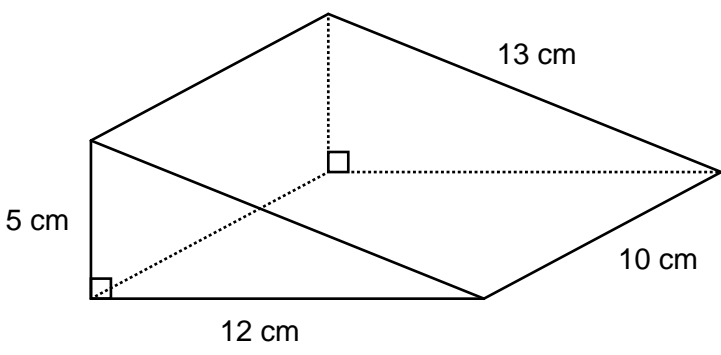# Volume and Surface Area of Prisms

REVISE THIS TOPIC

1 The cross section of a prism is a right-angled triangle.

Not drawn accurately

13 cm

5 cm

12 cm

10 cm

1 (a) Work out the volume of the prism. **[3 marks]**

$\frac{1}{2} \times 12 \times 5 = 30 \, cm^2$

$30 \times 10 = 300 \, cm^3$

Answer _____ 300 _____ cm³

1 (b) Work out the surface area of the prism. **[4 marks]**

$\frac{1}{2} \times 12 \times 5 = 30 \, cm^2$

$\frac{1}{2} \times 12 \times 5 = 30 \, cm^2$

$10 \times 12 = 120 \, cm^2$

$10 \times 5 = 50 \, cm^2$

$10 \times 13 = 130 \, cm^2$

$30 + 30 + 120 + 50 + 130 = 360$

Answer _____ 360 _____ cm²

1st

2   The cross section of a prism is a right-angled triangle.

Not drawn
accurately

10 cm

8 cm

15 cm

6 cm
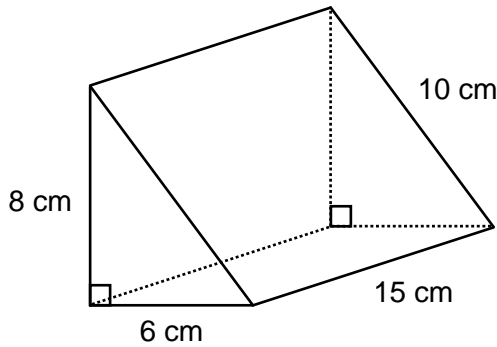
2 (a)   Work out the volume of the prism.   **[3 marks]**

$$\frac{1}{2} \times 6 \times 8 = 24 \text{ cm}^2$$
$$24 \times 15 = 360 \text{ cm}^3$$

Answer   **360**   cm³

2 (b)   Work out the surface area of the prism.   **[4 marks]**

$$\frac{1}{2} \times 6 \times 8 = 24 \text{ cm}^2$$
$$\frac{1}{2} \times 6 \times 8 = 24 \text{ cm}^2$$
$$6 \times 15 = 90 \text{ cm}^2$$
$$8 \times 15 = 120 \text{ cm}^2$$
$$10 \times 15 = 150 \text{ cm}^2$$
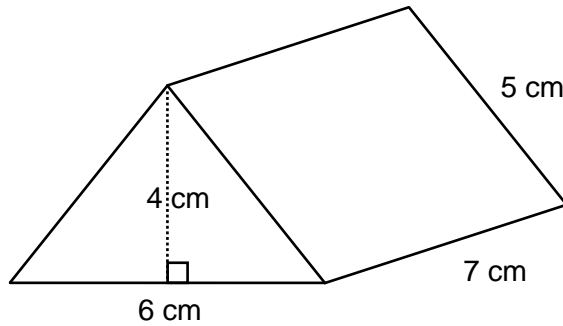$$24 + 24 + 90 + 120 + 150 = 408$$

Answer   **408**   cm²

1st

3 The cross section of a prism is an isosceles triangle.

Not drawn
accurately

5 cm

4 cm

7 cm

6 cm

3 (a) Work out the volume of the prism. **[3 marks]**

$$\frac{1}{2} \times 6 \times 4 = 12 cm^2$$
$$12 \times 7 = 84 cm^3$$

Answer _____ 84 _____ cm³

3 (b) Work out the surface area of the prism. **[4 marks]**

$$\frac{1}{2} \times 6 \times 4 = 12 cm^2$$
$$\frac{1}{2} \times 6 \times 4 = 12 cm^2$$
$$6 \times 7 = 42 cm^2$$
$$7 \times 5 = 35 cm^2$$
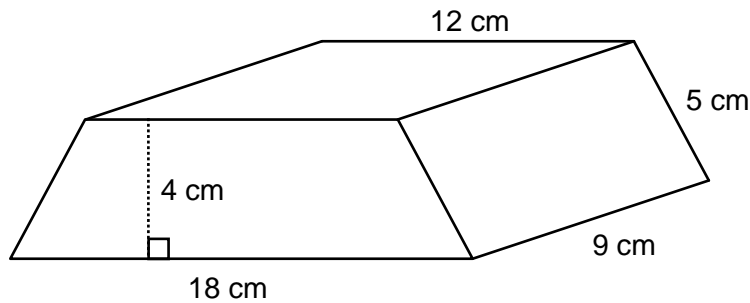$$7 \times 5 = 35 cm^2$$
$$12 + 12 + 42 + 35 + 35 = 136$$

Answer _____ 136 _____ cm²

14

Turn over ▶

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4   The cross section of a prism is a trapezium.

