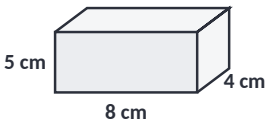
Volume: fact sheet

Planner week 4 · Learn these facts

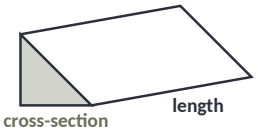
Cuboid



Volume = length × width × height

8 × 5 × 4 = 160 cm³

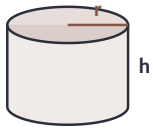
Prism



Area of the cross-section × length

Triangle: $\frac{1}{2}$ × base × height first

Cylinder



$\pi r^2 h$

π × radius² × height

Halve the diameter for the radius

Units

1 cm³ = 1000 mm³

1 litre = 1000 cm³

1 m³ = 1 000 000 cm³

Volume is in **cubed** units: cm³, m³

Litres: divide cm³ by 1000

How many fit?

Box 72 × 48 × 24, packet 8 × 6 × 2

72÷8 = 9, 48÷6 = 8, 24÷2 = 12

9 × 8 × 12 = 864 packets

Divide **each** length, then multiply

Not total ÷ total

Working backwards

Volume 224, front 8 × 4

224 ÷ 32 = 7

depth 7 cm

Divide the volume by what you know

Area × length = volume

Filling at a rate

Volume ÷ rate = time

942 478 cm³ ÷ 250 cm³/s

= 3770 s = 63 minutes

Same units for volume and rate

Then change seconds to minutes

Formulae

Cuboid	$l \times w \times h$
Prism	cross-section area × length
Cylinder	$\pi r^2 h$
Triangle	$\frac{1}{2}$ × base × height

Which sheet do I need?

Volume of cuboids and prisms ▸
cuboids and prisms

Volume of cylinders ▸
a cylinder: π is involved

Key words

- **Volume** the space inside a 3-D shape
- **Cross-section** the shape that is the same all the way through
- **Capacity** how much a container holds
- **cm³** cubic centimetres

Exam tips

- Write the **formula** first, then substitute.
- Use the **radius**, not the diameter.
- Make all the lengths the same units first (mm or cm).
- "In terms of π": leave π in your answer (45π).
- "How many fit": divide each side separately and round **down**.
- Volume answers are in cm³, m³ … or litres.

Volume of cuboids and prisms: fact sheet

Volume · Planner week 4 · Learn the method

Worked example

QUESTION

A prism is 25 cm long. The cross-section is a triangle with base 5 cm and height 12 cm.
Work out the volume of the prism.

ANSWER

1. Area of the triangle = $\frac{1}{2}$ × base × height = $\frac{1}{2}$ × 5 × 12 = 30 cm²
2. Volume = area of cross-section × length = 30 × 25

750 cm³

Volume = area of the cross-section × length.

How to do it

1. Cuboid: length × width × height.
2. Prism: find the **area of the cross-section** first.
3. Then multiply by the length.
4. Working backwards: divide the volume by what you know.
5. “How many fit?”: divide each dimension, round down, then multiply.

Model answer:

30 × 25 = 750 cm³

Watch out

- Forgetting the $\frac{1}{2}$ for a triangle.
- Mixing mm and cm.
- Dividing the total volumes for "how many fit".

Volume of cylinders: fact sheet

Volume · Planner week 4 · Learn the method

Worked example

QUESTION

A cylinder has a radius of 15 cm and a height of 43 cm.
Work out the volume of the cylinder. Give your answer to the nearest whole number.

ANSWER

1. Volume = π × radius² × height
2. = π × 15^2 × 43
3. = π × 225 × 43 = 30 395.9…

30 396 cm^3

π × radius² × height, then change units.

How to do it

1. Find the **radius** (half the diameter).
2. Volume = π × r^2 × h.
3. "In terms of π": e.g. 9 × 5 = 45, so 45π.
4. Change to litres if needed: ÷ 1000.
5. Time to fill = volume ÷ rate. Round at the end.

Model answer:

π × 15^2 × 43 = 30 396 cm^3

Watch out

- Using the diameter instead of the radius.
- Squaring the height instead of the radius.
- Forgetting to change cm^3 to litres.