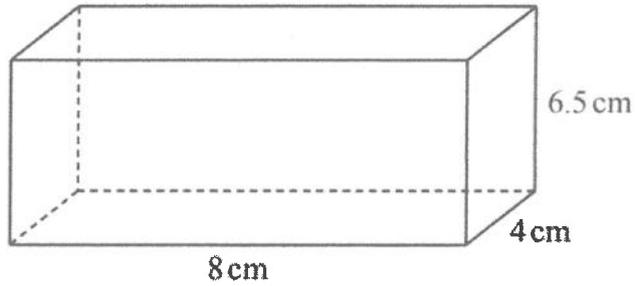


2



NOT TO  
SCALE

The diagram shows a cuboid.

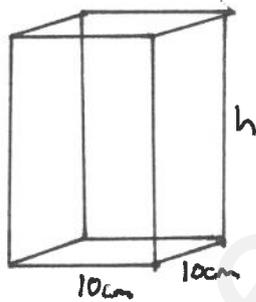
Calculate the volume of the cuboid.

$$V = 4 \times 6.5 \times 8$$
$$= 208 \text{ cm}^3$$

..... 208 .....  $\text{cm}^3$  [1]

1 A cuboid has a square base of side 10 cm and a volume of  $1200 \text{ cm}^3$ .

Work out the height of the cuboid.



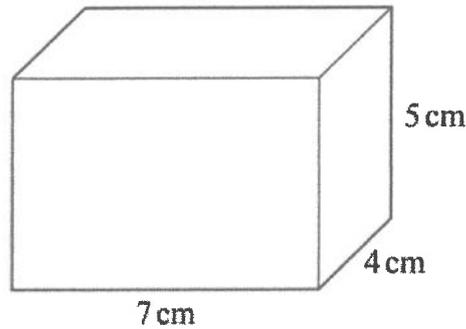
..... 12 ..... cm [2]

$$V = 10 \times 10 \times h$$
$$1200 = 100h$$

$\div 100$        $\div 100$

$$\underline{12} = h$$

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:

$$7 \times 4 = 28$$

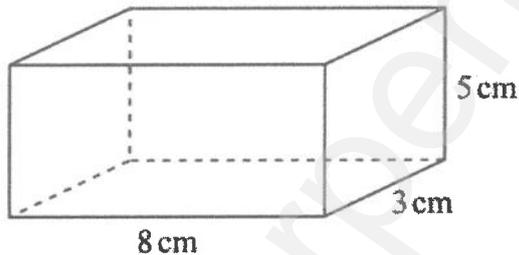
$$S.A. = 2 \times 35 + 2 \times 28 + 2 \times 20$$

$$= 70 + 56 + 40$$

$$= 166$$

$$\dots\dots\dots 166 \dots\dots\dots \text{cm}^2 [3]$$

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:

$$8 \times 3 = 24$$

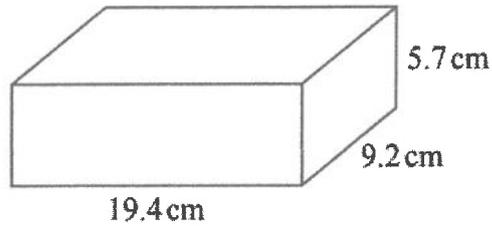
$$S.A. = 2 \times 40 + 2 \times 24 + 2 \times 15$$

$$= 80 + 48 + 30$$

$$= 158$$

$$\dots\dots\dots 158 \dots\dots\dots \text{cm}^2 [3]$$

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:

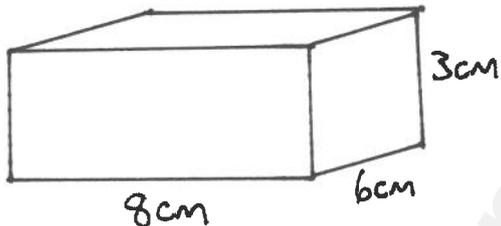
$$19.4 \times 9.2 = 178.48$$

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

$$= 221.16 + 356.96 + 104.88$$

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

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:

$$3 \times 6 = 18$$

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

$$= 48 + 96 + 36$$

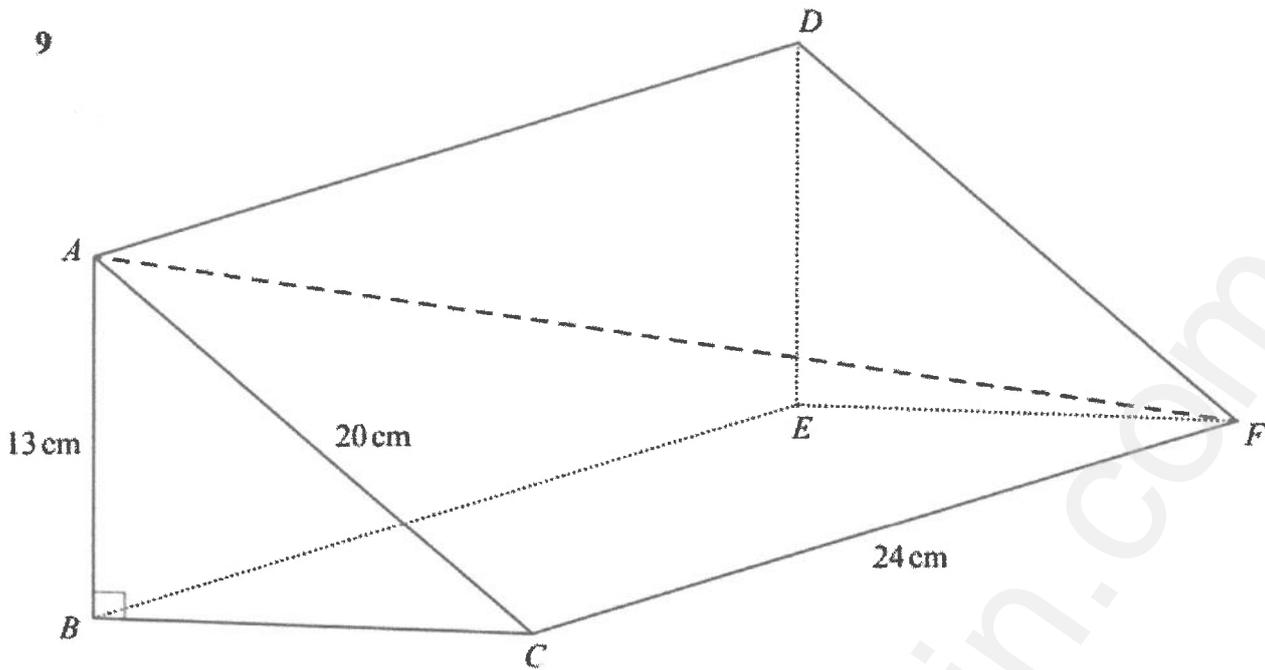
$$= 180$$

T & B:

$$8 \times 6 = 48$$

..... 180 ..... cm<sup>2</sup> [3]

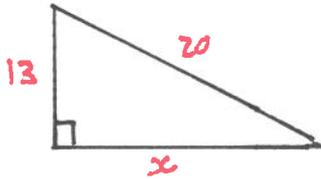
9

NOT TO  
SCALE

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.



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

$$x^2 + 169 = 400$$

$$\begin{array}{r} -169 \\ -169 \\ \hline x^2 = 231 \end{array}$$

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

- 16 The volume of a cylinder is  $1970 \text{ cm}^3$ .  
The height of the cylinder is  $12.8$  cm.

Calculate the radius of the cylinder.

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

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

$$\begin{array}{r} 153.90625 = \pi r^2 \\ \div \pi \\ \hline \end{array}$$

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

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

$$= 7.00 \text{ cm}$$

$$\dots\dots\dots 7.00 \dots\dots\dots \text{ cm [3]}$$

Two triangles:

$$\begin{aligned} A &= \frac{1}{2} \times b \times h \\ &= \frac{1}{2} \times 15.198 \times 13 \\ &= 98.791 \end{aligned}$$

Top:  $20 \times 24 = 480$

Side:  $13 \times 24 = 312$

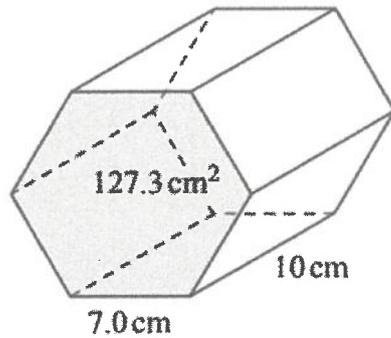
Bottom:  $15.198 \times 24 = 364.768$

$$\begin{aligned} \text{S.A.} &= 2 \times 98.791 + 480 + 312 + 364.768 \\ &= 1354.4 \end{aligned}$$

$$\dots\dots\dots 1350 \dots\dots\dots \text{ cm}^2 \text{ [6]}$$

(3sf)

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



NOT TO SCALE

(a) Find the volume of the prism.

$$127.3 \times 10 = 1273$$

..... 1273 ..... cm<sup>3</sup> [1]

(b) Calculate the surface area of the prism.

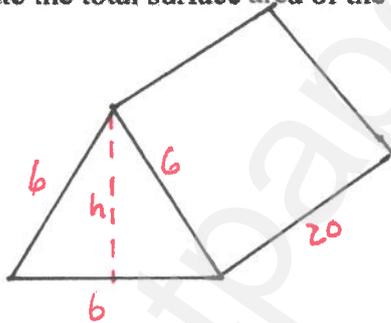
6 rectangles:  
 $7 \times 10 = 70$

S.A.:  $6 \times 70 + 2 \times 127.3$   
 $= 420 + 254.6$   
 $= 674.6$

..... 674.6 ..... cm<sup>2</sup> [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.



