

1.

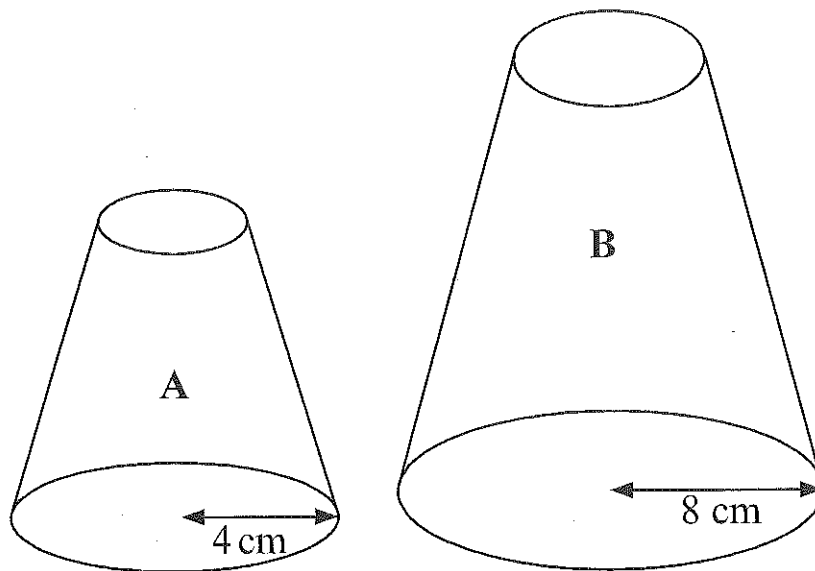


Diagram NOT accurately drawn

Two solid shapes, A and B, are mathematically similar.
The base of shape A is a circle with radius 4 cm.
The base of shape B is a circle with radius 8 cm.
The surface area of shape A is 80 cm^2 .

(a) Work out the surface area of shape B.

Length scale factor 2
 \therefore area scale factor $2^2 = 4$
 80×4

..... 320 cm^2 (2)

The volume of shape B is 600 cm^3 .

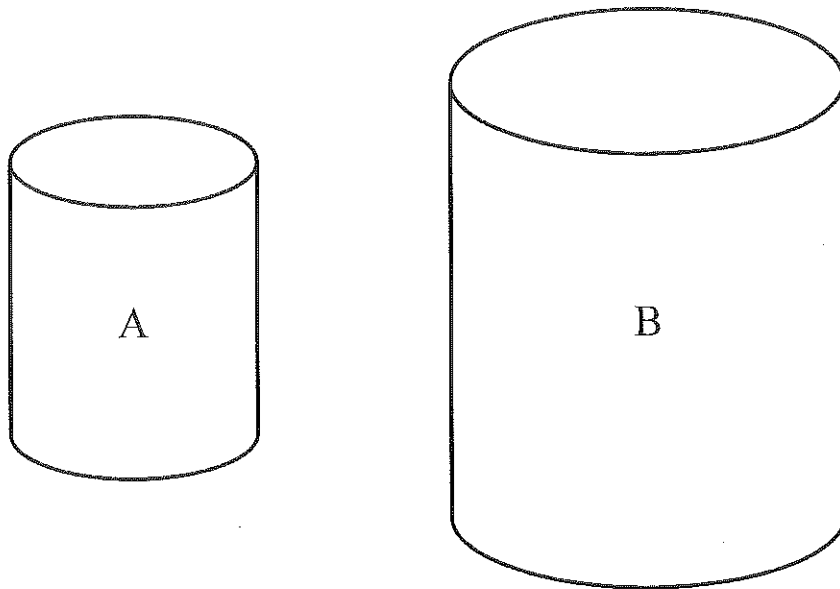
(b) Work out the volume of shape A.

volume scale factor $2^3 = 8$

$$\frac{600}{8} = \frac{300}{4} = \frac{150}{2}$$

..... 75 cm^3 (2)

2.



The two cylinders, A and B, are mathematically similar.
The height of cylinder B is twice the height of cylinder A.
The total surface area of cylinder A is 180 cm^2 .

