes and their properties.		
To learn how to draw and identify nets of 3D shapes.	• Students will know how to sketch the nets of prisms. • Students will know how to sketch the nets of pyramids. • Students will know how to identify a 3D shape from its net by looking at the faces on the net. • Students will know how to use isometric grids to sketch 3D solids.	Net – net means a pattern that you can cut and fold to make a model of a solid shape.	• Students need to identify 3D shapes.		
To learn how to draw plans and elevations of 3D shapes.	• 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 identify and draw 2D shapes.	**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 find the surface area of compound shapes. • Students will know how to solve problems involving surface area.	Surface area - the total area of all of the faces of a 3D solid added together	• 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**	

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				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. **Steps to Success - Finding Surface Area of Compound Shapes** **Step 1: Look at the 3D Shape Carefully** Understand what basic shapes make up the compound shape, look at how the parts are **joined together** — this affects which faces are **visible** and which are **hidden**. **Step 2: Identify and Label All the Visible Faces** Go around the shape and **list all the faces** you can see. **Step 3: Find the Area of Each Face** Use the correct formula for each face: **Step 4: Add the Areas of All the Faces** Add up the area of each face. This total is the **surface area** of the compound shape. Your final answer should include units, such as: cm^2/ m^2	
To learn how to calculate the volume of prisms.	• Students will know how to find the volume of cubes. • Students will know how to find the volume of cuboids. • Students will know how to find the volume of triangular prisms. **Opportunity for challenge:** • Students will know how to solve simple problems involving the volume of cubes, cuboids and triangular prisms. **Note: Please use volume = area of cross-section x length rather than just multiply all of the numbers together.**	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 squares, rectangles and triangles.	**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. **Steps to Success – Volume of a prism:** 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 the volume of compound shapes and cylinders.	• 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. **Note: Please use volume = area of cross-section x length rather than just multiply all of the numbers together.**	Compound Solid - a solid that is made up of 2 or more solids.	• Students need to find the area of circles.	**Steps to Success – Volume of a Cylinder** **Step 1 –**Calculate the area of the circle, you do this by using the formula π x radius^2 It is important to consider that if the diameter is shown you will need to divide it by 2 to find the radius. **Step 2 –** Secondly substitute the values into the equation volume = π x radius^2 x height **Step 3 –** Ensure the answer has the units of cm^3 If you are given the volume, remember to use the inverse operations to find a missing side.	

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				<u>Steps to Success - Find the Volume of Compound Prisms</u> To calculate the volume of a compound prism, follow these steps: **Step 1: Identify the Cross Section** Look at the end face (cross section) of the prism.. The cross section may be made up of more than one simple shape (for example, an L-shape made of two rectangles). **Step 2: Split the Cross Section Into Simpler Shapes** Divide the cross section into basic shapes like rectangles or triangles. **Step 3: Find the Area of Each Simple Shape** Use the appropriate area formulas: • Rectangle: Area = length × width • Triangle: Area = 1/2 × base × height **Step 4: Add the Areas Together** Add the areas of all the shapes you identified. This gives you the **total cross-sectional area**. **Step 5: Multiply the Total Area by the Depth (or Length)** Multiply the total area by the depth (how far the cross section extends) to find the **volume**. Formula: **Volume = Total Cross-Sectional Area × Depth**	
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