

Area Perimeter Volume

Example:

Using the formula for the **volume of a cylinder** $V = \pi r^2 h$
find the volume of a cylinder where $r = 5\text{cm}$ and $h = 10\text{cm}$.

Take $\pi = 3.14$

Answer :

$$\begin{aligned} V &= \pi r^2 h \\ &= 3.14 \times 5^2 \times 10 \\ &= 785\text{cm}^3 \end{aligned}$$

1. Find the volume of a cylinder where :

- (a) $r = 4\text{cm}$ $h = 10\text{cm}$
- (b) $r = 3\text{cm}$ $h = 5\text{cm}$
- (c) $r = 2.5\text{cm}$ $h = 4\text{cm}$
- (d) $r = 3.4\text{cm}$ $h = 20\text{cm}$

2. A glass is **cylindrical** in shape.

The circular top has a **radius** of 3.2 centimetres.

The height of the glass is 15centimetres.

Find the volume of the glass.

Give your answer to the nearest cubic centimetre.



Example :

The formula for the **volume of a sphere** is $V = \frac{4}{3} \pi r^3$

Find the volume of a sphere whose radius is 9cm.

Answer

$$\begin{aligned} V &= \frac{4}{3} \pi r^3 \\ &= \frac{4}{3} \times 3.14 \times 9^3 \\ &= 3052.1\text{cm}^3 \text{ to 1 dec place} \end{aligned}$$

3. Find the volume of the spheres where :

- (a) $r = 3\text{cm}$
- (b) $r = 6\text{cm}$
- (c) $r = 2.5\text{cm}$
- (d) $r = 5.7\text{cm}$

giving your answers correct to 1 decimal place.

To find the volume of a hemisphere, find the volume of the sphere then divide by 2.

Example :

Find the volume of the hemisphere shown opposite.

Answer :

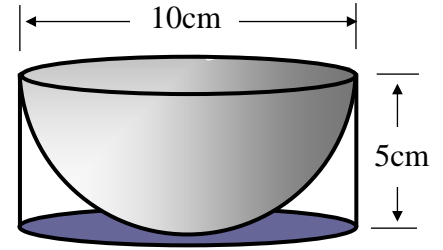
Diameter = 10cm

So $r = 5$

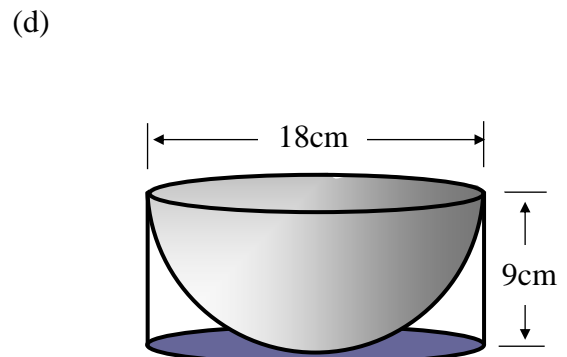
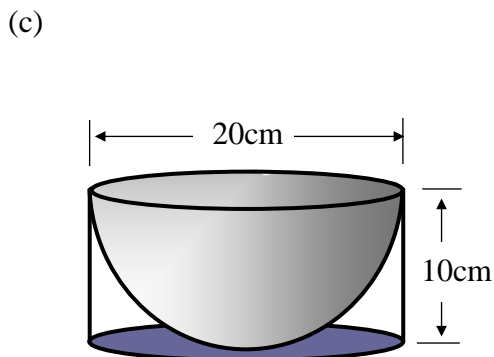
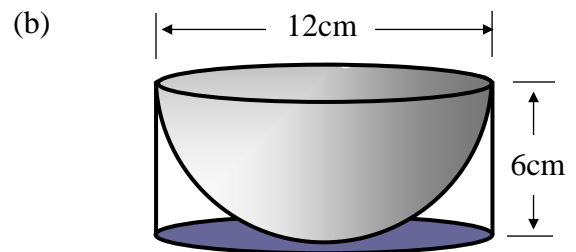
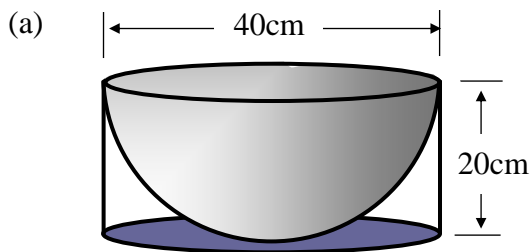
$$V = \frac{4}{3}\pi r^3$$

$$= \frac{4}{3}\pi r^3 = \frac{4}{3} \times 3.14 \times 5^3 = 523.3\text{cm}^3$$

So volume of hemisphere = $523.3 \div 2$
= 261.7 cm^3 correct to 1 decimal place.



