The Sutton Academy

Knowledge Rich Curriculum Plan

Year 10 Intermediate – Geometry 3

Lesson	Intended Knowledge:	Tiered Vocabulary	Prior Knowledge:	Steps to Success:	Feedback
To learn how to identify and draw plans and elevations.	• Students will know how to draw 3D shapes on isometric paper. • Students will know how to identify front, side and plan elevations of 3D solids. • Students will know how to draw the front, side and plan elevations of 3D solids. • Students will know how to draw the front, side and plan elevations of 3D solids involving measurements. • 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. Cultural capital	• Students need to know how to identify 3D shapes.	<u>Steps to Success- Plans and Elevations</u> **Step 1:** Identify which view you are looking for, remembering that the plan view is looking down at the shape, and front and side elevations are views from the front or side. **Step 2:** Count the number of squares that are on the required view and draw them. **Step 3:** Double check that each of the values match the different elevations	
To learn how to calculate the surface area of prisms.	• Students will know how to find the surface area of cuboids. • Students will know how to find the surface area of triangular prisms. • Students will know how to find the surface area of compound solids. **Opportunity for challenge:** • Students will know how to solve problems involving the surface area of triangular prisms and compound solids.	Surface area - the total area of all the faces of a 3D solid added together Compound solid – a 3D shape made up of two or more other 3D shapes	• Students need to know to find the surface area of cubes.	<u>Steps To Success – Surface area of Cuboid</u> **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. *** <u>Steps To Success – Surface area of triangular prisms</u> **Step 1:** Calculate the area of each of the faces of the shape. It is important to remember that we divide by 2 to find the area of a triangle. **Step 2:** To find the total surface area add the area of each face together. <u>Steps To Success – Surface area of compound solids</u> **Step 1:** Calculate the area of each of the faces of the shape. It is important to check that we have all the faces of the compound solid. **Step 2:** To find the total surface area add the area of each face together.	
To learn how to calculate the surface area of cylinders, pyramids, cones and spheres.	• Students will know how to find the surface area of cylinders. • Students will know how to find the surface area of pyramids. • Students will know how to find the surface area of sphere and hemi-spheres. **Opportunity for challenge:** • Students will know how to find the surface area of cones. • Students will know how to solve problems involving the surface are of cylinders, pyramids, cones, spheres and hemi-spheres.	Cylinder - a 3D shape with long straight sides and two circular ends the same size Formula sheet Some formulae given in exam questions.	• Students need to know how to calculate the area and circumference of circles.	<u>Steps To Success – Surface area of cylinders</u> **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 of the circle and multiplying it by the length. Use $C = \pi d$ to find the circumference. **Step 3:** Add the area of all the faces together to find the total surface area. <u>Steps To Success – Pyramids</u> **Step 1:** Calculate the area of each of the faces of the shape. It is important to check that we have all the faces of the pyramid. **Step 2:** To find the total surface area add the area of each face together. <u>Steps To Success – Cones</u> **Step 1:** Identify each part needed for the formula. You may need to use Pythagoras' theorem to find missing parts. **Step 2:** Substitute the value identified into the formula. **Step 3:** Calculate. You may be asked to round your answer to a given degree.	

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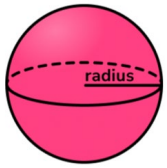
				$Surface\ area\ of\ a\ cone = \pi rl + \pi r^2$  **Steps To Success – Spheres** **Step 1:** Identify each part needed for the formula. You may need to use Pythagoras' theorem to find missing parts. **Step 2:** Substitute the value identified into the formula. **Step 3:** Calculate. You may be asked to round your answer to a given degree. ***For a hemi-sphere we need to divide the surface area for the sphere by 2 and add on the area of the circle***  $Surface\ area = 4\pi r^2$	
To learn how to calculate the volume of prisms and cylinders.	• Students will know how to find the volume of a prism using: Volume of a Prism = Area of Cross Section x Length • Students will know how to find the volume of cubes, cuboids and triangular prisms. • Students will know how to solve problems involving the volume of prisms. • Students will know how to work backwards from the volume to find the length of a missing side. • Students will know how to find the volume of compound solids. • Students will know how to find the volume of cylinders. • Students will know how to solve problems involving the volume of compound solids and cylinders. **Opportunity for challenge:** • Students will know how to find the volume of cylinders, leaving their answers in terms of π. • Students will know how to work backwards from the volume of a cylinder to calculate its height or the radius/diameter.	Volume – the amount of space inside a 3D object Formula sheet	• Students need to know how to calculate the area of rectangles, triangles and circles.	**Steps to Success – Volume of a prism** **Step 1:** Find the area of the cross-section of the prism. **Step 2:** Multiply the area of the cross-section by the length of the prism. **Step 3:** Don't forget to add in the units for volume. E.g. cm^3	

