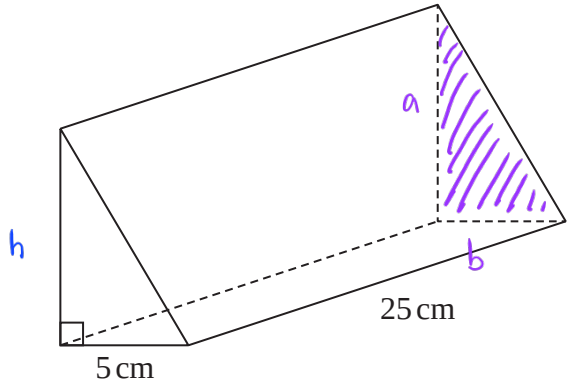
1 The diagram shows a prism.



Area of triangle = $\frac{1}{2} \times a \times b$

The cross section of the prism is a right-angled triangle.
The base of the triangle has length 5 cm

The prism has length 25 cm
The prism has volume 750 cm^3

Work out the height of the prism.

Area of cross section : $\frac{1}{2} \times h \times 5$ (1)

Volume of prism = Area of cross section x length

multiply both sides by 2 → $750\ cm^3 = \frac{1}{2} \times h \times 5\ cm \times 25\ cm$ (1)

$1500\ cm^3 = h \times 5\ cm \times 25\ cm$

Rearrange equation to place unknown on one side →

$h = \frac{1500\ cm^3}{(5 \times 25)cm^2}$

$= \frac{1500\ cm^3}{125\ cm^2}$

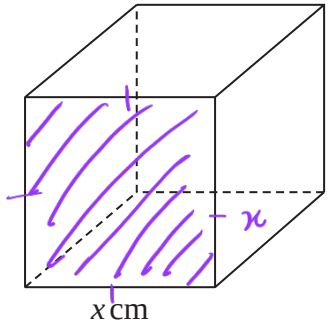
$= 12\ cm$ (1)

$125 \overline{)1500}$ → 12, 125, 250, 250

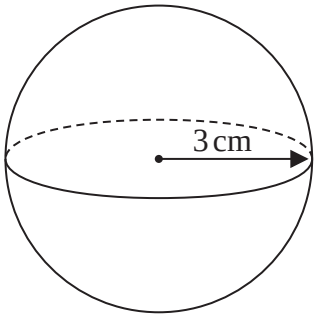
12 cm

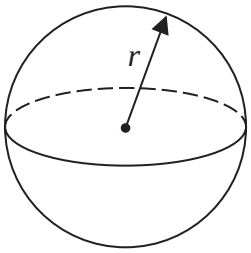
(Total for Question 1 is 3 marks)

2 The diagram shows a cube with edges of length x cm and a sphere of radius 3 cm.



6 surface





Surface area of sphere = $4\pi r^2$

The surface area of the cube is equal to the surface area of the sphere.

Show that $x = \sqrt{k\pi}$ where k is an integer.

total surface × area of 1 surface = $6 \times x^2$

↑

Surface area of cube $= 6x^2$ cm^2 (1)

Surface area of sphere $= 4\pi (3\text{ cm})^2$ $r = 3$ cm

$= 4\pi (9\text{ cm}^2)$

$= 36\pi$ cm^2 (1)

Surface area of cube = surface area of sphere

$6x^2 = 36\pi$ (1)

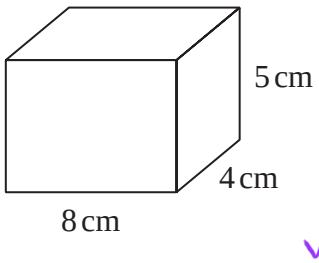
$x^2 = 6\pi$

$x = \sqrt{6\pi}$, where $k = 6$

$x = \sqrt{k\pi}$ (1)

(Total for Question 2 is 4 marks)

3 Here is a cuboid.



Work out the volume of the cuboid.

Volume of cuboid =

length x width x height

Volume = 8 x 5 x 4 (1)

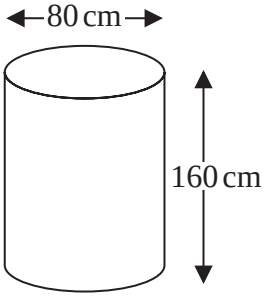
= 160 cm^3

160 (1)

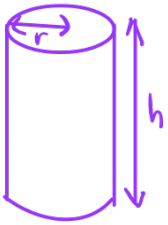
..... cm^3

(Total for Question 3 is 2 marks)

4 Karina has 4 tanks on her tractor.
Each tank is a cylinder with diameter 80 cm and height 160 cm.



Volume of cylinder : $\pi \times r^2 \times h$



The 4 tanks are to be filled completely with a mixture of fertiliser and water.

The fertiliser has to be mixed with water in the ratio 1 : 100 by volume.
Karina has 32 litres of fertiliser.

1 litre = 1000 cm^3

Has Karina enough fertiliser for the 4 tanks?
You must show how you get your answer.