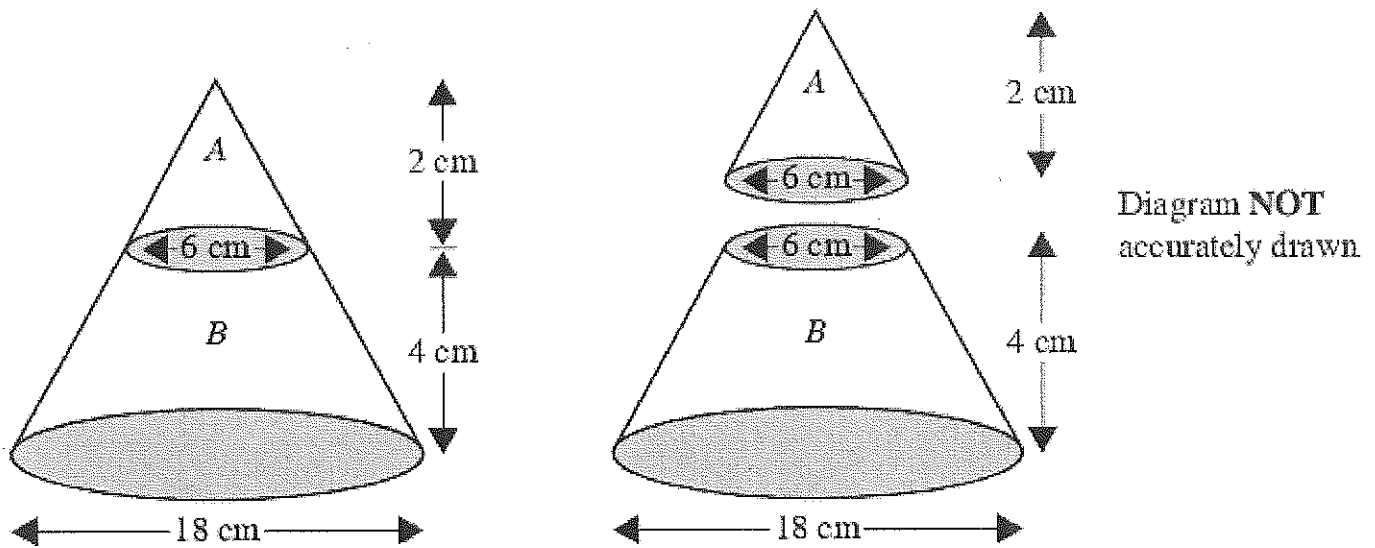
Calculate the total surface area of cylinder B.

$$\begin{array}{l} \text{length scale factor } 2 \\ \text{area scale factor } 2^2 = 4 \end{array}$$

$$180 \times 4 = 720$$

$$\underline{\underline{720 \text{ cm}^2}} \quad (3)$$

3.



The diagram represents a large cone of height 6 cm and base diameter 18 cm.

The large cone is made by placing a small cone A of height 2 cm and base diameter 6 cm on top of a frustum B.

Calculate the volume of the frustum B.

Give your answer in terms of π .

$$\begin{aligned} \text{Length scale factor} &= 3 \\ \text{area scale factor} &= 3^2 = 9 \\ \text{volume scale factor} &= 3^3 = 27 \end{aligned}$$

$$\begin{aligned} \text{volume of big cone} &= \frac{1}{3} \pi r^2 h \\ &= \frac{1}{3} \pi (9)^2 \cdot 6 \\ &= 162\pi \end{aligned}$$

$$\text{volume of small cone} = \frac{162\pi}{27} = 6\pi$$

$$\text{volume of frustum} = 162\pi - 6\pi$$

$$\dots\dots\dots 156\pi \text{ cm}^3 \quad (4)$$

4.

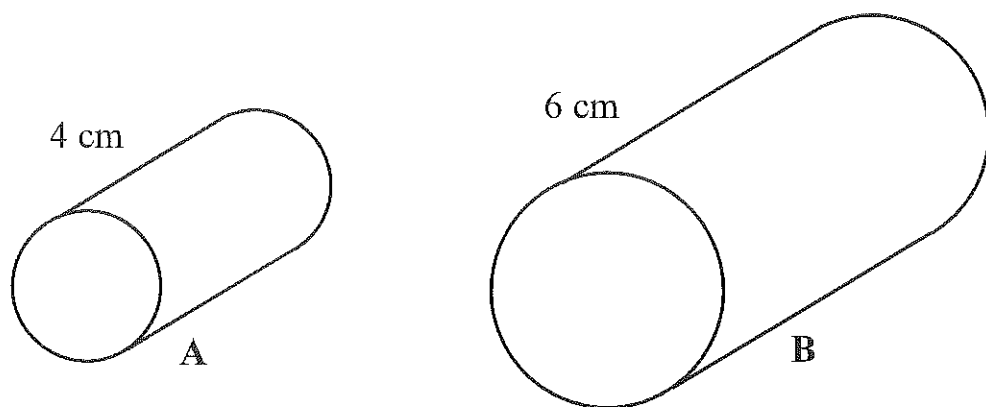


Diagram **NOT**
accurately drawn

Cylinder A and cylinder B are mathematically similar.

The length of cylinder A is 4 cm and the length of cylinder B is 6 cm.

The volume of cylinder A is 80 cm^3 .

Calculate the volume of cylinder B.

$$\begin{aligned} \text{length scale factor} & \quad \frac{3}{2} \\ \text{area scale factor} & \quad \left(\frac{3}{2}\right)^2 = \frac{9}{4} \\ \text{volume scale factor} & \quad \left(\frac{3}{2}\right)^3 = \frac{27}{8} \end{aligned}$$

$$80 \times \frac{27}{8} = 270 \quad \dots\dots\dots \text{cm}^3 \quad (3)$$

5.

