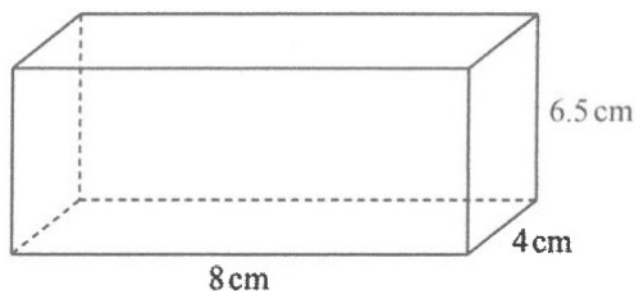


2



NOT TO
SCALE

The diagram shows a cuboid.

Calculate the volume of the cuboid.

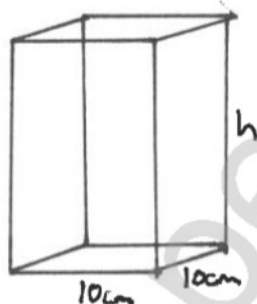
$$V = 4 \times 6.5 \times 8$$

$$= 208 \text{ cm}^3$$

..... 208 cm^3 [1]

- 1 A cuboid has a square base of side 10 cm and a volume of 1200 cm^3 .

Work out the height of the cuboid.



..... 12 cm [2]

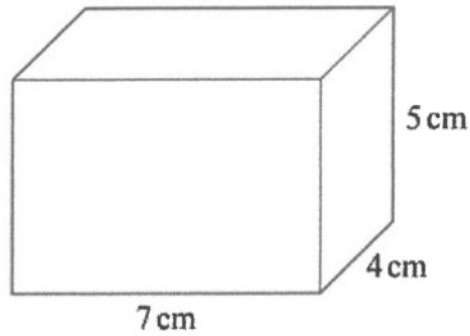
$$V = 10 \times 10 \times h$$

$$1200 = 100h$$

$$\div 100 \quad \div 100$$

$$12 = h$$

4

NOT TO
SCALE

Calculate the total surface area of this cuboid.

Front and Back:

$$7 \times 5 = 35$$

Left and Right:

$$5 \times 4 = 20$$

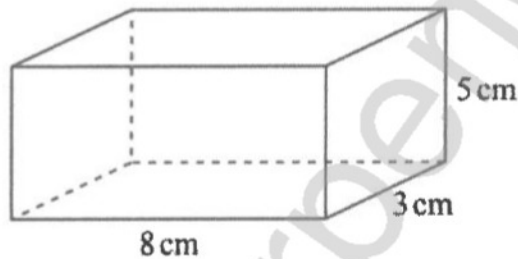
Top and Bottom:

$$7 \times 4 = 28$$

$$\begin{aligned} \text{S.A.} &= 2 \times 35 + 2 \times 28 + 2 \times 20 \\ &= 70 + 56 + 40 \\ &= 166 \end{aligned}$$

..... 166 cm^2 [3]

3

NOT TO
SCALE

Find the total surface area of the cuboid.

Front and Back:

$$8 \times 5 = 40$$

Left and Right:

$$5 \times 3 = 15$$

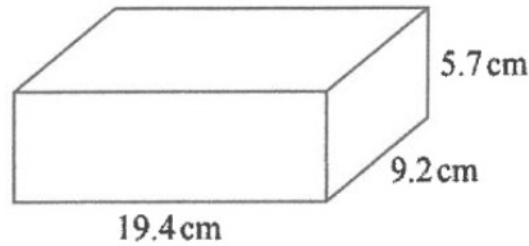
Top and Bottom:

$$8 \times 3 = 24$$

$$\begin{aligned} \text{S.A.} &= 2 \times 40 + 2 \times 24 + 2 \times 15 \\ &= 80 + 48 + 30 \\ &= 158 \end{aligned}$$

..... 158 cm^2 [3]

1 (a)



NOT TO SCALE

The diagram shows a brick in the shape of a cuboid.

(i) Calculate the total surface area of the brick.

