



Surface area of prisms

Year 7 About 70 minutes Calculator allowed 51 marks

Date _____

A Do Now

Quick questions to start.

- A1** Needed today [1 mark]

Work out the area of a triangle with base 8 cm and height 5 cm.

A2 Needed today [1 mark]

A cube has edges of 3 cm. Work out its total surface area.

Answer

Answer

- A3** Last lesson [1 mark]

Convert 5.2 m^2 to cm^2 .

A4 From chapter 2 [1 mark]

Three angles of a quadrilateral are 97° , 64° and 118° . Work out the fourth angle.

Answer

Answer

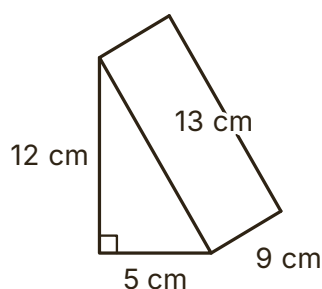
B Example, then your turn

Year 7

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

EXAMPLE 1

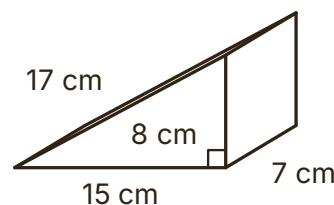
Work out the total surface area of the triangular prism.



Not drawn accurately

Hint There are two equal right-angled triangles and three different rectangles. Each rectangle is one side of the triangle times the length of the prism.

- B1** Work out the total surface area [3 marks] of the triangular prism.

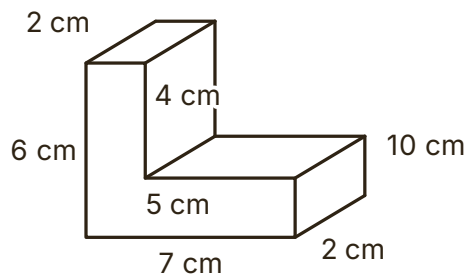


Not drawn accurately

Answer

EXAMPLE 2

The prism has an L-shaped cross-section. Work out its total surface area.



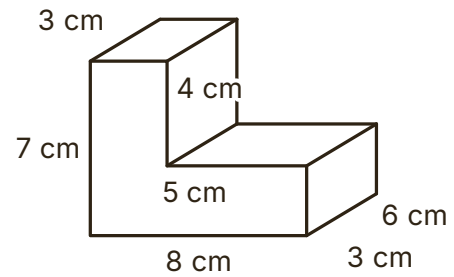
Not drawn accurately

Hint Split the L into two rectangles to find its area. The rectangles round the sides together are the perimeter of the L times the length.

B2

The prism has an L-shaped cross-section. Work out its total surface area.

[4 marks]

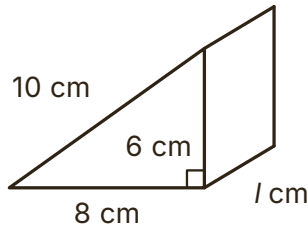


Not drawn accurately

Answer

EXAMPLE 3

The total surface area of the triangular prism is 312 cm^2 . Work out the length, l , of the prism.



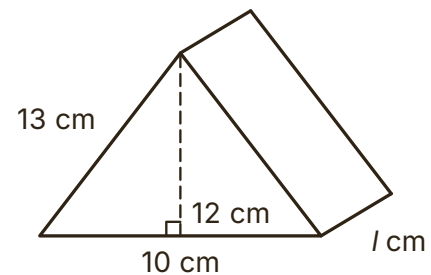
Not drawn accurately

Hint Write the surface area with l in it and set it equal to 312.

B3

The total surface area of the triangular prism is 552 cm^2 . Work out the length, l , of the prism.

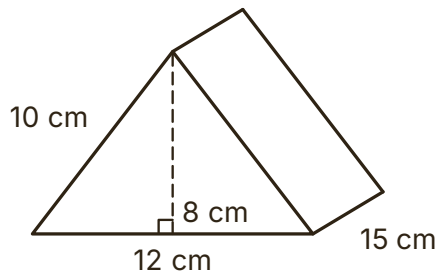
[3 marks]



Not drawn accurately

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

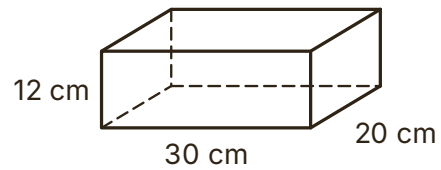
- C1** The cross-section of this prism is an isosceles triangle. Work out the total surface area of the prism. [3 marks]



Not drawn accurately

Answer

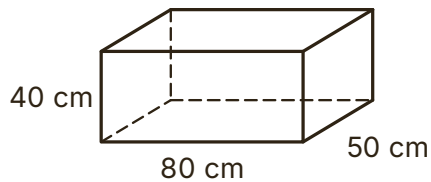
- C2** A box is a cuboid with no lid. It is 30 cm long, 20 cm wide and 12 cm high. Work out the area of card used to make the box. [3 marks]



Not drawn accurately

Answer

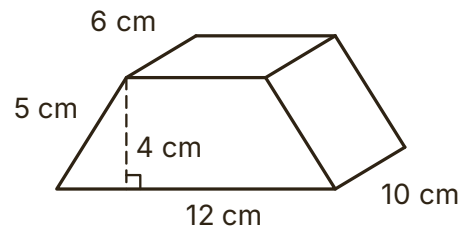
- C3** A wooden chest is a cuboid. Work out its total surface area. Give your answer in m^2 . [3 marks]