4. Find the volume of these hemispheres in the same way :



Example :

$$\text{Volume of a cone} = \frac{1}{3}\pi r^2 h$$

Using the formula, find the volume of a cone where the radius is 6cm and the height is 20cm.

Answer :

$$V = \frac{1}{3}\pi r^2 h = \frac{1}{3} \times 3.14 \times 6^2 \times 20 = 753.6\text{cm}^3$$

5. In the same way find the volume of a cone where :

- (a) $r = 4\text{cm}$ $h = 12\text{cm}$
- (b) $r = 5\text{cm}$ $h = 10\text{cm}$
- (c) $r = 3\text{cm}$ $h = 6.5\text{cm}$
- (d) $r = 8.2\text{cm}$ $h = 100\text{cm}$

Example :

The shape opposite consists of a cone sitting on top of a hemisphere.

Find :

- (a) the volume of the cone
- (b) the volume of the hemisphere
- (c) the total volume.

Answer :

- (a) diameter of semi-circle = 4cm so $r = 2\text{cm}$

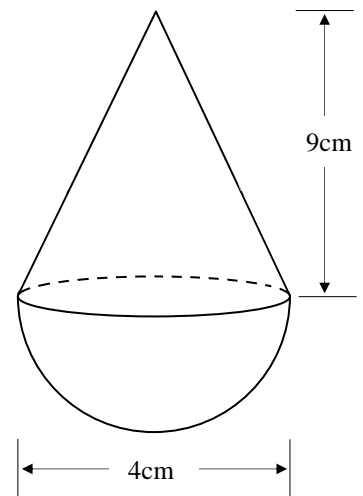
$$V = \frac{1}{3}\pi r^2 h = \frac{1}{3} \times 3.14 \times 2^2 \times 9 = 37.7\text{cm}^3$$

- (b) Volume of sphere

$$= \frac{4}{3}\pi r^3 = \frac{4}{3} \times 3.14 \times 2^3 = 33.5\text{cm}^3$$

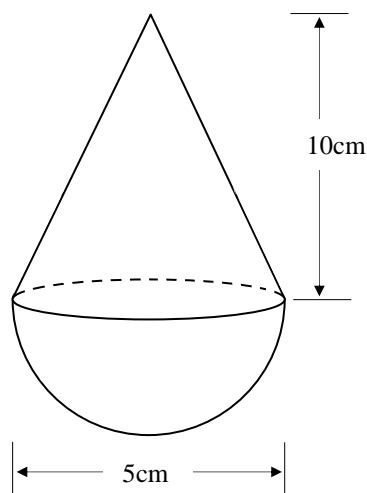
$$\text{So volume of hemisphere} = 33.5 \div 2 \\ = 16.8\text{cm}^3 \text{ correct to 1 decimal place.}$$

- (c) Total volume = $37.7 + 16.8 = 54.5\text{cm}^3$

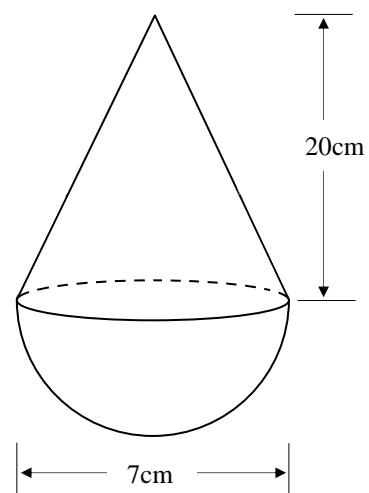


6. Find the volume of each of these shapes :

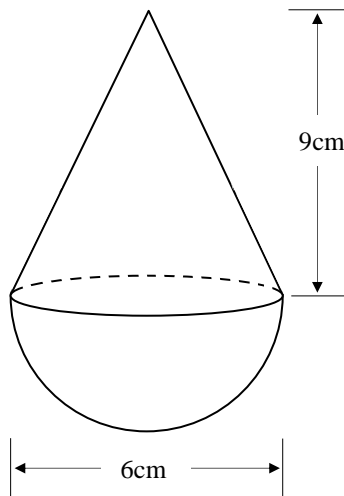
(a)