Finding volume of a tank :

$\pi \times r^2 \times h = \pi \times 40^2 \times 160 = 256\,000\,\pi$ (1)

Finding volume of 4 tanks :

$4 \times 256\,000\,\pi = 1\,024\,000\,\pi$ (1)

Finding the amount of mixture for 1 tank :

$$\frac{256\,000\,\pi}{(100+1)} = \frac{256\,000\,\pi}{101} = 7962.8\ cm^3$$

4 tanks : $7962.8 \times 4 = 31851.4\ cm^3$ (1)

Fertiliser Karina has :

$32 \times 1000\ cm^3 = 32000\ cm^3$

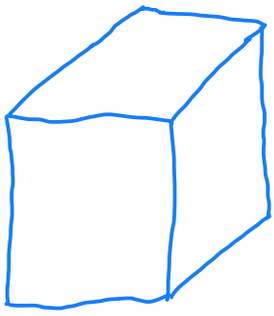
Yes. Karina has $32000\ cm^3$ to fill in $31851.4\ cm^3$ of tank. (1)

(Total for Question 4 is 4 marks)

5 A cube has a total surface area of $150\,cm^2$

Work out the volume of the cube.

diagram



surface area = $150\ cm^2$

6 sides x area of one side = $150\ cm^2$

area of one side = $\frac{150}{6}$ = $25\ cm^2$ ✓①



$x^2 = 25$

$x = \sqrt{25}$ = 5 cm length ✓①

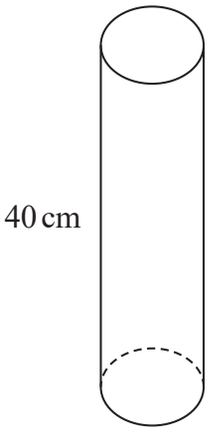
Volume of cube = $5 \times 5 \times 5$

= $125\ cm^3$ ✓①

125 ..... cm^3 ✓①

(Total for Question 5 is 4 marks)

6 The diagram shows a solid cylinder on a horizontal floor.



$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

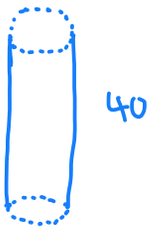
The cylinder has a

volume of $1200\,\text{cm}^3$
height of 40 cm.

The cylinder exerts a force of 90 newtons on the floor.

Work out the pressure on the floor due to the cylinder.

already have force so area is needed



volume = 1200

area cross section × height = 1200

area × 40 = 1200

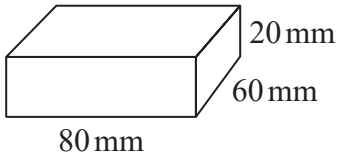
area = $30\,\text{cm}^2$ ✓1

Pressure = $\frac{\text{Force}}{\text{Area}} = \frac{90}{30} = 3$ ✓1

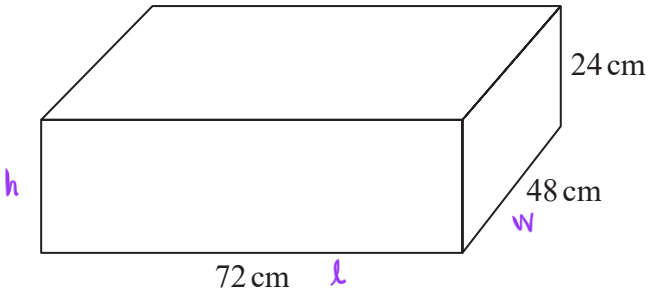
3 ✓1 ..... newtons/cm^2

(Total for Question 6 is 3 marks)

7 Packets of sweets are put into boxes.



Packet

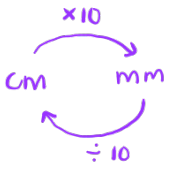


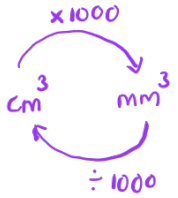
Box

Volume of cuboid = l x w x h

Each packet is a cuboid, 80 mm by 60 mm by 20 mm.
Each box is a cuboid, 72 cm by 48 cm by 24 cm.

Work out the greatest number of packets that can be put into each box.





Calculate volume of box :

$V_B = (72 \times 48 \times 24)$

$= 82\,944\ cm^3$ (1)

Calculate volume of packet :

$V_P = 80 \times 60 \times 20$

$= 96\,000\ mm^3$

Convert to cm^3 $= 96000\ mm^3 \times \frac{1\ cm^3}{1000\ mm^3}$ (1)

$= 96\ cm^3$

Calculate number of packets can fit in the box :

$N = \frac{V_B}{V_P} = \frac{82\,944\ cm^3}{96\ cm^3}$ (1) $= 864$ (1)

864

(Total for Question 7 is 4 marks)

8 A solid cuboid is made of metal.

density = mass / volume

The metal has a density of 9 g/cm^3
The volume of the cuboid is 72 cm^3

Work out the mass of the cuboid.

mass = density x volume

= 9 g/cm^3 x 72 cm^3 (1)

= 648 g (1)

648 ..... g

(Total for Question 8 is 2 marks)

9 Habib has two identical tins.

He puts 600 grams of flour into one of the tins.
The flour fills the tin completely.
The density of the flour is 0.6 g/cm^3

Habib puts 600 grams of salt into the other tin.
The salt does **not** fill the tin completely.
The volume of the space in the tin that is **not** filled with salt is 700 cm^3

Work out the density of the salt.
You must show all your working.

Density : $\frac{\text{Mass}}{\text{Volume}}$

Volume of tin : $\frac{\text{Mass}}{\text{Density}}$

$= \frac{600}{0.6}$

$= 1000\ \text{cm}^3$ (1)

Volume of salt : $1000 - 700$

$= 300\ \text{cm}^3$ (1)

Density of salt $= \frac{600}{300}$ (1)

$= 2\ \text{g/cm}^3$

2 (1)

..... g/cm^3

(Total for Question 9 is 4 marks)