F & B:

$$19.4 \times 5.7 = 110.58$$

L & R:

$$5.7 \times 9.2 = 52.44$$

T & B:

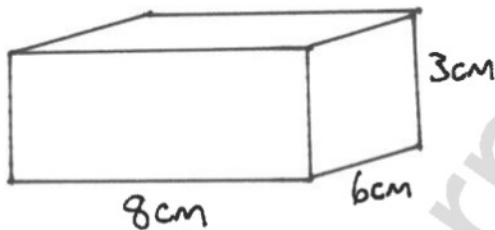
$$19.4 \times 9.2 = 178.48$$

$$S.A. = 2 \times 110.58 + 2 \times 178.48 + 2 \times 52.44$$

$$= 221.16 + 356.96 + 104.88$$

$$= \underline{683 \text{ cm}^2}$$

5 Find the total surface area of a cuboid with length 8 cm, width 6 cm and height 3 cm.



F & B:

$$8 \times 3 = 24$$

L & R:

$$3 \times 6 = 18$$

$$S.A. = 2 \times 24 + 2 \times 48 + 2 \times 18$$

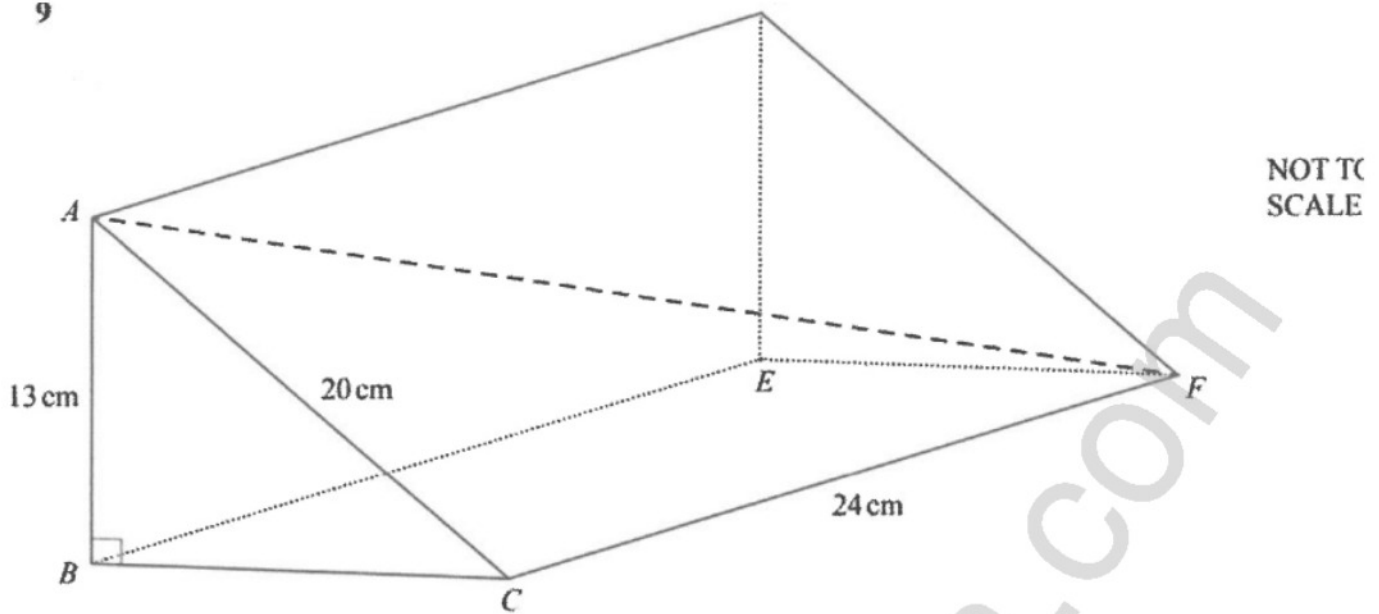
$$= 48 + 96 + 36$$

$$= 180$$

T & B:

$$8 \times 6 = 48$$

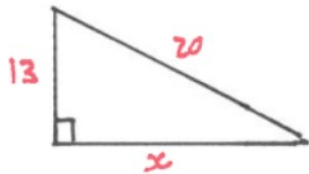
$$\underline{180} \text{ cm}^2 [3]$$



The diagram shows a prism, $ABCDEF$.