Area of Triangles:

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

$$= \frac{1}{2} \times 6 \times 3\sqrt{3}$$

$$= 9\sqrt{3}$$

Area of 3 rectangles:

$$A = 6 \times 20$$

$$= 120$$

height of triangle:



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

$$h^2 + 9 = 36$$

$$\begin{array}{r} -9 \\ -9 \end{array}$$

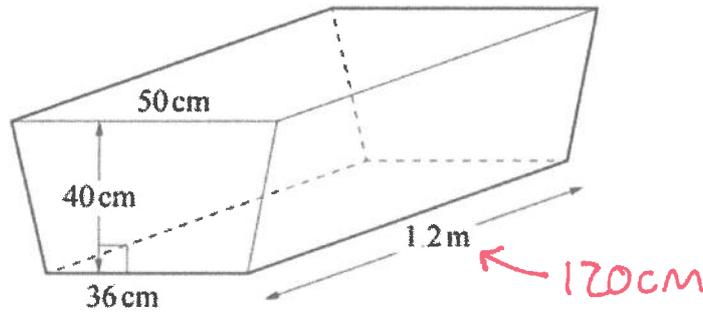
$$h^2 = 27$$

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

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

..... 391 ..... cm<sup>2</sup> [4]

5

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 cm<sup>3</sup>)

[3]

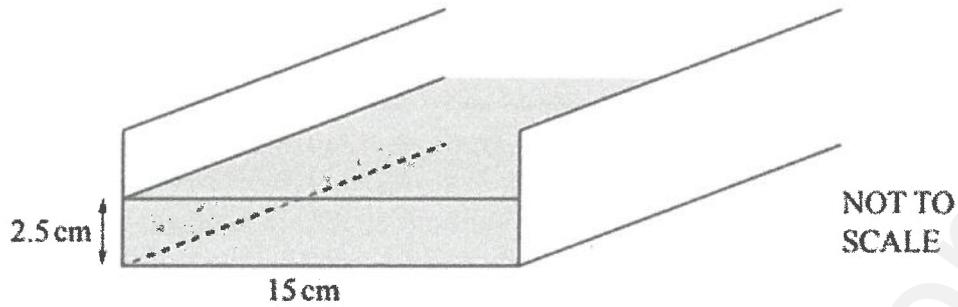
(b) The water from the trough is emptied at a rate of 600 ml per second.

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:

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

1 hour in seconds:

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

Volume in 1 second:

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

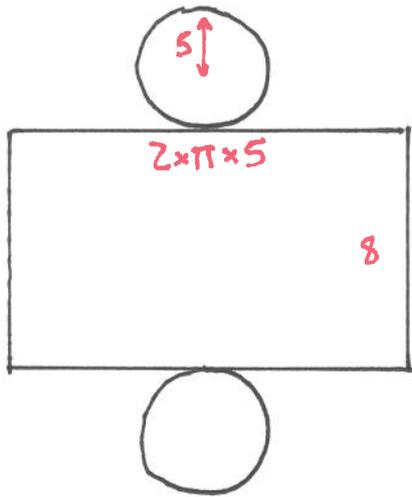
In 1 hour,

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

.....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:

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

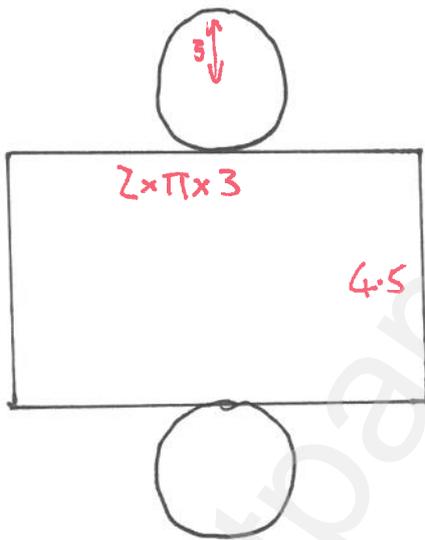
$$\begin{aligned} \text{S.A.} &= 2 \times 25\pi + 80\pi \\ &= 50\pi + 80\pi \\ &= \underline{130\pi} \end{aligned}$$

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

(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:

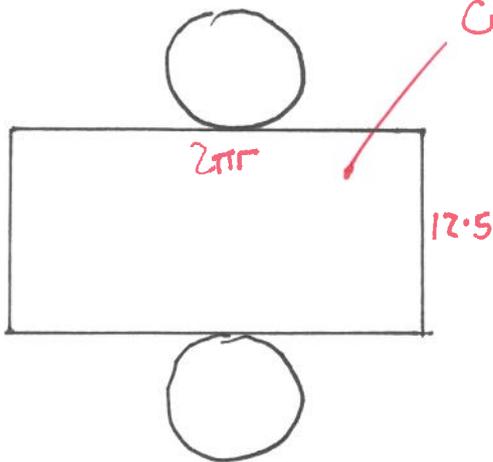
$$\begin{aligned} \text{Area} &= 2\pi r \times h \\ &= 2\pi \times 3 \times 4.5 \\ &= 27\pi \end{aligned}$$

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

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

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:

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

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

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

$$105 = 25r$$

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

$$4.2 = r$$

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

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

$$= \underline{693}$$

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