Frustums

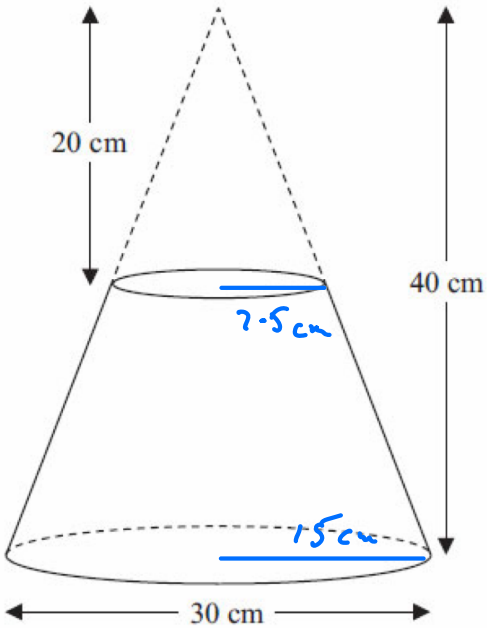


Diagram **NOT** accurately drawn

Vol of cone $= \frac{1}{3}\pi r^2 h$

A frustrum is made by removing a small cone from a similar large cone.

The height of the small cone is 20 cm.
The height of the large cone is 40 cm.
The diameter of the base of the large cone is 30 cm.

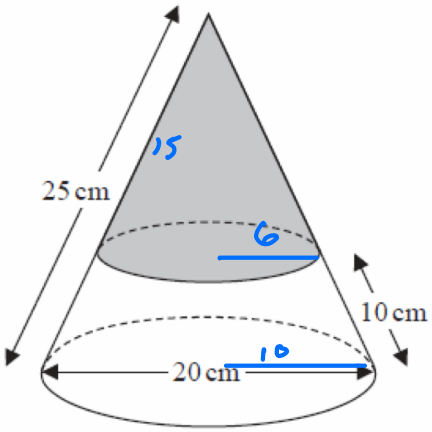
Work out the volume of the frustrum.
Give your answer correct to 3 significant figures.

Vol of Frustum = Vol of large cone − Vol of small cone

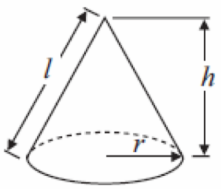
$= \frac{1}{3}\pi \times 15^2 \times 40 - \frac{1}{3}\pi \times 7.5^2 \times 20$

$= \frac{1}{3}\pi(9000 - 1125) = 8246.68 \text{ cm}^3$

$= 8250 \text{ cm}^3$ to 3 s.f.



Curved surface area of cone = πrl



Ratio of slant heights
= 15 : 25
= 3 : 5

∴ ratio of radii = 3 : 5

The cone has a base diameter of 20 cm and a slant height of 25 cm.

A circle is drawn around the surface of the cone at a slant height of 10 cm above the base.
The curved surface of the cone above the circle is painted grey.

Work out the area of the curved surface of the cone that is *not* painted grey.
Give your answer as a multiple of π
You must show all your working.

..... cm^2

Unpainted curved surface =
curved surface of large cone
− curved surface of small cone

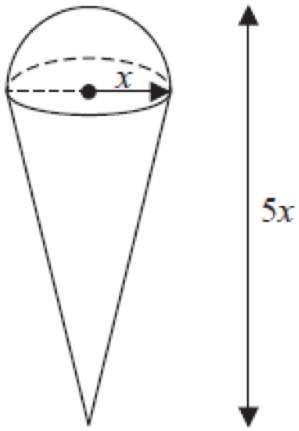
$\pi \times 10 \times 25 - \pi \times 6 \times 15$

$250\pi - 90\pi$

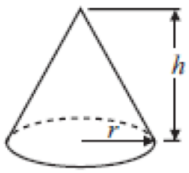
$= 160\pi \ cm^2$

Q10.

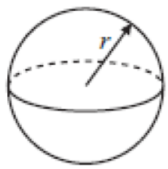
A solid is made by putting a hemisphere on top of a cone.



