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**Knowledge Rich Curriculum Plan**

Year 11 Higher+ Geometry 1

| **Lesson/Learning Sequence** | **Intended Knowledge:**  *Students will know that…* | **Tiered Vocabulary** | **Prior Knowledge:**  *In order to know this …* | **Assessment** |
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| **To learn how to measure and draw bearings** | * Students will know the rules for bearings;  1) Always measure from North  2) Bearings must be written as 3 digits.  3) Always measure in a clockwise direction. * Students will know how to use a protractor to accurately draw bearings from A to B and B to A. * Students will know how to use a protractor and ruler to accurately measure bearings on a map, including measuring from A to B and B to A. * Students will know how to accurately draw and measuring bearings using a protractor to solve problems * Students will know how to use the angle properties of parallel lines to determine bearings | **Bearing –** angles, measured clockwise from north | * Students should already know how to measure and draw angles * Students should know how to find missing angles at a point * Students should know how to calculate angles in parallel lines using the fact that co-interior angles add to 180 |  |
| **To learn how to solve problems involving area and perimeter** | * Students will know how to use inverse operations to find the missing lengths of shapes when given the perimeter. * Students will know how to solve real life problems involving perimeter. * Students will know how to solve more complex problems involving perimeter including those involving algebra * Students will know that the formula for the area of a trapezium is  where a and b are the parallel sides and h is the height of the trapezium * Students will know how to calculate the area of a trapezium * Students will know how to calculate the area of compound shapes involving trapezia * Students will know how to solve worded problems involving the area of a trapezium * Students will know how to work backwards to find missing lengths given the area of a trapezium | **Perimeter –** the distance around the outside of a shape  **Area –** the amount of space inside a 2D shape  **Trapezium –** a quadrilateral with one pair of sides parallel.  **Quadrilateral –** a four-sided shape | * Students should already know how to calculate the area of rectangles, squares, parallelograms and triangles * Students should already know how to calculate the area of compound shapes involving rectangles, squares, parallelograms and triangles |  |
| **To learn how to solve problems involving area and circumference of a circle** | * Students will know how to calculate the area of a circle using the formula πr² leaving answers rounded to a given degree of accuracy * Students will know how to calculate the area of a circle using the formula πr², without a calculator leaving answers in terms of π. * Students will know how to calculate the area of semi circles * Students will know how to calculate the area of quarter circles or three-quarters of a circle * Students will know how to use inverse operations to find the missing radius or diameter when given the area. * Students will know how to solve problems involving the area of circles. * Students will know how to calculate the area of compound shapes involving circles or parts of circles * Students will know how to calculate the circumference of a circle using the formula - πd, giving their answer to a suitable degree of accuracy * Students will know how to calculate the arc length and perimeter of a semi-circle * Students will know how to calculate the arc length and perimeter of quarter circles or three quarters of a circle * Students will know how to use inverse operations to find the missing radius or diameter when given the circumference. * Students will know how to solve problems involving area and circumference of circles | **Radius –** a straight line from the centre to the circumference of a circle or sphere  **Diameter –** a straight line passing from side to side through the centre of a body or figure, especially a circle or sphere  **Circumference –** the perimeter of a circle  **Perimeter –** the distance around the outside of a shape  **Arc –** a part of a curve, a part of the circumference of a circle | * Students should already know how to calculate the area and circumference of a circle given the radius or diameter * Students should know how to identify the different parts of a circle |  |
| **To learn how to calculate the area, arc length and perimeter for a sector** | * Students will know how to calculate the area of a sector using the formula, * Students will know how to calculate the angle of a sector given its area * Students will know how to calculate the radius of a sector given its area * Students will know how to calculate the arc length of the sector using the formula * Students will know how to calculate the perimeter of a sector * Students will know how to calculate the angle of a sector given its arc length using inverse operations * Students will know how to calculate the radius of a sector given its arc length * Students will know how to form and solve equations involving the sector of a circle | **Sector –** a pie-shaped part of a circle made of the arc along with its two radii | * Students need to know how to calculate area and circumference of a circle * Students need to know that angles around a point add to 360 |  |