$AB = 13$ cm, $AC = 20$ cm, $CF = 24$ cm and angle $ABC = 90^\circ$.

(a) Calculate the total surface area of the prism.



$$x^2 + 13^2 = 20^2$$

$$x^2 + 169 = 400$$

$$\begin{array}{r} -169 \\ -169 \end{array}$$

$$x^2 = 231$$

$$x = 15.198... \text{ STO}$$

Two triangles:

$$A = \frac{1}{2} \times b \times h$$

$$= \frac{1}{2} \times 15.198 \times 13$$

$$= 98.791$$

Top: $20 \times 24 = 480$

Side: $13 \times 24 = 312$

Bottom: $15.198 \times 24 = 364.768$

S.A. = $2 \times 98.791 + 480 + 312 + 364.768$

$$= 1354.4$$

$$\underline{\quad 1350 \quad} \text{ (3sf) } \text{ cm}^2 [6]$$

- 16 The volume of a cylinder is 1970 cm^3 .
The height of the cylinder is 12.8 cm.

Calculate the radius of the cylinder.

$$V = \pi r^2 \times h$$

$$1970 = \pi r^2 \times 12.8$$

$$\div 12.8$$

$$\div 12.8$$

$$153.90625 = \pi r^2$$

$$\div \pi$$

$$\div \pi$$

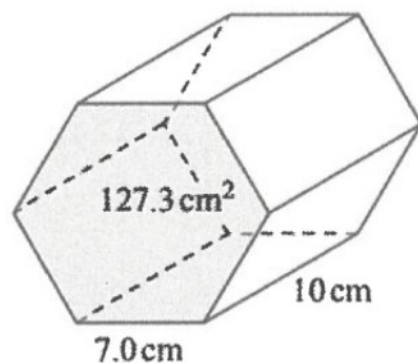
$$r^2 = \frac{153.90625}{\pi}$$

$$r = \sqrt{\frac{153.90625}{\pi}}$$

$$= 7.00 \text{ cm}$$

$$\underline{\quad 7.00 \quad} \text{ cm [3]}$$

- (ii) The hexagon is the cross-section of a prism of length 10 cm.



NOT TO
SCALE

- (a) Find the volume of the prism.

$$127.3 \times 10 = 1273$$

$$\underline{1273} \text{ cm}^3 [1]$$

- (b) Calculate the surface area of the prism.

6 rectangles:

$$7 \times 10 = 70$$

$$\text{S.A.: } 6 \times 70 + 2 \times 127.3$$

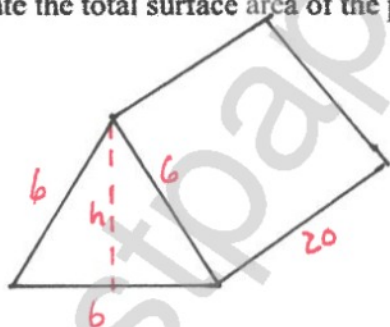
$$= 420 + 254.6$$

$$= 674.6$$

$$\underline{674.6} \text{ cm}^2 [2]$$

- 19 The cross-section of a prism is an equilateral triangle of side 6 cm.
The length of the prism is 20 cm.

Calculate the total surface area of the prism.



height of triangle:



$$h^2 + 3^2 = 6^2$$

$$h^2 + 9 = 36$$

$$h^2 = 27$$

$$h = 3\sqrt{3}$$

Area of Triangles:

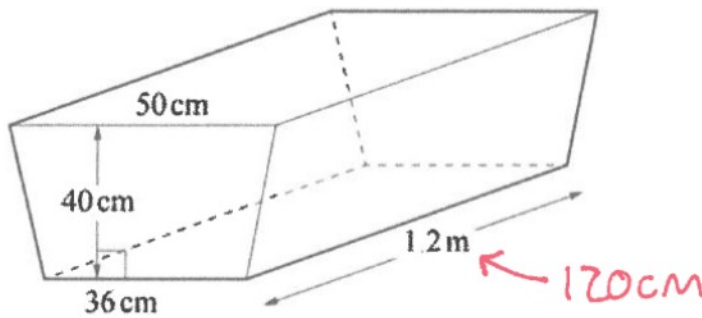
$$\begin{aligned} A &= \frac{1}{2} \times b \times h \\ &= \frac{1}{2} \times 6 \times 3\sqrt{3} \\ &= 9\sqrt{3} \end{aligned}$$