Not drawn accurately

Answer

- C4** The cross-section of this prism is a trapezium. Work out the total surface area of the prism. [3 marks]



Not drawn accurately

Answer

- C5** A cube has a total surface area of 294 cm^2 . Work out the length of one edge. [2 marks]

Answer

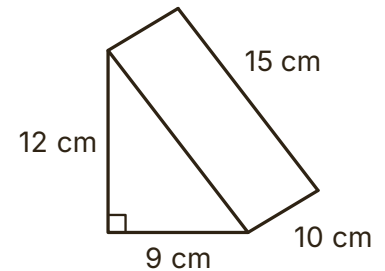
D1

Mia works out the total surface area of this prism as
 $9 \times 10 + 12 \times 10 + 15 \times 10 = 360 \text{ cm}^2$.

[3 marks]

Mia's answer is wrong. Explain what she has done wrong, and work out the correct total surface area.

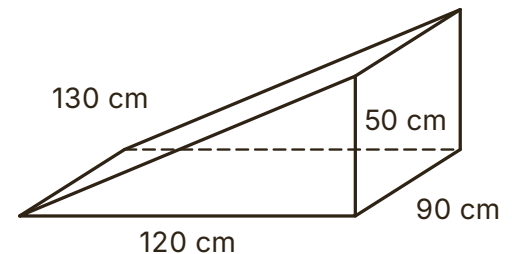
Answer cm^2



Not drawn accurately

D2 Ola makes a concrete ramp. It is a prism with a right-angled triangle as its cross-section. The bottom of the ramp sits on the ground. She paints all the other faces.

- (a) Work out the area she paints. Give your answer in m^2 . [4 marks]



Not drawn accurately

Answer

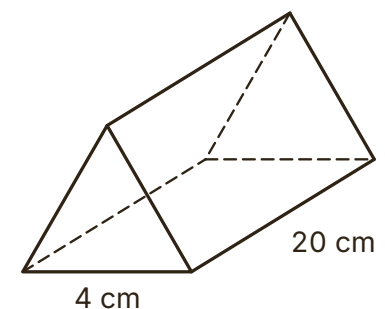
- (b) One tin of paint covers 1.2 m^2 . How many tins does she need? Give a reason for your answer. [2 marks]

Answer

Total for D2: 6 marks

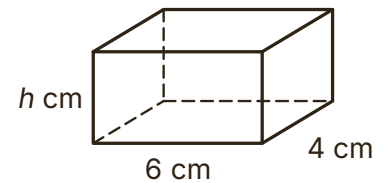
D3 A chocolate box is a prism. Its cross-section is an equilateral triangle with sides of 4 cm and an area of 6.9 cm^2 . The box is 20 cm long. A factory makes 100 boxes. Card is sold in sheets of 1 m^2 . How many sheets must the factory buy? [4 marks]

Answer



Not drawn accurately

- D4** A cuboid is 6 cm long, 4 cm wide and h cm high. Its total surface area is 148 cm^2 . [3 marks]
Work out the value of h .

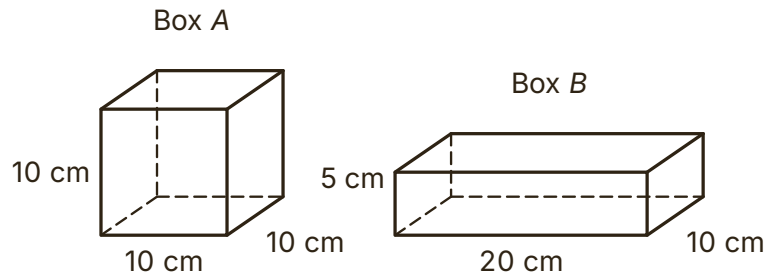


Answer $h = \dots\dots$

Not drawn accurately

- D5** Box A is a cube with edges of 10 cm. Box B is a cuboid 20 cm by 10 cm by 5 cm. [3 marks]
Both boxes have the same volume. Which box needs less card to make? You must show your working.

Answer



Not drawn accurately

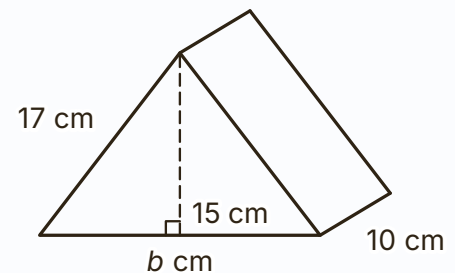
E Extension

Stretch

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

- E1** The cross-section of this prism is an isosceles triangle with base b cm, equal sides of 17 cm and height 15 cm. The prism is 10 cm long. Its total surface area is 740 cm^2 . Work out the value of b . [4 marks]

Answer $b = \dots\dots$



Not drawn accurately

Extension hints

Cover these with paper. Uncover one at a time.

- E1** **Hint 1** Write the area of the two triangles and the area of the three rectangles in terms of b .
Hint 2 The two triangles have area $2 \times \frac{1}{2} \times b \times 15 = 15b$. The rectangles have area $(b + 17 + 17) \times 10 = 10b + 340$.
Hint 3 $15b + 10b + 340 = 740$, so $25b = 400$ and $b = 16$.

How did it go?

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

I can work out the total surface area of a cuboid and of a triangular prism.



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



I can work backwards from a surface area to find a length.