| **To learn how to calculate the surface area of prisms and cylinders** | * Students will know how to find the surface area of prisms including cubes, cuboids and triangular prisms * Students will know how to find the surface area of other prisms including compound prisms. * Students will know how to find the surface area of cylinders. Students will know how to calculate this in terms of π as well as by using a calculator. * Students will know how to solve problems involving the surface area of prisms and cylinders | **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  **Compound Solid** - a solid that is made up of 2 or more solids. | * Students need to be able to draw nets of shapes and identify nets of different 3D objects * Students need to know how to calculate the area of squares, rectangles, triangles and compound shapes * Students need to know how to calculate area and circumference of circles |  |
| **To learn how to calculate the surface area of cones and spheres** | * Students will know how to calculate the curved surface area of a cone using the formula * Students will know that to calculate the total surface area for a cone they need to add on the area of the circle on the base * Students will know to use Pythagoras’ theorem to calculate missing lengths required for the curved surface area of cone * Students will know how to calculate the surface area of a sphere using the formula * Students will know how to calculate the surface area of cones and spheres, leaving their answers in terms of π. * Students will know how to calculate the surface area of hemispheres and quarter-spheres * Students will know how to work backwards from the surface area of a cone or sphere to find missing lengths. * Students will know how to solve problems involving the surface area of cones and spheres |  | * Students need to be able to substitute into formulae * Students need to be able to use Pythagoras’ theorem to calculate missing lengths in right-angled triangles |  |
| **To learn how to calculate the volume of prisms and cylinders** | * Students will know that: Volume of a Prism = Area of Cross Section x Length * Students will know how to find the volume of cubes, cuboids, triangular prisms and compound prisms by calculating the area of the cross-section and multiplying it by the length of the prism * Students will know how to find the volume of cylinders. Students will know how to leave their answers for this in terms of π. * Students will know how to work backwards from the volume of a prism to find missing lengths * Students will know how to work backwards from the volume of a cylinder to calculate its height or the radius/diameter * Students will know how to solve problems involving the volume of prisms and cylinders | **Volume** – the amount of space inside a 3D object  **Prism** – A solid object with two identical ends and flat sides  **Compound Solid** - a solid that is made up of 2 or more solids. | * Students need to be able to calculate the area of squares, rectangles, triangles, compound shapes and circles |  |
| **To learn how to calculate the volume of pyramids and cones** | * Students will know how to find the volume of pyramids and cones. * Students will know how to find the volume of cones, leaving their answers in terms of π. * Students will know how to work backwards from the volume of a pyramid to calculate missing lengths * Students will know how to find the volume of cones. * Students will know how to work backwards from the volume of a cone to calculate its height, radius or diameter * Students will know how to find the volume of compound solids and solve problems involving the volume of pyramids and cones |  | * Students will need to know how to calculate the volume of cuboids, cubes and cylinders * Students need to be able to find 1/3 of a number * Students need to be able to divide an integer by 1/3 * Students will need to know how to substitute numbers into formulae |  |
| **To learn how to calculate the volume of a sphere and solve problems involving cones and spheres** | * Students will know how to find the volume of spheres and hemi-spheres. * Students will know how to find the volume of sphere and hemi-spheres, leaving their answers in terms of π. * Students will know how to work backwards from the volume of a sphere to calculate its radius or diameter * Students will know how to find the volume of compound solids involving pyramids, cylinders, cones and hemi-spheres, leaving their answers in terms of π where necessary. * Students will know how to solve problems involving working backwards with the volume and surface area of cones, spheres, hemispheres and compound shapes |  | * Students need to be able to substitute into formulae. * Students need to be able to multiply an integer by 4/3 * Students need to be able to divide an integer by 4/3 |  |
| **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 combine the densities, mass and volumes of two materials/liquids to make a third material/liquid. Students will know how to find missing values from a liquid using the density, mass or volumes for the other liquids. * Students will know how to solve more complex problems involving density, mass and volume | **Density** – a measurement of the amount of a substance contained in a certain volume  **Mass** – the weight of an object | * Students need to be able to convert units for mass * Students need to be able to convert units for length and understand how to convert units for volume |  |