Area of 3 rectangles:

$$\begin{aligned} A &= 6 \times 20 \\ &= 120 \end{aligned}$$

$$\begin{aligned} \text{S.A.} &= 2 \times 9\sqrt{3} + 3 \times 120 \\ &= 18\sqrt{3} + 360 \\ &= 391 \text{ cm}^2 \end{aligned}$$

$$\underline{391} \text{ cm}^2 [4]$$



NOT TO
SCALE

The diagram shows a water trough in the shape of a prism.
The prism has a cross-section in the shape of an isosceles trapezium.
The trough is completely filled with water.

- (a) Show that the volume of water in the trough is 206.4 litres.

Area of Trapezium:

$$\begin{aligned} A &= \frac{1}{2}(a+b) \times h \\ &= \frac{1}{2}(36+50) \times 40 \\ &= \frac{1}{2} \times 86 \times 40 \\ &= 1720 \end{aligned}$$

$$\begin{aligned} \text{Volume} &= 1720 \times 120 \\ &= 206\,400 \text{ cm}^3 \\ &= 206\,400 \text{ ml} \\ &= \underline{206.4 \text{ l}} \end{aligned}$$

(1 ml = 1 cm³)

[3]

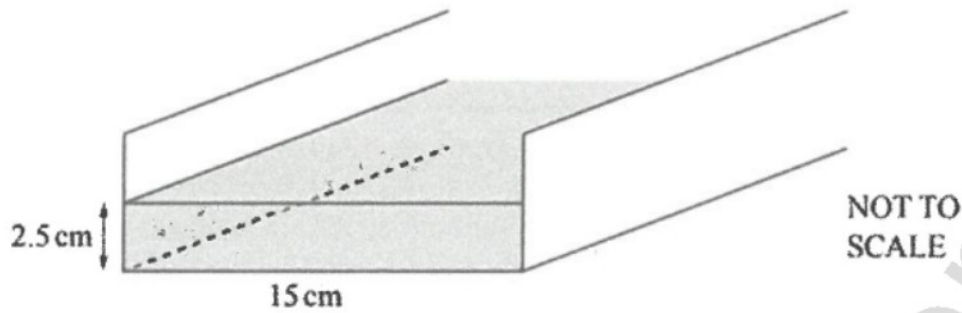
- (b) The water from the trough is emptied at a rate of 600 ml per second.

Calculate the time taken, in minutes and seconds, for the trough to be emptied.

$$\begin{aligned} \frac{206\,400}{600} &= 344 \text{ seconds} \\ &= 5 \text{ mins, } 44 \text{ seconds} \end{aligned}$$

..... 5 minutes 44 seconds [3]

(b)



Water flows at a speed of 20 cm/s along a rectangular channel into a lake.
The width of the channel is 15 cm.
The depth of the water is 2.5 cm.

Calculate the amount of water that flows from the channel into the lake in 1 hour.
Give your answer in litres.

Area of rectangular cross-section:

$$A = 15 \times 2.5 \\ = 37.5 \text{ cm}^2$$

Volume in 1 second:

$$V = 37.5 \times 20 \\ = 750 \text{ cm}^3$$

1 hour in seconds:

$$1 \text{ hr} = 60 \times 60 \\ = 3600 \text{ s}$$

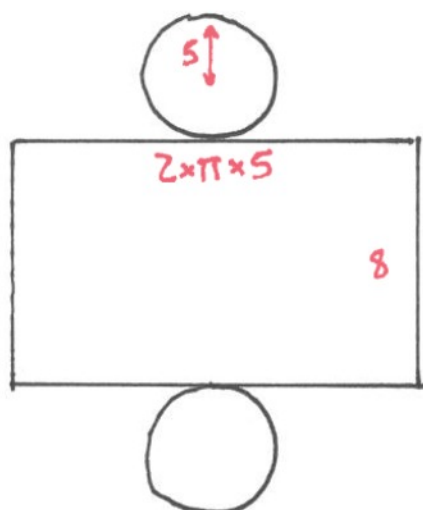
In 1 hour,

$$750 \times 3600 = 2\,700\,000 \text{ cm}^3 \\ = 2\,700\,000 \text{ ml} \\ = 2\,700 \text{ l}$$

.....2700..... litres [4]

- 18 A solid cylinder has radius 5 cm and height 8 cm.