Not drawn
accurately

12 cm

5 cm

4 cm

9 cm

18 cm

4 (a)   Work out the volume of the prism.   **[3 marks]**

½(12 + 18) × 4 = 60cm²
60 × 9 = 540 cm³

Answer _____ 540 _____ cm³

4 (b)   Work out the surface area of the prism.   **[4 marks]**

½(12 + 18) × 4 = 60cm²
½(12 + 18) × 4 = 60cm²
9 × 5 = 45 cm²
9 × 5 = 45 cm²
9 × 18 = 162 cm²
9 × 12 = 108 cm²
60 + 60 + 45 + 45 + 162 + 108 = 480

Answer _____ 480 _____ cm²

5 The cross section of a prism is made from two rectangles.

Not drawn accurately

3 cm

11 cm

10 cm

A

B

5 cm

8 cm

14 cm
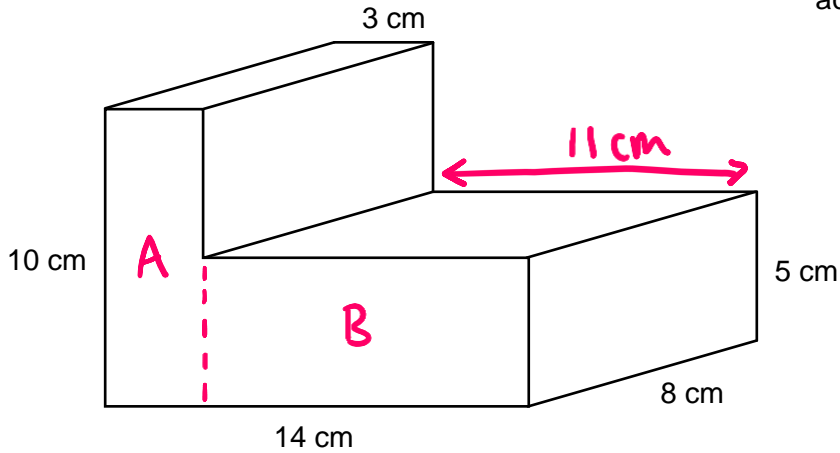
Work out the volume of the prism. **[4 marks]**

$A : 3 \times 10 = 30 cm^2$
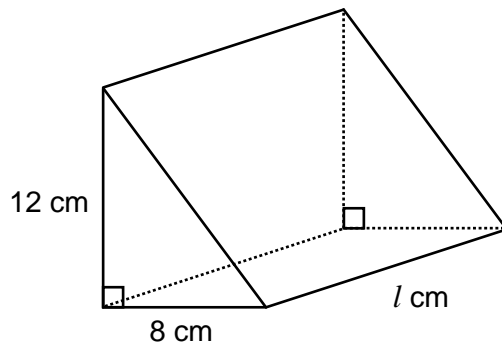$B : 11 \times 5 = 55 cm^2$

$30 + 55 = 85 cm^2$

$85 \times 8 = 680 cm^3$

Answer _____ 680 _____ cm³

11

Turn over ▶

6   The cross section of a prism is a right-angled triangle.

Not drawn
accurately

12 cm

8 cm

l cm

The volume of the prism = 696 cm³

Work out the value of l, the length of the prism.   **[3 marks]**

$$\tfrac{1}{2} \times 8 \times 12 = 48 \, cm^2$$
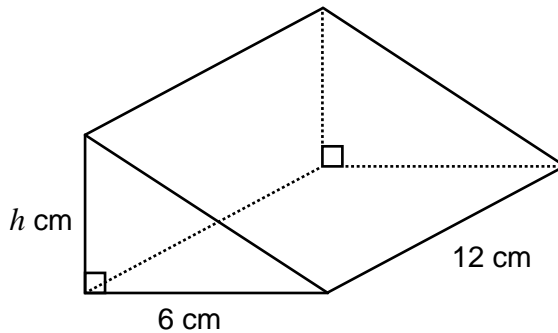
$$696 \div 48 = 14.5$$

l =   14.5   cm

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7 Prism **A**, Prism **B** and Prism **C** all have the same volume.

