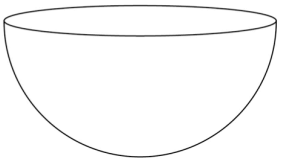
Q1. (2018)

10

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

A container is a hemisphere of radius 30 cm



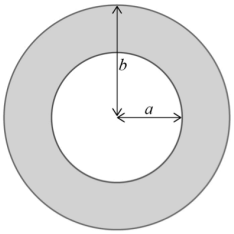
Sand fills the container at a rate of 4000 cm^3 per minute.

Does it take **less than** a quarter of an hour to fill the container?
You **must** show your working.

[3 marks]

Q2. (2018)

20 Here is an inflated swimming ring with dimensions in centimetres.



The volume of the ring, V cm^3, is given by

$$V = 0.25\pi^2(b-a)^2(b+a)$$

Work out the volume when $a = 20$ and $b = 30$
Give your answer to 3 significant figures.

[3 marks]

Answer _____ cm^3

Q3. (2018)

23 Solids X and Y are similar.

X has volume 64 cm^3

Y has volume 343 cm^3

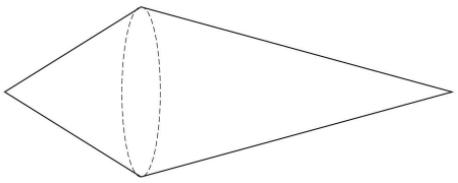
The surface area of X is 176 cm^2

Work out the surface area of Y.

[3 marks]

Q4. (2019)

21 A solid shape is made by joining two cones.
Each cone has the same radius.



One cone has slant height = 2 × radius
The other cone has slant height = 3 × radius

The total surface area of the shape is 57.8π cm^2

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

Work out the radius.

[3 marks]

Answer _____ cm

Q5. (2019)

23 A and B are similar cuboids.

surface area of A : surface area of B = 16 : 25

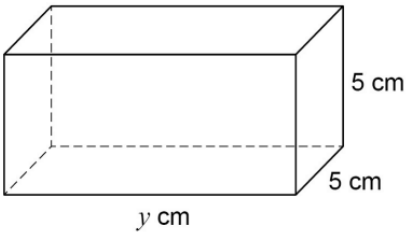
Work out volume of A : volume of B
Circle your answer.

[1 mark]

4 : 5 16 : 25 64 : 125 256 : 625

Q6. (2020)

9 Here is a cuboid.



(A)

9 (a) Assume that the total surface area of the cuboid is 200 cm^2

Work out the volume of the cuboid.

[3 marks]

Answer _____ cm^3

(B)

9 (b) In fact, the total surface area of the cuboid is smaller than 200 cm^2

What does this mean about the volume of the cuboid?

Tick **one** box.

[1 mark]

- ☐ It is smaller than the answer to part (a)
- ☐ It is bigger than the answer to part (a)
- ☐ It is the same as the answer to part (a)
- ☐ It could be any of the above

Q7. (2020)

11 A solid piece of silver has

mass 2.625 kilograms

volume 250 cm^3

Work out the density of the piece of silver.

Give your answer in grams per cubic centimetre.

[2 marks]

Answer _____ g/cm^3

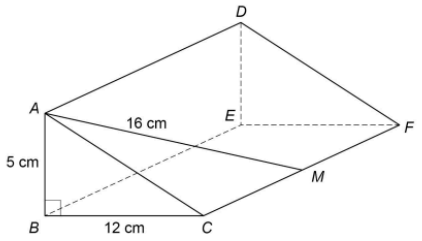
Q8. (2020)

23 Right-angled triangle *ABC* is the cross section of a prism.

AB = 5 cm *BC* = 12 cm

M is the midpoint of *CF*.

AM = 16 cm



Work out the volume of the prism.

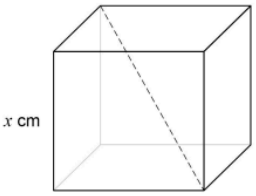
[4 marks]

Answer _____ cm^3

Q9. (2021)

16 Here is a cube with edge length x cm

One diagonal is shown.



(A)

16 (a) Circle the length, in centimetres, of the diagonal.

[1 mark]

$\sqrt{3}\,x$ $\sqrt[3]{3x^2}$ $\sqrt{x^3}$ $\sqrt[3]{3}\,x$

(B)

16 (b) The total length, in centimetres, of the edges of the cube is a multiple of 18

Circle the correct statement.

[1 mark]

x is a whole number | x is not a whole number | x might be a whole number

Q10. (2021)

9 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]

Q11. (2022)

13 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

(A)

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

[4 marks]

Answer _____ cm^3

(B)

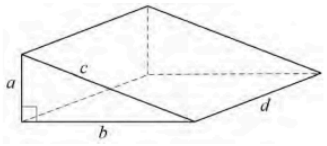
13 (b) The actual cornets that the cafe sells are **similar** to the plastic one.
For the actual cornets, the cone and the hemisphere each have radius 2 cm

How many times greater is the volume of the plastic cornet than an actual cornet?

[3 marks]

Q12. (2024)

25 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