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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
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| **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 $\frac{1}{2}\left(a+b\right)h$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
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| **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
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| **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, $Area of a Sector=\frac{θ}{360}πr^{2}$
* 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 $Arc Length=\frac{θ}{360}πd$
* 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
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| **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
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| **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 $Curved surface area of a cone=πrl$
* 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 $Surface area of a sphere=4πr^{2}$
* 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
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| **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
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| **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
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| **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
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| **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
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