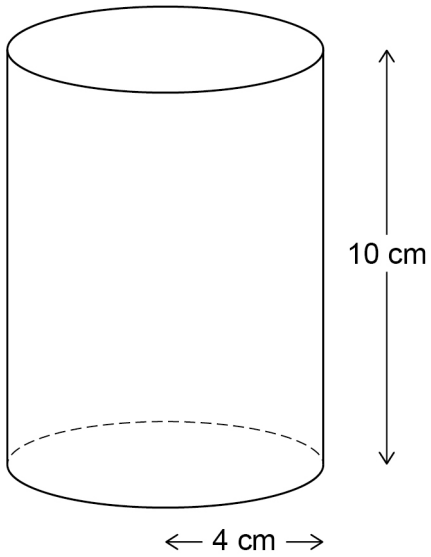
1 Here are two solids.

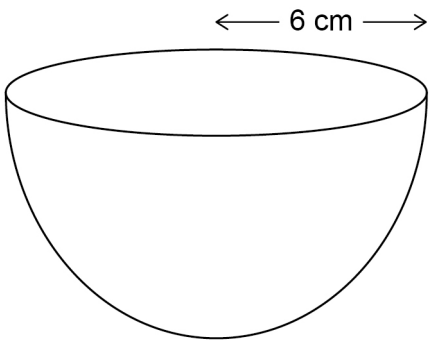
Cylinder

radius 4 cm height 10 cm



Hemisphere

radius 6 cm



volume of a hemisphere $= \frac{2}{3}\pi r^3$ where r is the radius

Which solid has the greater volume?

You **must** show your working.

[4 marks]

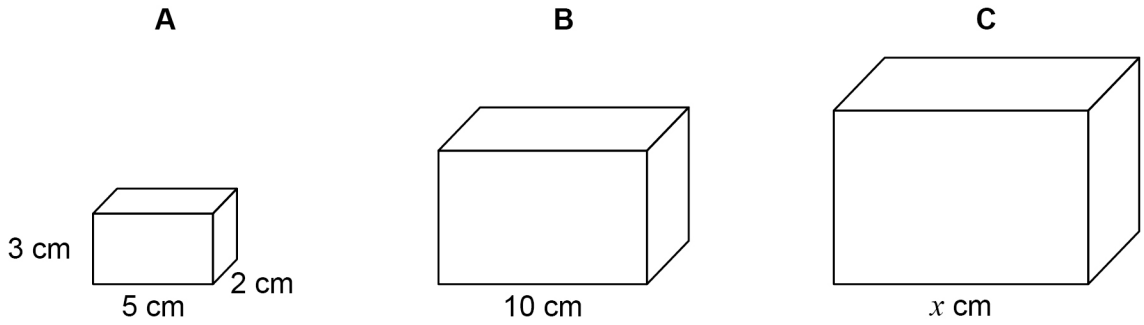
Answer _____

2 Here are three similar cuboids, A, B and C.

A has length 5 cm, width 2 cm and height 3 cm

B has length 10 cm

C has length x cm



2 (a) The total surface area of A is 62 cm^2

Tim wants to work out the total surface area of B.

Here is his working.

$10 \div 5 =$	2
$62 \times 2 =$	124
Total surface area of B $=$	124 cm^2

Make **one** criticism of Tim's method.

[1 mark]

2 (b) Volume of A $\times \frac{125}{8}$ = Volume of C

Work out the value of x.

[3 marks]

Answer _____

3 A ball contains 5000 cm^3 of air.

More air is pumped into the ball at a rate of 160 cm^3 per second.

The ball is full of air when it becomes a sphere with radius 15 cm

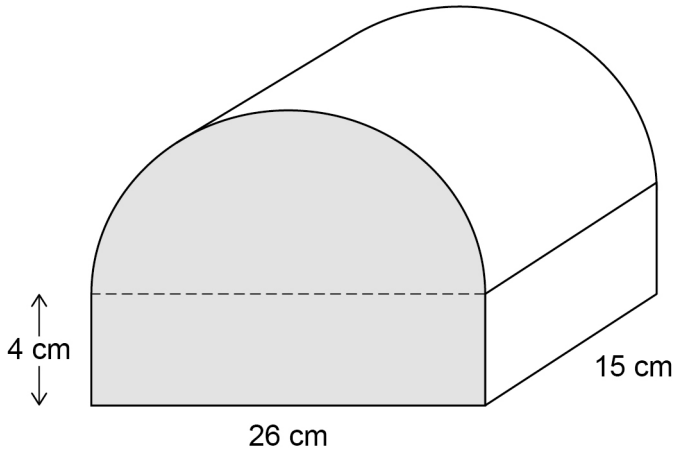
Volume of a sphere $= \frac{4}{3}\pi r^3$ where r is the radius

Does it take **less than** 1 minute to fill the ball?

