



Volume of prisms

Year 7 About 70 minutes Calculator allowed 48 marks

Date _____

A Do Now

Quick questions to start.

- A1** Needed today [1 mark]

A trapezium has parallel sides of 7 cm and 11 cm. The distance between them is 4 cm. Work out its area.

A2 Needed today [1 mark]

A right-angled triangle has shorter sides of 9 cm and 6 cm. Work out its area.

Answer

- A3** Last lesson [1 mark]

Work out the total surface area of a cuboid 5 cm by 3 cm by 2 cm.

A4 From chapter 4 [1 mark]

Increase £120 by 15%.

Answer

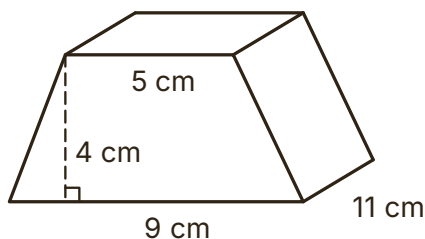
B Example, then your turn

Year 7

Your teacher works through each example with you. Then try the one beside it.

EXAMPLE 1

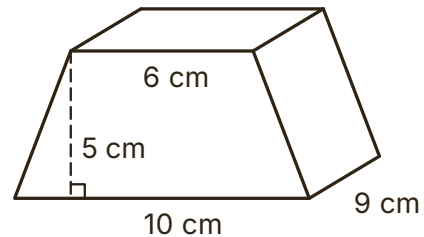
The cross-section of this prism is a trapezium. Work out the volume of the prism.



Not drawn accurately

Hint Area of a trapezium: half the sum of the parallel sides, times the distance between them.

- B1** The cross-section of this prism is a trapezium. Work out the volume of the prism. [2 marks]

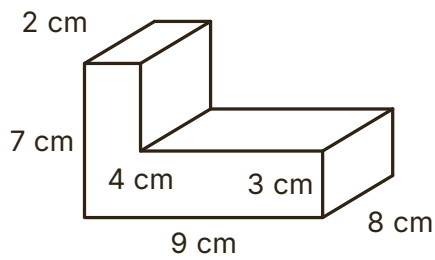


Not drawn accurately

Answer

EXAMPLE 2

The prism has an L-shaped cross-section. Work out its volume.



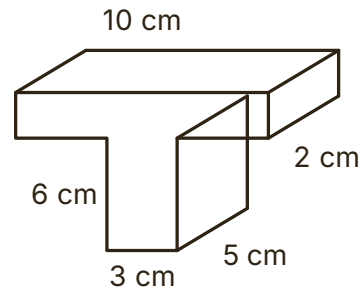
Not drawn accurately

Hint Split the L into two rectangles, add their areas, then multiply by the length.

B2

The prism has a T-shaped cross-section. Work out its volume.

[3 marks]

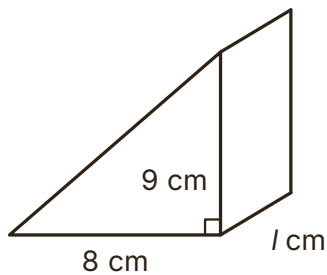


Not drawn accurately

Answer

EXAMPLE 3

The volume of the triangular prism is 360 cm^3 . Work out its length, l .



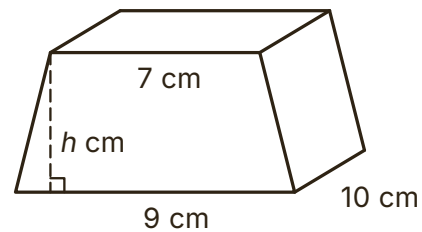
Not drawn accurately

Hint Find the area of the cross-section, then divide the volume by it.

B3

The cross-section of this prism is a trapezium. The volume of the prism is 480 cm^3 . Work out the height, h , of the trapezium.

[3 marks]



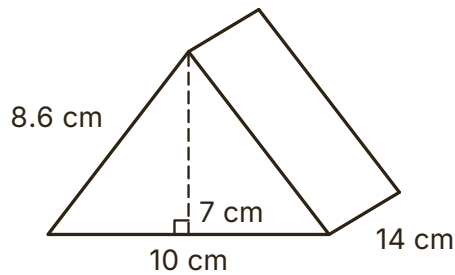
Not drawn accurately

Answer $h = \dots\dots \text{ cm}$

C Practice

Year 7

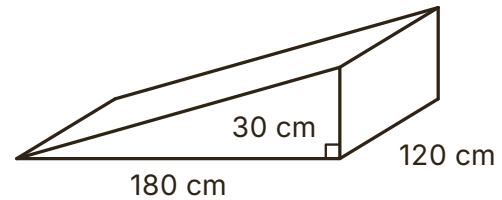
- C1** The cross-section of this prism is an isosceles triangle. Work out the volume of the prism. [2 marks]



Not drawn accurately

Answer

- C2** A wooden wedge holds a door open. It is a prism with a right-angled triangle as its cross-section. Work out its volume in m^3 . [3 marks]



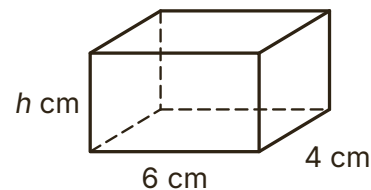
Not drawn accurately

Answer

- C3** A bar of chocolate is a prism. A bar 8 cm long has a volume of 96 cm^3 . A longer bar has the same cross-section and is 19 cm long. Work out its volume. [2 marks]