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



Volume of sphere $= \frac{4}{3}\pi r^3$



The total height of the solid is $5x$
The radius of the base of the cone is x
The radius of the hemisphere is x

Vol of cone $= \frac{1}{3}\pi \times x^2 \times 4x$

$= \frac{4}{3}\pi x^3$

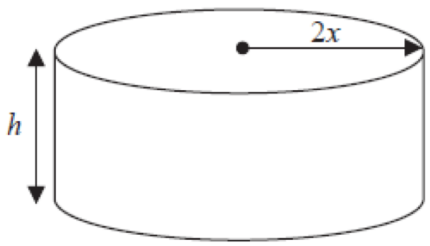
Vol of hemisphere

$= \frac{2}{3}\pi x^3$

Vol of cone + hemisphere

$= \frac{4}{3}\pi x^3 + \frac{2}{3}\pi x^3$

$= \frac{6}{3}\pi x^3 = 2\pi x^3$



A cylinder has the same volume as the solid.
The cylinder has radius $2x$ and height h
All measurements are in centimetres.

Find a formula for h in terms of x
Give your answer in its simplest form.

Vol of cylinder $= \pi r^2 h$

Vol $= \pi \times (2x)^2 h$

$= 4\pi x^2 h$

Volumes equal so

$4\pi x^2 h = 2\pi x^3$

$h = \frac{2\pi x^3}{4\pi x^2} = \frac{x}{2}$

$h = \frac{x}{2}$

.....

(Total for question = 5 marks)

Q11. The diagram shows a large tin of pet food in the shape of a cylinder.

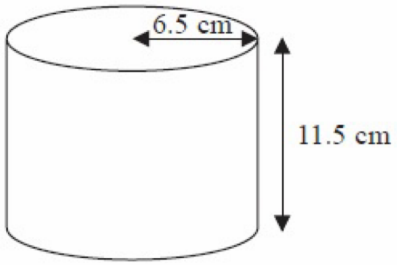


Diagram **NOT** accurately drawn

$Vol = \pi r^2 h$

The large tin has a radius of 6.5 cm and a height of 11.5 cm.

$V = \pi \times 6.5^2 \times 11.5$

$= 1526.42 \text{ cm}^3$

A pet food company wants to make a new size of tin.

The new tin will have a radius of 5.8 cm.

It will have the same volume as the large tin.

Calculate the height of the new tin.

Give your answer correct to one decimal place.

14.4 ..... cm

(Total for Question is 3 marks)

$V = \pi r^2 h$

$\frac{V}{\pi r^2} = h$

$h = \frac{1526.42}{(\pi \times 5.8^2)} = 14.4 \text{ cm}$

Q12.

The diagram shows a container used to store oil.

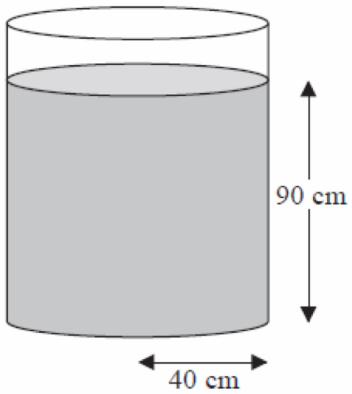


Diagram **NOT** accurately drawn

Vol of oil
$= \pi r^2 h$
$= \pi \times 40^2 \times 90$
$= 452389 \text{ cm}^3$

The container is in the shape of a cylinder of radius 40 cm.

The height of the oil in the container is 90 cm.

65 litres of oil are taken from the container. $= 65000 \text{ cm}^3$
1 litre = 1000 cm^3.

oil left
$= 452389$
$- 65000$
387389 cm^3

Work out the new height of the oil in the container.
Give your answer correct to one decimal place.

..... cm

$V = \pi r^2 h$

$\frac{V}{\pi r^2} = h$

$h = \frac{387389}{(\pi \times 40^2)} = 77.1 \text{ cm}$