YR6 Knowledge Organiser - Measure (Perimeter, Area & Volume)

Key Concepts

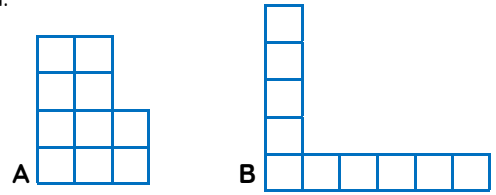
- Recognise that shapes with the same areas can have different perimeters and vice versa.
- Recognise when it is possible to use formulae for area and volume of shapes.
- Calculate the area of parallelograms and triangles.
- Calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres (cm^3) and cubic metres (m^3), and extending to other units (for example, mm^3 and km^3).

Key Vocabulary

- area / perimeter / volume
- rectilinear
- formula / formulae
- approximate
- estimate
- base
- perpendicular
- parallelogram / triangle
- cubic units
- cube / cuboid

Same Area, Different Perimeter

Different rectilinear shapes can have the same area.

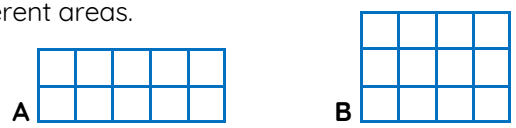


Shapes with the same area can have different perimeters.

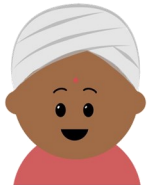
"The shapes both have an area of 10cm^2. Shape A has a perimeter of 14cm. Shape B has a perimeter of 22cm."

Same Perimeter, Different Area

Shapes with the same perimeter can have different areas.



"The shapes both have a perimeter of 14cm. Shape A has an area of 10cm^2. Shape B has an area of 12cm^2.



Area of a Rectangle

We can use a formula for the area of a rectangle.

area = length × width or $a = l \times w$

We can use this and our knowledge of factor pairs to draw rectangles with a given area.

A rectangle with an area of 12cm^2 could have side lengths of 1cm and 12cm, 2cm and 6cm or 3cm and 4cm.

We can use a formula for the perimeter of a rectangle.

perimeter = 2 × length + 2 × width or $p = 2(l + w)$

$a = l \times w = 12cm \times 4cm = 48cm^2$

$p = 2\ (l + w) = 2\ (12 + 4) = 32cm$

Area of Rectilinear Shapes

We can apply our understanding of the area of a rectangle to calculate the area of rectilinear shapes. By splitting rectilinear shapes into rectangles, we can find the sum of their areas.

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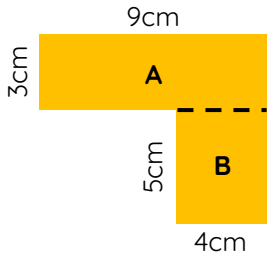


Area of A = 9cm × 3cm = 27cm²
Area of B = 5cm × 4cm = 20cm²
Total area = 27cm² + 20cm² = 47cm²

Area of a Parallelogram

If we cut the 'triangle' shape from one side of a parallelogram and move it to the other side, it becomes a rectangle.

We can see the side length is equal to its perpendicular height.

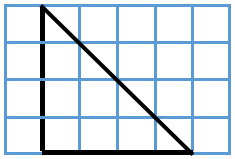
This means that we can use our understanding of the area of rectangles to calculate the area of parallelograms.

area = base × perpendicular height

area = 6cm × 2cm = 12cm²

Area of a Triangle

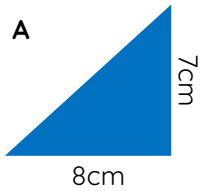
We can find the area of a triangle by counting squares. It can help to add a mark to each square once it has been counted to make sure you don't miss any or repeat any squares.

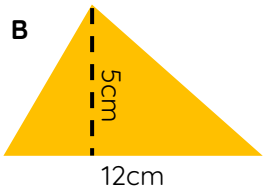


The triangle is made up of 6 squares and 4 half squares. The area is 8cm².

We can also use a formula for the area of a triangle, noticing it is half the area of a square, rectangle or parallelogram.

area = base × perpendicular height ÷ 2



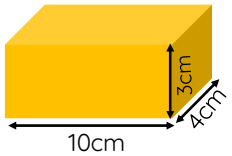


A = 8cm × 7cm ÷ 2 = 56 ÷ 2 = 28cm²
B = 12cm × 5cm ÷ 2 = 60 ÷ 2 = 30cm²

Calculate Volume

We can use a formula for the volume of a cuboid.

volume = length × width × height or v = l × w × h



v = 10cm × 4cm × 3cm = 120cm³

Compare Volume

Once we can calculate volume, we can compare the volume of different cubes and cuboids.

Estimate Volume

Now, we can apply our knowledge to estimate the volume of cuboids.

I estimate the volume of the cuboid is 3cm × 2cm × 2cm = 12cm³