You **must** show your working.

[4 marks]

4 A box is the shape of half a cylinder on top of a cuboid.



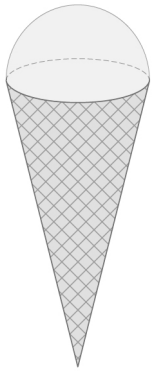
Work out the volume of the box.

[4 marks]

Answer _____ cm^3

5 Outside a cafe there is a large plastic ice cream cornet.

The cornet is a hemisphere on top of a cone.



The cone and the hemisphere each have radius 24 cm

The cone has perpendicular height 117 cm

Volume of a cone $= \frac{1}{3}\pi r^2 h$ r is the radius h is the perpendicular height	Volume of a hemisphere $= \frac{2}{3}\pi r^3$ r is the radius

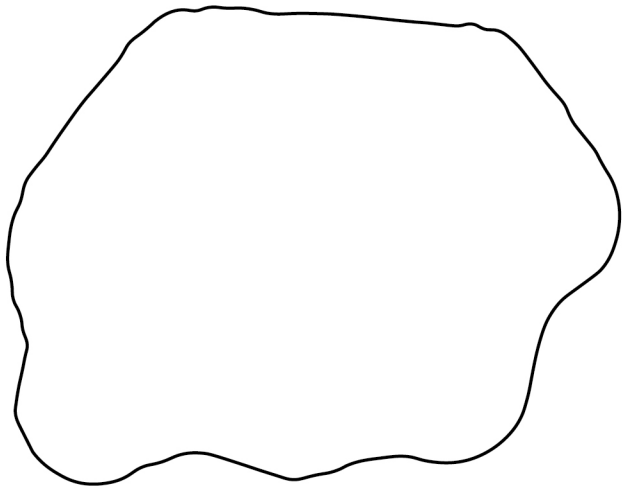
5 (a) Work out the total volume of the cornet.

[4 marks]

Answer _____ cm^3

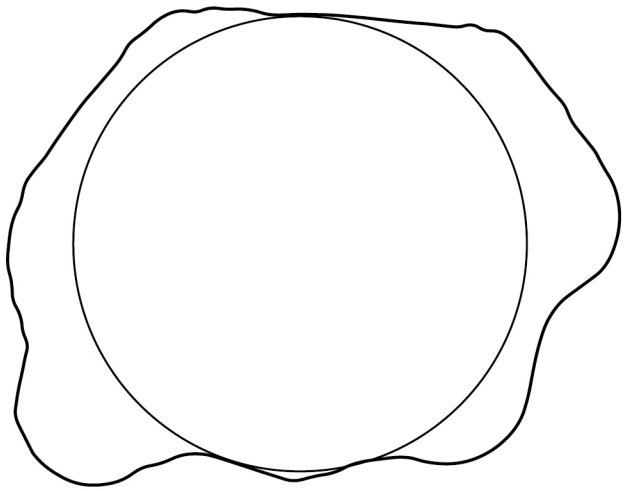
6 Here is a scale drawing of a reservoir.

Scale: 1 cm represents 500 m



Virat wants to estimate the volume of water in the reservoir.

He draws on the scale drawing a circle with radius 3 cm



6 (a) Virat estimates the volume of the reservoir by assuming that

- the reservoir is a cylinder whose cross section is the circle
- the depth of the reservoir is 17 metres.

Work out Virat's estimate in cubic metres.

[3 marks]

Answer _____ m^3

6 (b) In fact,

- the depth of the reservoir is 13.8 metres
- the reservoir is **not** a cylinder (see diagram).

Which statement about the actual volume of the reservoir is correct?
Tick **one** box.

☐ It is less than Virat's estimate

☐ It is greater than Virat's estimate

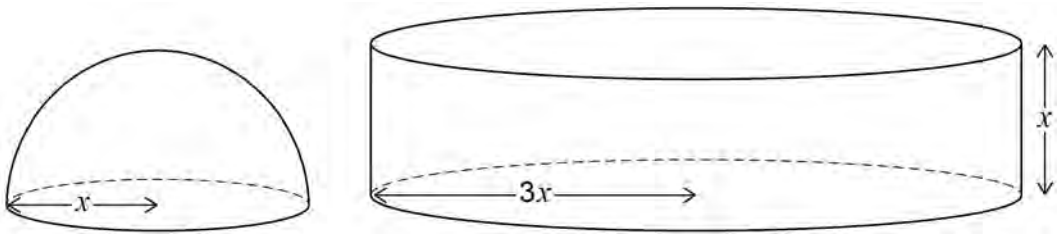
☐ It could be less than or greater than Virat's estimate

Give a reason for your answer.