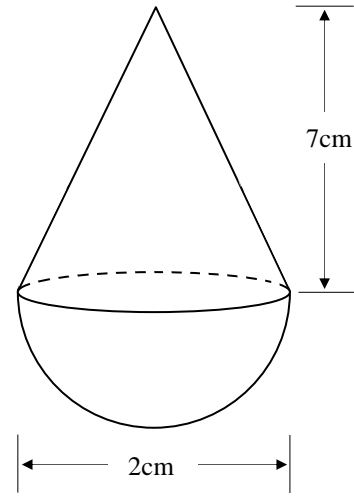
(b)



(c)



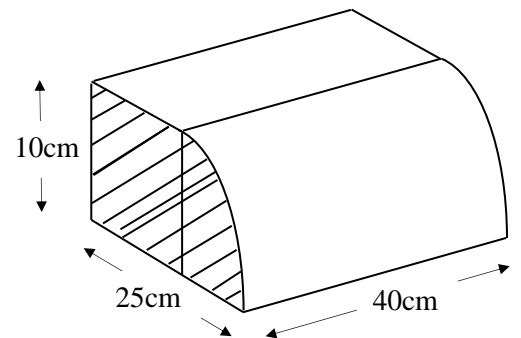
(d)



Example :

The diagram shows a bread-bin.
The shaded side is made up from a rectangle and a quarter circle

- (a) Calculate the shaded area.
- (b) Calculate the volume of the bread-bin.
- (c) Calculate the length of the black strip around the left side of the bin



Answer :

(a) Area of rectangle = $L \times B = 10 \times 15$
 $= 150\text{cm}^2$

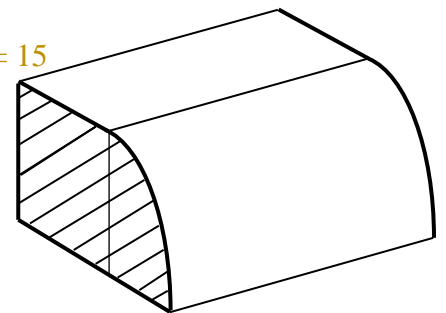
Area of circle $A = \pi r^2$
 $= 3.14 \times 10^2$
 $= 314\text{cm}^2$

Area of $\frac{1}{4}$ circle $= 314 \div 4$
 $= 78.5\text{cm}^2$

Shaded Area of side
 $= 150 + 78.5$
 $= 228.5\text{cm}^2$

$L = 10$ $B = 25 - 10 = 15$

$r = 10\text{cm}$



(b) Volume of tin \equiv Area of side \times Length of tin
 $= 228.5 \times 40$
 $= 9140\text{cm}^3$