Calculate the total surface area of the cylinder.



Two Circles:

$$\begin{aligned} \text{Area} &= \pi \times 5^2 \\ &= 25\pi \end{aligned}$$

Rectangle:

$$\begin{aligned} \text{Area} &= 2\pi r \times h \\ &= 2 \times \pi \times 5 \times 8 \\ &= 80\pi \end{aligned}$$

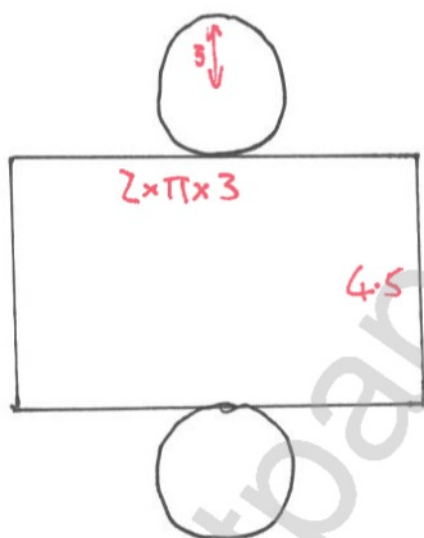
$$\begin{aligned} \text{S.A.} &= 2 \times 25\pi + 80\pi \\ &= 50\pi + 80\pi \\ &= 130\pi \end{aligned}$$

$$\underline{408} \text{ cm}^2 [4]$$

(3sf)

- 10 A solid cylinder has radius 3 cm and height 4.5 cm.

Calculate the total surface area of the cylinder.



Two Circles:

$$\begin{aligned} \text{Area} &= \pi \times 3^2 \\ &= 9\pi \end{aligned}$$

Rectangle:

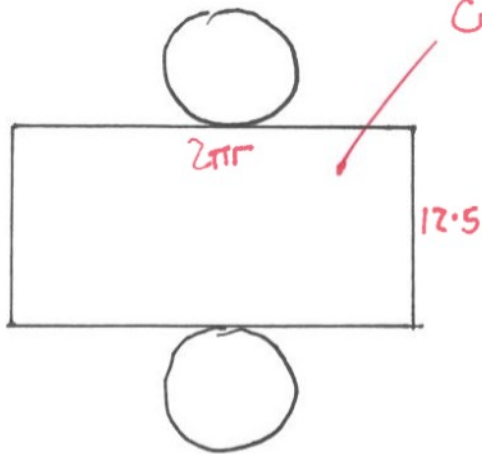
$$\begin{aligned} \text{Area} &= 2\pi r \times h \\ &= 2\pi \times 3 \times 4.5 \\ &= 27\pi \end{aligned}$$

$$\begin{aligned} \text{S.A.} &= 2 \times 9\pi + 27\pi \\ &= 18\pi + 27\pi \\ &= 45\pi \\ &= 141 \text{ cm}^2 \end{aligned}$$

$$\underline{141} \text{ cm}^2 [4]$$

- 16 A cylinder with height 12.5 cm has a curved surface area of $105\pi \text{ cm}^2$.

Calculate the volume of the cylinder.



Curved surface area is the rectangle:

$$\text{Area} = 2\pi r \times 12.5$$

$$105\pi = 25\pi r$$

$$\div \pi \quad \div \pi$$

$$105 = 25r$$

$$\div 25 \quad \div 25$$

$$4.2 = r$$

$$\text{Volume} = \pi r^2 \times h$$

$$= \pi \times 4.2^2 \times 12.5$$

$$= \underline{693}$$

$$\underline{693} \text{ cm}^3 [4]$$