[2 marks]

7 A solid hemisphere has radius x.

A solid cylinder has radius $3x$ and height x.



Surface area of a sphere = $4\pi r^2$
where r is the radius

Work out the ratio

total surface area of the hemisphere : total surface area of the cylinder

Give your answer in its simplest form.

You **must** show your working.

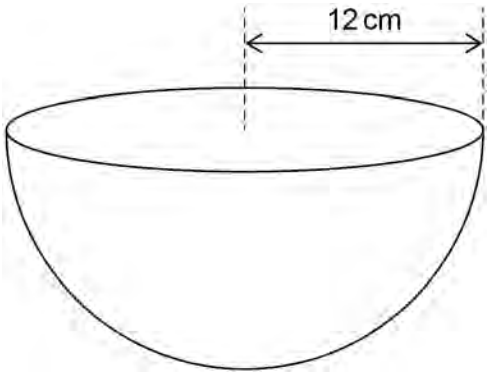
[3 marks]

Answer _____ : _____

8

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

A bowl is a hemisphere with radius 12 cm



Water is poured into the bowl

at a rate of 325 cm^3 per second

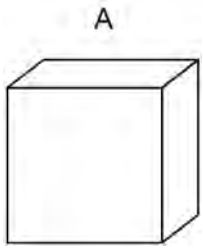
for 8 seconds.

Does the water fill **more than** 70% of the bowl?

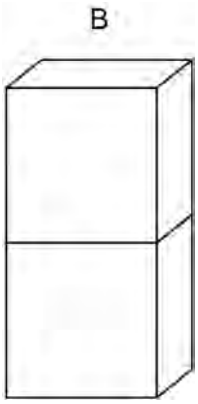
You **must** show your working.

[4 marks]

9 Here is cuboid A.



Cuboid B is made from **two** of cuboid A.



volume of A : volume of B = 1 : 2

Matthew says,

"surface area of A : surface area of B must be 1 : 2 because B is made of 2 of A."

Is Matthew correct?

Tick **one** box.

☐ Yes ☐ No ☐ Cannot tell

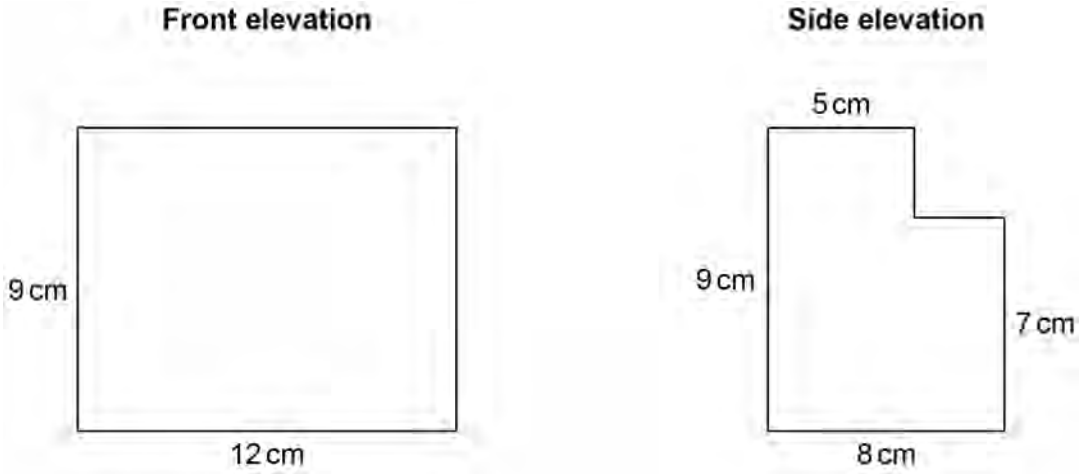
Give a reason for your answer.

[2 marks

10 A solid shape is made from centimetre cubes.

The front elevation and side elevation of the shape are shown.

