



Perimeter, area and volume

What do I need to be able to do?

By the end of this unit you should be able to

- Display same areas
- Calculate area and perimeter
- Find the area of a triangle
- Find the area of a parallelogram
- Find volume by counting cubes
- Find the volume of a cuboid

Keywords

Area - the size of a surface (2D shapes)

Perimeter - the distance around a 2D shape

Volume - the amount of 3-dimensional space an object takes up (with liquid this is called capacity)

Perpendicular - two lines that meet at 90°

Vertex - a point where two or more line segments meet

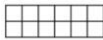
Face - any of the flat surfaces of a solid object

Edge - a line segment on the boundary joining one vertex to another

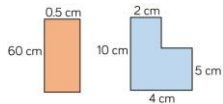
Commutative - you can swap the order around in the calculation and still achieve the same answer

Shapes with the same area

All the shapes have an area of 12cm^2 - they are all made up of 12 squares.



The shapes below also have the same area



Area

Rectangle/ Square area = Base x Height

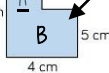
Compound Shapes

Area of A

The height of shape A is 5cm
 $2 \times 5 = 10\text{cm}^2$

Area of B

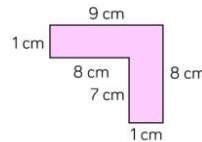
$4 \times 5 = 20\text{cm}^2$



Total area = Area A + Area B = $10 + 20 = 30\text{cm}^2$

Perimeter

Length around the outside of the shape



In compound shapes make sure all the lengths have measurements

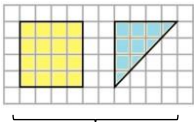
Perimeter = $9\text{cm} + 8\text{cm} + 1\text{cm} + 7\text{cm} + 8\text{cm} + 1\text{cm}$
 $= 34\text{cm}$

Perimeter: often asks about boundaries or walks in questions

Area of triangles

Area can be calculated by counting squares.

Often this is an estimation with triangles if it does not cut a square in half.

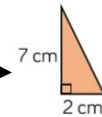


Notice the relationship between the square and the triangle.

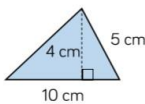
Area triangle = $\frac{1}{2}$ area of the square

Right-angled triangles

The height of a right-angled triangle



Perpendicular heights

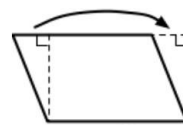


The perpendicular height meets the base at 90°

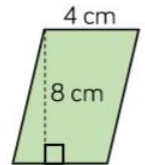
Area = $\frac{1}{2} \times 10 \times 4 = 20\text{cm}^2$

Area triangle = $\frac{1}{2} \times \text{base} \times \text{perpendicular height}$

Area of parallelograms



Parallelogram = Base x Perpendicular height

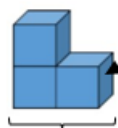


Area = $4 \times 8 = 32\text{cm}^2$

Properties of parallelograms

- Two sets of parallel lines
- Four sides (quadrilateral)
- Interior angles = 360°
- Opposite angles are equal
- 2D shape

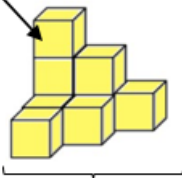
Volume (counting cubes)



Each cube has a given volume. E.g. 1cm^3

This shape is made up of 3 cubes
So the volume is 3cm^3

Always check the units of measurement.
Volume can be mm^3 , cm^3 , m^3 , km^3



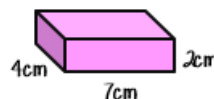
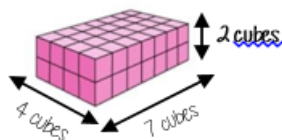
Don't forget about cubes you can't see. This is a 3D shape.

The volume of this shape is 9cm^3



Use multilink cubes to notice that volume can be any shape - it is the number of cubes that make up the volume

Volume of cuboids



Counting cubes

Counting the cubes = 56cm^3

OR

There are 28 cubes on the bottom row and two rows
 $28 \times 2 = 56$

Volume of cuboid = length x width x height

Volume = $4 \times 7 \times 2 = 56\text{cm}^3$

Properties of cuboids

- 3D shape
- 8 vertices
- 6 faces
- 12 edges

Remember multiplication is commutative so the values can be multiplied in any order