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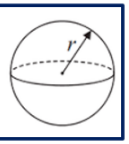
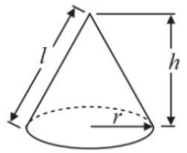
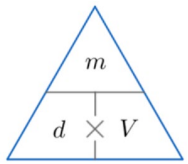
To learn how to calculate the volume of pyramids, cones and spheres.	• Students will know how to find the volume of pyramids. • Students will know how to find the volume of cones. • Students will know how to find the volume of spheres and hemi-spheres. **Opportunity for challenge:** • Students will know how to solve problems involving the volume of cylinders, pyramids, cones, spheres and hemi-spheres.	Some formulae given in exam questions.	• Students need to know how to calculate the area of circles.	**Key formulae:** Volume of sphere $= \frac{4}{3}\pi r^3$  Volume of cone $= \frac{1}{3}\pi r^2 h$  $Volume\ of\ a\ Pyramid = \frac{1}{3} \times Area\ of\ Base \times Height$	
To learn how to calculate density, mass and volume.	• Students will know how to calculate mass, density or volume using two variables. • Students will know how to find the mass or density given one of the variables and by working out the volume. • Students will know how to solve simple problems involving density, mass and volume. • Students will know how to solve multi-step problems involving mass, density and volume. **Opportunity for challenge:** • Students will know how to solve problems which involve combing two materials/liquids to make a third.	**Density** - the degree of compactness of the object **Mass** - the weight of the object **Volume** - the amount of space that the object occupies	• Students need to know how to convert units for mass. • Students need to know how to find the volume of prisms.	**Steps to Success – Calculating density, mass, volume** **Step 1:** Check the units! If you are asked to calculate either volume or mass, check the units in the question are consistent, if they are, you're good to go but if they aren't you will need to convert them. For example, if the density is given in g/cm^3, check that the mass is also in grams and not kg. If they aren't consistent you need to convert the units for mass to match that given in the units for density. Likewise, if the volume is given in m^3 but the density is given in cm^3 you need to convert the volume. **Step 2:** Once you have converted any units you are ready to use the formulae below: Density = Mass ÷ Volume Volume = Mass ÷ Density Mass = Density x Volume **Step 3:** Substitute the known variables into the formula and calculate the unknown density, mass or volume. **Step 4:** Check the units for your answer. **Step 5:** Check you've answered the question fully – there may be more steps! 	

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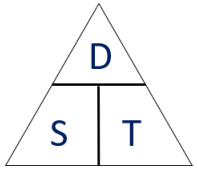
To learn how to calculate speed, distance and time	• Students will know that $Speed = \frac{distance}{time}$ • Students will know that $Time = \frac{distance}{speed}$ • Students will know that $Distance = Speed \times Time$ • Students will know the formula triangle for speed, distance and time. • Students will know how to solve basic SDT problems where the time is an integer number of hours and all units correspond. • 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 need to know how to solve simple problems involving speed, distance and time. **Opportunity for challenge:** • 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 distance travelled per unit of time. It is how fast an object is moving.	• Students need to know how to convert from minutes to hours and minutes.	**Steps to Success – Calculating speed, distance, time** **Step 1:** Check the units! If you are asked to calculate either distance or time, check the units in the question are consistent, if they are, you're good to go but if they aren't you will need to convert them. For example if the speed is given in m/s, check that the distance is also in metres and not km. If they aren't consistent you need to convert the units for distance to match that given in the units for speed. Likewise, if the time is given in hours and minutes but the speed is given in hours you need to convert the time into a decimal number of hours. **Step 2:** Once you have converted any units you are ready to use the formulae below: Speed = Distance ÷ Time Time = Distance ÷ Speed Distance = Speed x Time **Step 3:** Substitute the known variables into the formula and calculate the unknown speed, distance or time. **Step 4:** Check the units for your answer. If you are calculating time you may need to convert back from a decimal number of hours to hours and minutes! **Step 5:** Check you've answered the question fully – there may be more steps!  **Converting Time** Hours ▶ Mins x60 Mins ▶ Hours ÷60 Secs ▶ Mins x60 Mins ▶ Secs ÷60	
To learn how to draw and interpret distance-time graphs.	• Students will know how to draw distance–time graphs. • Students will know how to work out time intervals for graph scales. • Students will know how to find the total time taken of individual sections of a distance-time graph. • Students will know how to find the total distance in individual sections of a distance-time graph. • Students will know how to find the speed of individual sections of a distance-time graph. • Students will know how to interpret information presented in a range of linear graphs. • Students will know how to interpret gradient as the rate of change in distance–time and speed–time graphs, graphs of containers filling and emptying, and unit price graphs.	**Gradient** – steepness. The gradient of a line tells us how steep the line is.	• Students need to know how to find the difference between two times. • Students need to know how to find the speed using a distance and time.		
Exam Preparation 14					