Not drawn accurately



Work out

the **maximum** possible number of cubes in the shape

and

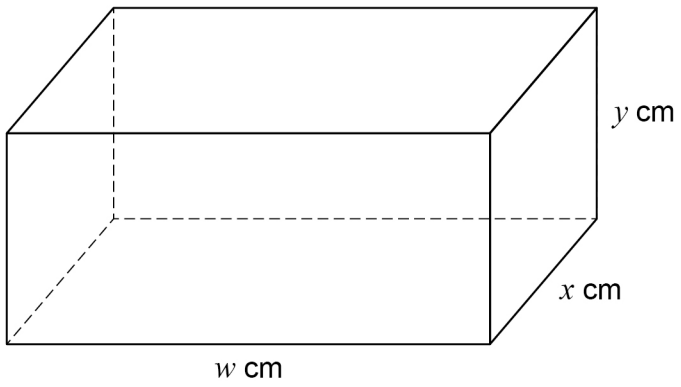
the **minimum** possible number of cubes in the shape.

[3 marks]

Maximum _____ Minimum _____

11 (a) Here is a cuboid.

w, x and y are **different** whole numbers.



The total length of **all** the edges of the cuboid is 80 cm

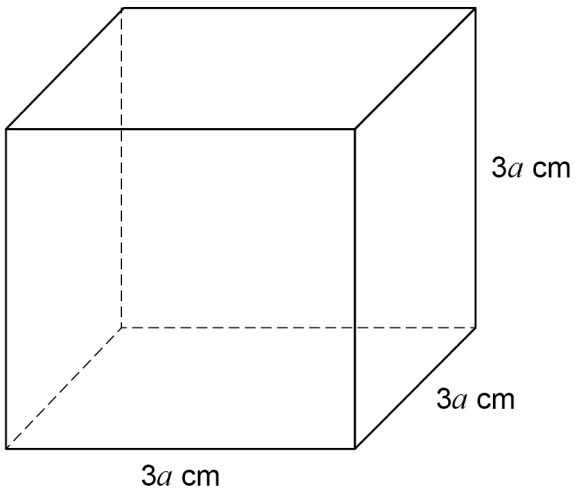
The volume is **greater** than 200 cm^3

Work out one possible set of values for w, x and y.

[2 marks]

$w =$ _____ $x =$ _____ $y =$ _____

11 (b) Here is a solid cube.



Circle the expression for the **total** surface area in cm^2

[1 mark]

$36a$ $54a$ $36a^2$ $54a^2$

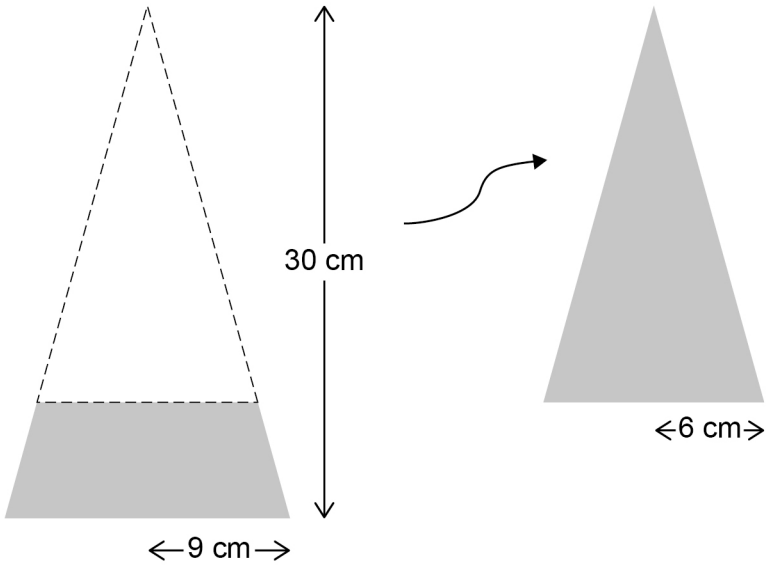
12 Alec makes a bowl for dog food from a solid wooden cone.

The sketches show how the bowl is made.

The cone has radius 9 cm and perpendicular height 30 cm

A smaller cone, with radius 6 cm, is removed.

Not drawn accurately

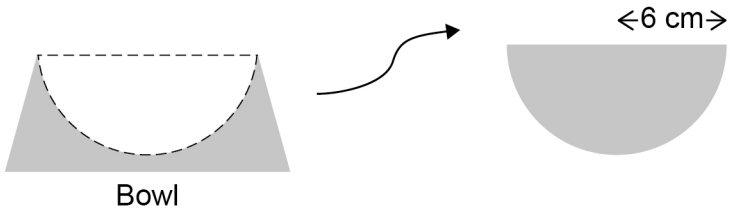


Volume of a cone $= \frac{1}{3}\pi r^2 h$

where r is the radius and h is the perpendicular height

A hemisphere with radius 6 cm is then removed.

