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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 | |
| **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:**   |  |  | | --- | --- | | 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 | | **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. |
| **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 meanings  Question – 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. | |