Complete the table. **[4 marks]**

	Prism A	**Prism B**	**Prism C**
Cross Sectional Area	24 cm²	**20cm²**	40 cm²
Length	15 cm	18 cm	**9cm**
Volume	**360cm³**	**360cm³**	**360cm³**

8 The cross section of a prism is a right-angled triangle.

h cm

6 cm

12 cm

The prism has a volume of 162 cm³
Work out the value of h, the height of the right-angled triangle. **[3 marks]**

$$162 \div 12 = 13.5$$

$$\tfrac{1}{2} \times 6 \times h = 13.5$$

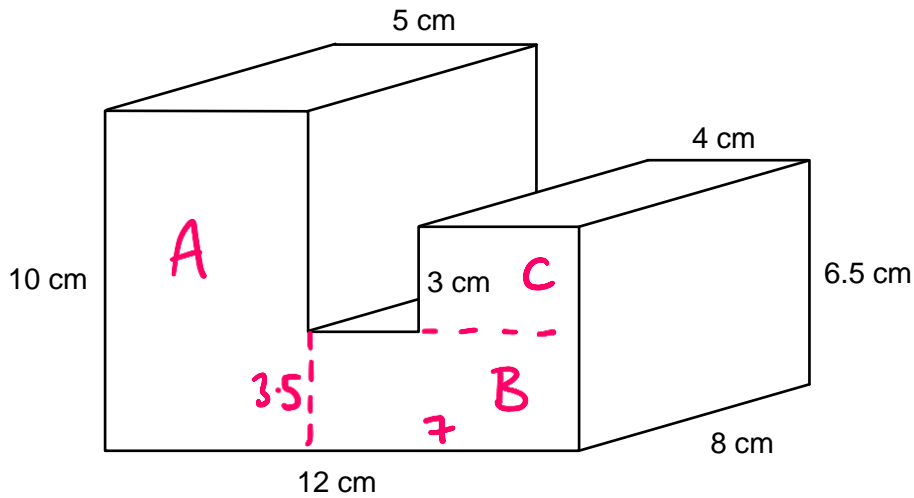$$\div3 \left(3h = 13.5 \right) \div3$$

$$h = 4.5$$

$h =$ _____ **4.5** _____ cm

10

Turn over ▶

9 The cross section of a prism is made from three rectangles.

5 cm
4 cm
A
10 cm
3 cm C
6.5 cm
3.5
B
7
8 cm
12 cm

Work out the volume of the prism. **[5 marks]**

$A: 10 \times 5 = 50 \text{ cm}^2$

$B: 7 \times 3.5 = 24.5 \text{ cm}^2$

$C: 4 \times 3 = 12 \text{ cm}^2$

$50 + 24.5 + 12 = 86.5$

$86.5 \times 8 = 692$

Answer _____692_____ cm³
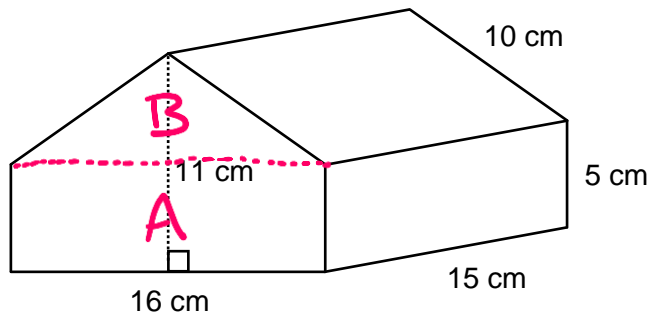
10   The cross section of a prism is a pentagon with one line of symmetry.

10 cm

Not drawn
accurately

B

11 cm

5 cm

A

15 cm

16 cm

10 (a)   Work out the volume of the prism.   **[4 marks]**

A: $16 \times 5 = 80 \, cm^2$

B: $\frac{1}{2} \times 16 \times 6 = 48 \, cm^2$

$80 + 48 = 128 \, cm^2$

$128 \times 15 = 1920$

Answer _____1920_____ cm³

10 (b)   Work out the surface area of the prism.   **[4 marks]**

$15 \times 5 = 75$

$15 \times 5 = 75$

$15 \times 10 = 150$

$15 \times 10 = 150$

$16 \times 15 = 240$

$75 + 75 + 150 + 150 + 240 + 128 + 128$

946

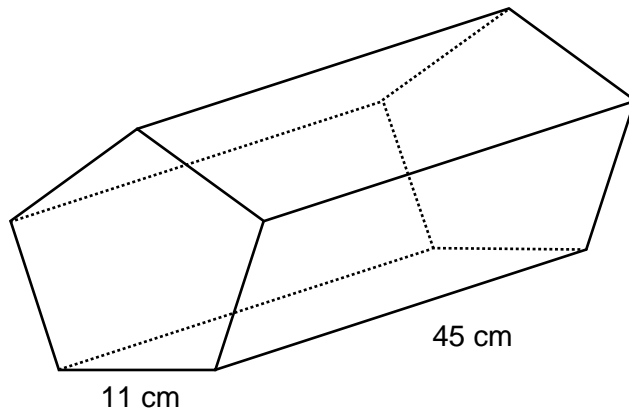Answer _____946_____ cm²

13

Turn over ▶

11 The cross section of a prism is a regular pentagon.

Not drawn accurately

45 cm

11 cm

The volume of the prism = 9368 cm³

Work out the total surface area of the prism.
Give your answer to 4 significant figures.

[4 marks]

$9368 \div 45 = 208.17...$

$45 \times 11 = 495$
$495 \times 5 = 2475$

$2475 + 208.17... + 208.17...$
$= 2891.35...$

Answer _____ **2891** _____ cm²

4

Solutions