Not drawn accurately



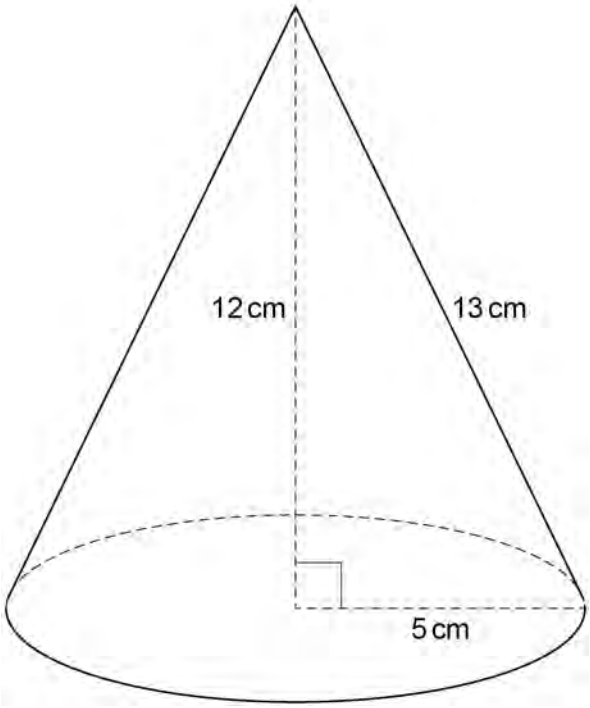
Volume of a hemisphere $= \frac{2}{3}\pi r^3$ where r is the radius

Work out the volume of the remaining wood that forms the bowl.

[5 marks]

Answer _____ cm^3

13 Here is a cone.



13 (a)

Curved surface area of a cone = πrl where r is the radius and l is the slant height

Beth tries to work out the curved surface area in terms of π

Curved surface area of the cone = $\pi \times 5 \times 12$ $= 60\pi \text{ cm}^2$

What mistake has she made?

[1 mark]

13 (b) Adam uses $\pi = 3$ to estimate the area of the **base** of the cone.

Work out his estimate.

[2 marks]

Answer _____ cm^2

13 (c) Beth uses $\pi = 3.14$ to estimate the area of the **base** of the cone.

Is Beth's estimate more than or less than Adam's estimate?

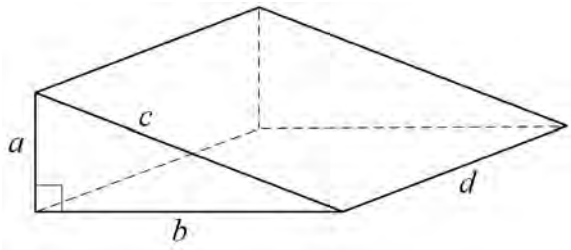
Tick a box.

More than ☐ Less than ☐

Give a reason for your answer.

[1 mark]

14 Here is a right-angled triangular prism.



The ratio of the edges is $a : b : c : d = 3 : 4 : 5 : 12$

The **volume** of the prism is $1125\,\text{cm}^3$

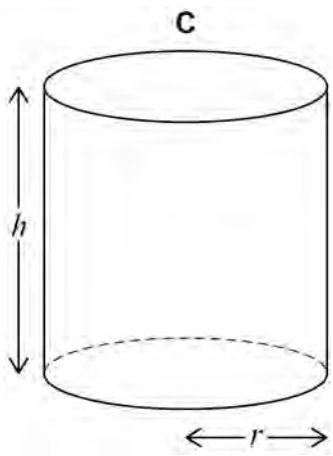
Work out the total length of **all** of the edges of the prism.

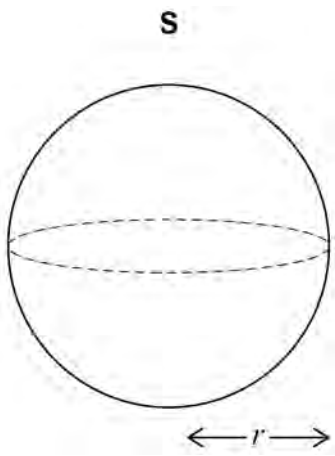
[5 marks]

Answer _____ cm

15 A cylinder, C, and a sphere, S, each have radius r

C has height h





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

where r is the radius

15 (a) volume of C = volume of S

Work out the ratio r : h

You **must** show your working.

[3 marks]

Answer _____ : _____

15 (b) A **different cylinder** has radius $3r$ and height $2h$.

How many times bigger is the volume of this cylinder than the volume of C?

[2 marks]

Answer _____