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| **UNIT 8: Perimeter, area and volume** | **Teaching Time**  **9-11 hours** |

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**SPECIFICATION REFERENCES**

N14 estimate answers; check calculations using approximation and estimation, including answers obtained using technology

A5 understand and use standard mathematical formulae; …

R1 change freely between related standard units (e.g. time, length, area, volume/capacity, mass) and compound units (e.g. speed, rates of pay, prices, density, pressure) in numerical and algebraic contexts

G11 solve geometrical problems on coordinate axes

G12 identify properties of the faces, surfaces, edges and vertices of: cubes, cuboids, prisms, cylinders, pyramids, cones and spheres

G14 use standard units of measure and related concepts (length, area, volume/capacity, mass, time, money, etc.)

G15 measure line segments and angles in geometric figures …

G16 know and apply formulae to calculate: area of triangles, parallelograms, trapezia; volume of cuboids and other right prisms (including cylinders)

G17 … calculate: perimeters of 2D shapes, including … composite shapes

**PRIOR KNOWLEDGE**

Students should be able to measure lines and recall the names of 2D shapes.

Students should be able to use strategies for multiplying and dividing by powers of 10.

Students should be able to find areas by counting squares and volumes by counting cubes.

Students should be able to interpret scales on a range of measuring instruments.

**KEYWORDS**

Triangle, rectangle, parallelogram, trapezium, area, perimeter, formula, length, width, prism, compound, measurement, polygon, cuboid, volume, symmetry, vertices, edge, face, units, conversion

**OBJECTIVES**

By the end of the sub-unit, students should be able to:

* Indicate given values on a scale, including decimal value;
* Know that measurements using real numbers depend upon the choice of unit;
* Convert between units of measure within one system, including time and metric units to metric units of length, area and volume and capacity e.g. 1ml = 1cm3;
* Make sensible estimates of a range of measures in everyday settings;
* Measure shapes to find perimeters and areas using a range of scales;
* Find the perimeter of
  + rectangles and triangles;
  + parallelograms and trapezia;
  + compound shapes;
* Recall and use the formulae for the area of a triangle and rectangle;
* Find the area of a trapezium and recall the formula;
* Find the area of a parallelogram;
* Calculate areas and perimeters of compound shapes made from triangles and rectangles;
* Estimate surface areas by rounding measurements to 1 significant figure;
* Find the surface area of a prism;
* Find surface area using rectangles and triangles;
* Identify and name common solids: cube, cuboid, cylinder, prism, pyramid, sphere and cone;
* Sketch nets of cuboids and prisms;
* Recall and use the formula for the volume of a cuboid;
* Find the volume of a prism, including a triangular prism, cube and cuboid;
* Calculate volumes of right prisms and shapes made from cubes and cuboids;
* Estimate volumes etc by rounding measurements to 1 significant figure;

**POSSIBLE SUCCESS CRITERIA**

Find the area/perimeter of a given shape, stating the correct units.

Justify whether a certain number of small boxes fit inside a larger box.

Calculate the volume of a triangular prism with correct units.

**OPPORTUNITIES FOR REASONING/PROBLEM SOLVING**

Given two 2D that shapes have equal areas, work out all the dimensions of the sides of the shapes.

Problems involving straight-forward and compound shapes in a real-life context should be explored to reinforce the concept of area. For example, the floor plan of a garden linked to the purchase of grass seed.

**COMMON MISCONCEPTIONS**

Shapes involving missing lengths of sides often result in incorrect answers.

Students often confuse perimeter and area.

Volume often gets confused with surface area.

**NOTES**

Use questions that involve different metric measures that need converting.

Measurement is essentially a practical activity: use a range of everyday shapes to bring reality to lessons.

Ensure that students are clear about the difference between perimeter and area.

Practical examples help to clarify the concepts, i.e. floor tiles, skirting board, etc.

Discuss the correct use of units.

Drawings should be done in pencil.

Consider ‘how many small boxes fit in a larger box’-type questions.

Practical examples should be used to enable students to understand the difference between perimeter, area and volume.