Answer

- C4** A cuboid is 6 cm long and 4 cm wide. Its volume is 168 cm^3 . Work out its height, h . [2 marks]



Not drawn accurately

Answer $h = \dots \text{ cm}$

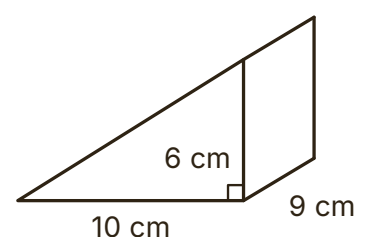
D Exam-style questions

GCSE Foundation

- D1** Leo works out the volume of a triangular prism. The triangle is right-angled with shorter sides of 6 cm and 10 cm, and the prism is 9 cm long. Leo writes $6 \times 10 \times 9 = 540 \text{ cm}^3$. [3 marks]

Leo is wrong. Explain his mistake and work out the correct volume.

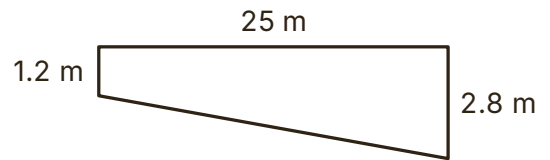
Answer cm^3



Not drawn accurately

D2 A swimming pool is 25 m long and 12 m wide. The diagram shows its side. The pool is 1.2 m deep at the shallow end and 2.8 m deep at the deep end. The bottom slopes evenly.

- (a) Work out the area of the side of the pool. [2 marks]



Not drawn accurately

Answer

- (b) Work out how many litres of water the pool holds when it is full. ($1 \text{ m}^3 = 1000$ litres.) [2 marks]

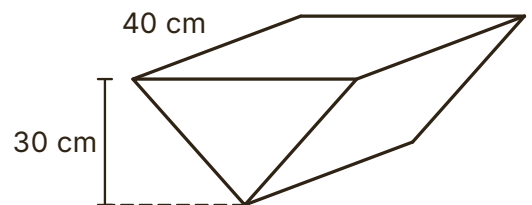
Answer

- (c) A pump fills the pool at 2500 litres a minute. How many hours does it take to fill the empty pool? [2 marks]

Answer

Total for D2: 6 marks

D3 A water trough is a prism. Its cross-section is a triangle 40 cm across the top and 30 cm deep. The trough holds 54 litres when it is full. Work out the length of the trough. (1 litre = 1000 cm^3 .) [4 marks]

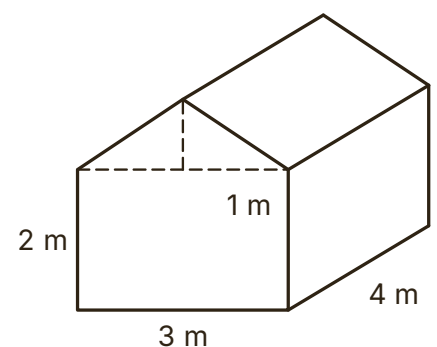


Answer

Not drawn accurately

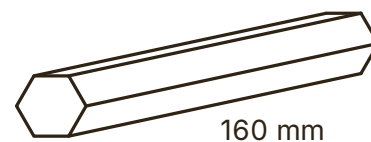
D4 A shed is a prism. Its cross-section is a rectangle 3 m wide and 2 m high, with a triangle on top that is 1 m high. The shed is 4 m long. Work out the volume of the shed. [4 marks]

Answer



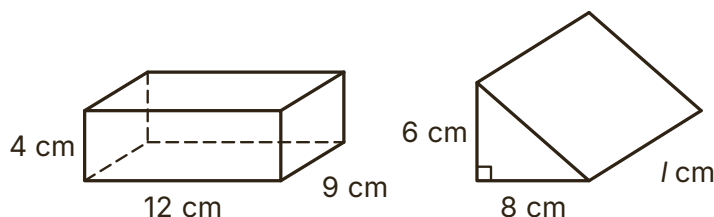
Not drawn accurately

- D5** A pencil is a prism. Its cross-section is a hexagon with an area of 85 mm^2 . The pencil is 160 mm long. Work out the volume of the pencil in cm^3 . [3 marks]



Answer Not drawn accurately

- D6** A block of metal is a cuboid 12 cm by 9 cm by 4 cm. It is melted down and made into a prism. The cross-section of the prism is a right-angled triangle with shorter sides of 6 cm and 8 cm. No metal is lost. Work out the length, l , of the new prism. [3 marks]



Answer $l = \dots\dots$ cm

Not drawn accurately

E Extension

Stretch

No route is given. The hints are at the end of the sheet. Use one at a time.

- E1** A cuboid has a square cross-section. Its length is 3 times the side of the square. Its volume is 375 cm^3 . Work out the side of the square. [4 marks]

Answer

Extension hints

Cover these with paper. Uncover one at a time.

- E1** **Hint 1** Call the side of the square x . Write the length and the volume in terms of x .
- Hint 2** The volume is $x \times x \times 3x = 3x^3$, so $3x^3 = 375$.
- Hint 3** $x^3 = 125$. Try whole numbers: $5 \times 5 \times 5 = 125$, so $x = 5$.

How did it go?

Colour one circle on each line: not yet, nearly, yes.

I can work out the volume of a prism from its cross-section and its length.



I can split a compound cross-section into shapes I know.



I can work backwards from a volume to find a length, in any units.

