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| Year 10 – Higher Tier | **Topic: Unit 7 – Area and Volume****Period:** Autumn 1 |
| **Overview of topic:**Students will build on their knowledge from KS3 in dealing with geometrical concepts of perimeter, area and volume, applying them to both 2-dimensional and 3 dimensional shapes where appropriate* Perimeter and Area
* Circles
* Sectors of Circles
* Prisms
* Cylinders and Spheres
* Pyramids and Cones
* Units
* Accuracy
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| **Key** **knowledge:*** Calculate the area and/or perimeter of shapes with different units of measurement.
* Understand that answers in terms of 𝜋 are more accurate.
* Calculate the perimeters and/or areas of circles, semicircles and quarter-circles given the radius or diameter and vice versa.
* Given dimensions of a rectangle and a pictorial representation of it when folded, work out the dimensions of the new shape.
* Work out the length given the area of the cross-section and volume of a cuboid.
* Understand that answers in terms of 𝜋 are more accurate.
* Given two solids with the same volume and the dimensions of one, write and solve an equation in terms of 𝜋 to find the dimensions of the other, e.g. a sphere is melted down to make ball bearings of a given radius, how many will it make?
* Combinations of 3D forms such as a cone and a sphere where the radius has to be calculated given the total height.
* Round 16,000 people to the nearest 1000.
* Round 1100 g to 1 significant figure.
* Work out the upper and lower bounds of a formula where all terms are given to 1 decimal place.
* Be able to justify that measurements to the nearest whole unit may be inaccurate by up to one half in either direction.

**Key vocabulary:**

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| Tier 2 | Tier 3 |
| * Area
* Perimeter
* Formula
* Length
* Width
* Compound
* Measurement
* Volume
* Nets
* Edge
* Face
* Circle
* Segment
* Sector
* Composite
* Capacity
* Bounds
* Accuracy
 | * Triangle
* Rectangle
* Parallelogram
* Trapezium
* Prism
* Polygon
* Cuboid
* Isometric
* Symmetry
* Vertices
* Arc
* Cylinder
* Circumference
* Radius
* Diameter
* Pi
* Sphere
* Cone
* Hemisphere
* Frustum
* Surface area
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 | **Key skills:** * Recall and use the formulae for the area of a triangle, rectangle, trapezium and parallelogram using a variety of metric measures;
* Calculate the area of compound shapes made from triangles, rectangles, trapezia and parallelograms using a variety of metric measures;
* Find the perimeter of a rectangle, trapezium and parallelogram using a variety of metric measures;
* Calculate the perimeter of compound shapes made from triangles and rectangles;
* Estimate area and perimeter by rounding measurements to 1 significant figure to check reasonableness of answers;
* Recall the definition of a circle and name and draw parts of a circle;
* Recall and use formulae for the circumference of a circle and the area enclosed by a circle (using circumference = 2𝜋𝑟 = 𝜋𝑑 and area of a circle = 𝜋𝑟2) using a variety of metric measures;
* Use 𝜋 ≈ 3.142 or use the 𝜋 button on a calculator;
* Calculate perimeters and areas of composite shapes made from circles and parts of circles (including semicircles, quarter-circles, combinations of these and also incorporating other polygons);
* Calculate arc lengths, angles and areas of sectors of circles;
* Find radius or diameter, given area or circumference of circles in a variety of metric measures;
* Give answers to an appropriate degree of accuracy or in terms of 𝜋;
* Form equations involving more complex shapes and solve these equations.
* Find the surface area of prisms using the formulae for triangles and rectangles, and other (simple) shapes with and without a diagram;
* Draw sketches of 3D solids and identify planes of symmetry of 3D solids, and sketch planes of symmetry;
* Recall and use the formula for the volume of a cuboid or prism made from composite 3D solids using a variety of metric measures;
* Convert between metric measures of volume and capacity, e.g. 1 ml = 1 cm3;
* Use volume to solve problems;
* Estimating surface area, perimeter and volume by rounding measurements to 1 significant figure to check reasonableness of answers;
* Use 𝜋 ≈ 3.142 or use the 𝜋 button on a calculator;
* Find the volume and surface area of a cylinder;
* Recall and use the formula for volume of pyramid;
* Find the surface area of a pyramid;
* Use the formulae for volume and surface area of spheres and cones;
* Solve problems involving more complex shapes and solids, including segments of circles and frustums of cones;
* Find the surface area and volumes of compound solids constructed from cubes, cuboids, cones, pyramids, spheres, hemispheres, cylinders;
* Give answers to an appropriate degree of accuracy or in terms of 𝜋;
* Form equations involving more complex shapes and solve these equations.
* Calculate the upper and lowers bounds of numbers given to varying degrees of accuracy;
* Calculate the upper and lower bounds of an expression involving the four operations;
* Find the upper and lower bounds in real-life situations using measurements given to appropriate degrees of accuracy;
* Find the upper and lower bounds of calculations involving perimeters, areas and volumes of 2D and 3D shapes;
* Calculate the upper and lower bounds of calculations, particularly when working with measurements;
* Use inequality notation to specify an error interval due to truncation or rounding.
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| **Co-curricular opportunities:** Geometry skills are a vital key skill across multiple other areas of study including Science, Resistant Materials, Art, Graphics, Food Technology and many others | **Key reading skills taught and key texts:**Clarify – identify key vocabulary in questions and be fluent in understanding the meaningsQuestion – from a worded question, what Maths is required to be done in order to get a solution?**Wider Reading Opportunities/Links:** |
| **How can I use this information at home?*** Conversation starters with your children to discuss their learning
* Support your child in carrying out independent research around the topic
* Visit your local library (or BorrowBox), museums, or other locations to explore the topic
* Promote books/other texts that explore this topic (see reading section)
* Help your child to learn the key vocabulary
* Encourage practice and consolidation through completion of homework, TTRockStars and using other online learning platforms
* Encourage them to practice their mathematical skills in a variety of everyday situations wherever the opportunity arises.
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