(c) Circumference of circle

$$C = \pi D = 3.14 \times 20 = 62.8\text{cm}$$

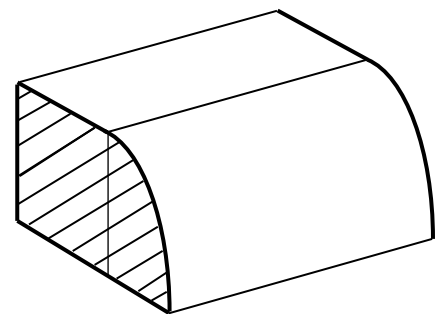
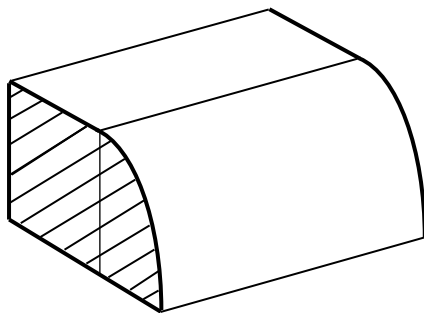
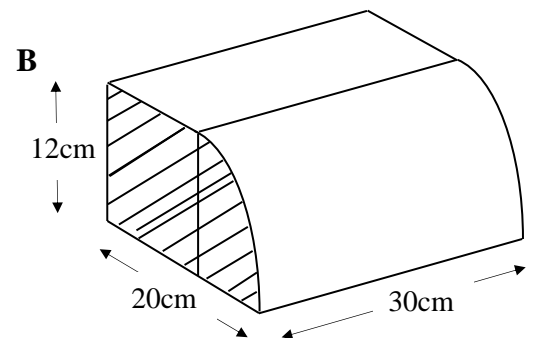
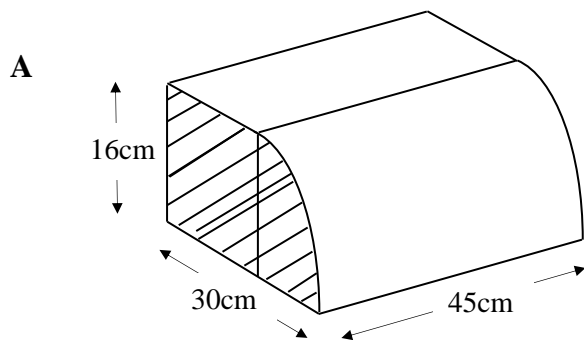
$$D = 2r = 2 \times 10 = 20$$

$$\text{Length of arc} = 62.8 \div 4 = 15.7\text{cm}$$

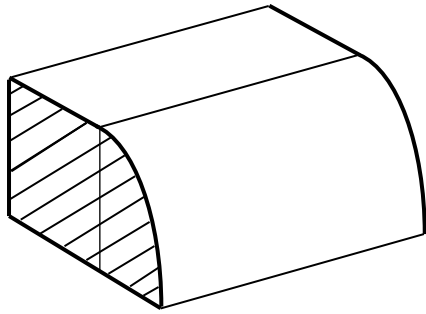
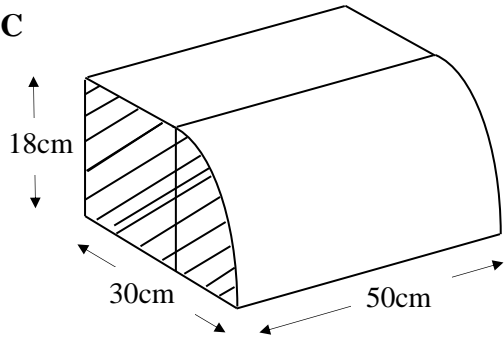
$$\text{So length of strip} = L + B + 25 + \text{arc} = 15 + 10 + 25 + 15.7 = \underline{65.7\text{cm}}$$

7. In each of the following , as in the example :

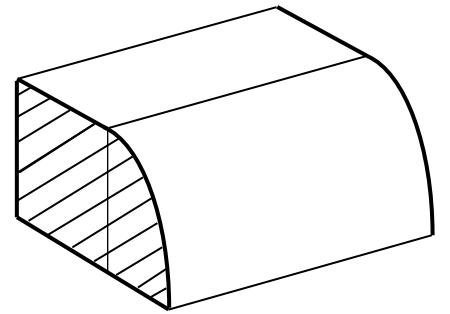
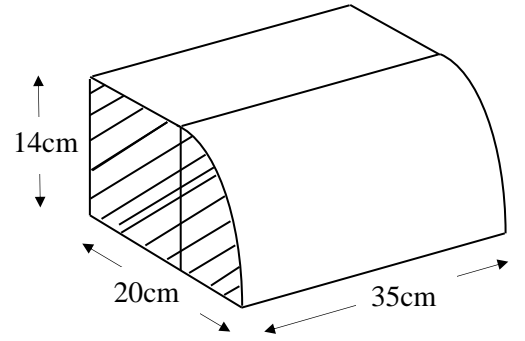
- (a) Calculate the shaded area.
- (b) Calculate the volume of the bread-bin.
- (c) Calculate the length of the black strip around the left side of the bin.



C



D



Mrs McLaughlin
Mr Mailley