X and Y are two geometrically similar solid shapes.

The total surface area of shape X is 450 cm^2 .

The total surface area of shape Y is 800 cm^2 .

The volume of shape X is 1350 cm^3 .

Calculate the volume of shape Y.

$$\text{scale factor for area} = \frac{800}{450} = \frac{16}{9}$$

$$\text{scale factor for length} = \sqrt{\frac{16}{9}} = \frac{4}{3}$$

$$\text{scale factor for volume} = \left(\frac{4}{3}\right)^3 = \frac{64}{27}$$

$$1350 \times \frac{64}{27}$$

$$450 \times \frac{64}{9}$$

$$50 \times 64$$

$$\dots\dots\dots \text{cm}^3 \quad (3)$$

6.

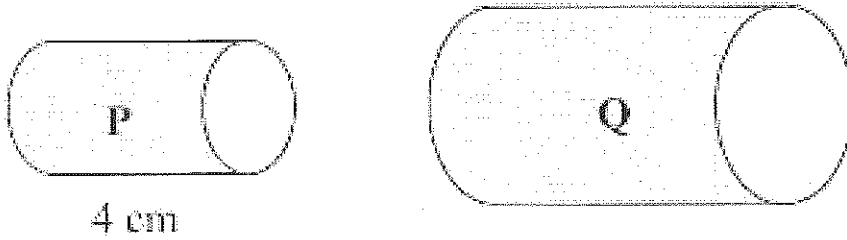


Diagram **NOT** accurately drawn

Two cylinders, P and Q, are mathematically similar.

The total surface area of cylinder P is $90\pi \text{ cm}^2$

The total surface area of cylinder Q is $810\pi \text{ cm}^2$

The length of cylinder P is 4 cm.

area scale factor = $\frac{810}{90} = 9$
length scale factor = $\sqrt{9} = 3$

(a) Work out the length of cylinder Q.

$$4 \times 3 = 12$$

.....12..... cm (3)

The volume of cylinder P is $100\pi \text{ cm}^3$

(b) Work out the volume of cylinder Q.

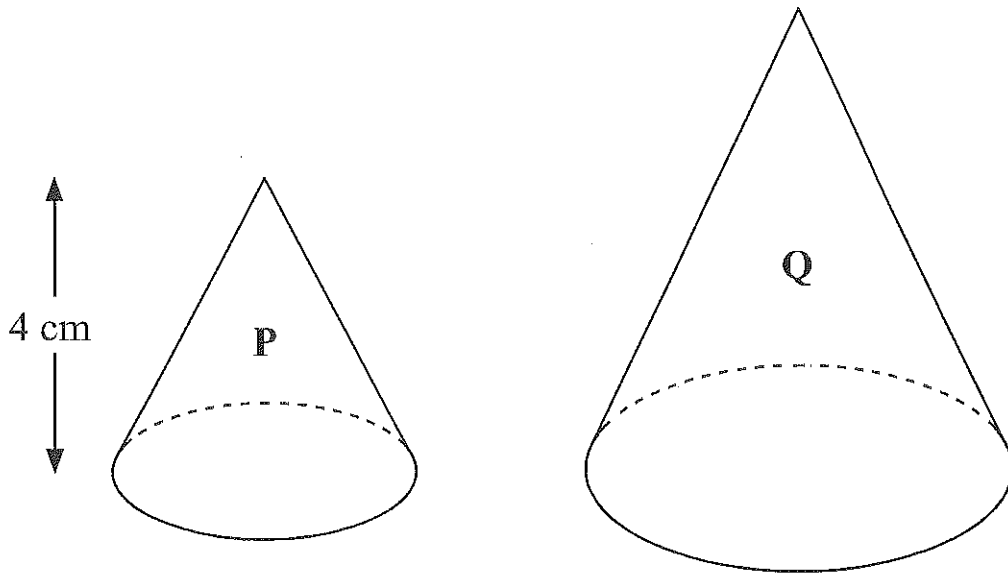
Give your answer as a multiple of π .

volume scale factor = $3^3 = 27$

$$100\pi \times 27$$

.....2700 π cm³ (2)

7.



Two cones, P and Q, are mathematically similar.

The total surface area of cone P is 24 cm^2 .

The total surface area of cone Q is 96 cm^2 .

The height of cone P is 4 cm.

(a) Work out the height of cone Q.

$$\text{area scale factor} = \frac{96}{24} = 4$$

$$\text{length scale factor} = \sqrt{4} = 2$$

$$4 \times 2 = 8$$

.....8..... cm (3)

The volume of cone P is 12 cm^3

(b) Work out the volume of cone Q.

$$\text{volume scale factor} = 2^3 = 8$$

$$12 \times 8 = 96$$

.....96..... cm^3 (2)