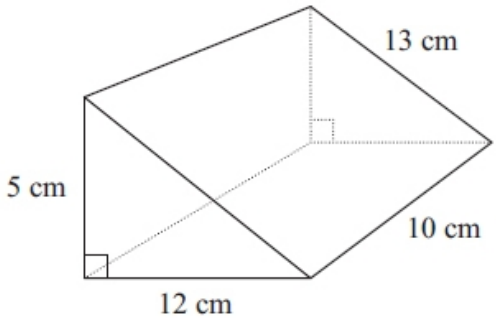
Area and Volume Exam Questions

Q1.



Work out the total surface area of this triangular prism.

Q2. Here is a vase in the shape of a cylinder.

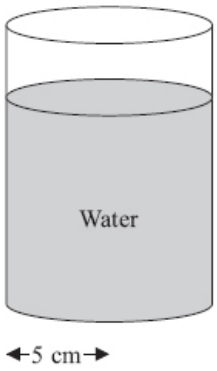


Diagram **NOT** accurately drawn

The vase has a radius of 5 cm.

There are 1000 cm^3 of water in the vase.

Work out the depth of the water in the vase.
Give your answer correct to 1 decimal place.

Q3. The diagram shows a circle drawn inside a square.

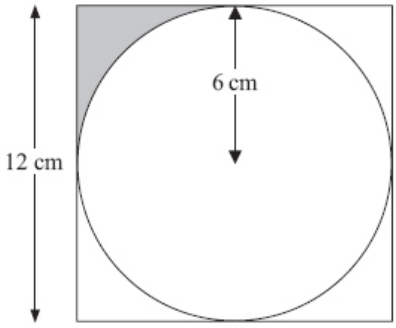


Diagram **NOT** accurately drawn

The circle has a radius of 6 cm. The square has a side of length 12 cm. Work out the shaded area. Give your answer in terms of π.

Q4.

The diagram shows a solid hemisphere of radius 5 cm.

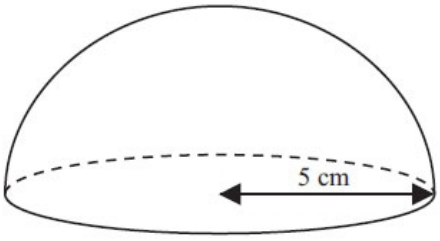


Diagram **NOT** accurately drawn

Find the **total** surface area of the solid hemisphere.
Give your answer in terms of π.

Q5.

A frustum 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 frustum.
Give your answer correct to 3 significant figures.

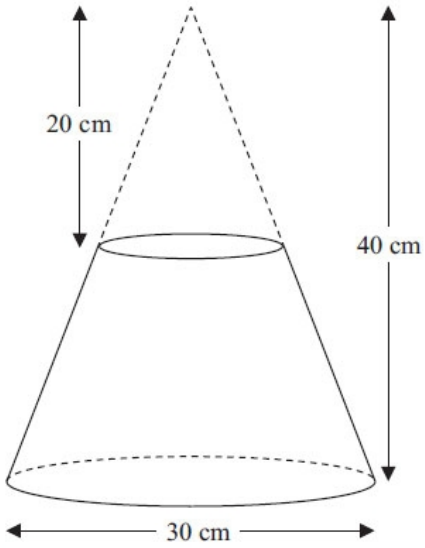


Diagram **NOT** accurately drawn

Q6. Sumeet has a pond in the shape of a prism.

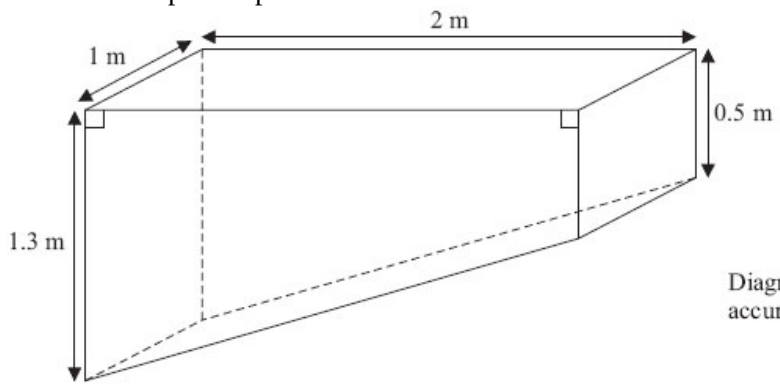


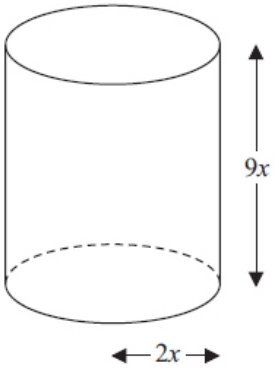
Diagram **NOT** accurately drawn

The pond is completely full of water.
Sumeet wants to empty the pond so he can clean it.
Sumeet uses a pump to empty the pond.

The volume of water in the pond decreases at a constant rate.
The level of the water in the pond goes down by 20 cm in the first 30 minutes.

Work out how much more time Sumeet has to wait for the pump to empty the pond completely.

Q7. The diagram shows a solid metal cylinder.



The cylinder has base radius $2x$ and height $9x$.

The cylinder is melted down and made into a sphere of radius r.

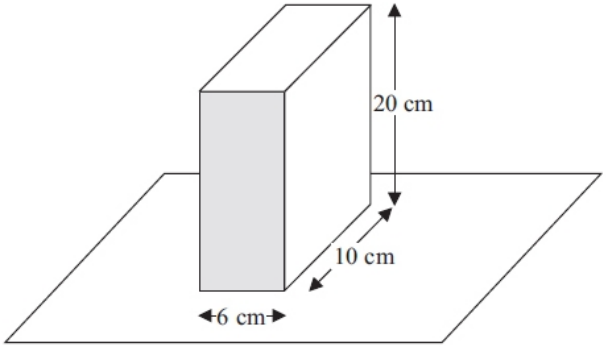
Find an expression for r in terms of x.

Q8. Jane has a carton of orange juice.
The carton is in the shape of a cuboid.

The depth of the orange juice in the carton is 8 cm.

Jane closes the carton.
Then she turns the carton over so that it stands on the shaded face.

Work out the depth, in cm, of the orange juice now.



Q9. Ella is designing a glass in the shape of a cylinder.

The glass must hold a minimum of ½ litre of liquid.

The glass must have a diameter of 8 cm.

Calculate the minimum height of the glass.

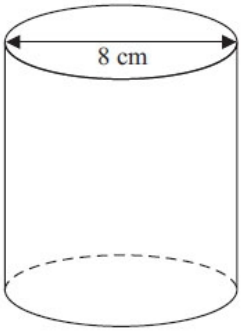


Diagram **NOT** accurately drawn

Q10. * The diagram shows the triangle *PQR*.

PQ = *x* cm
PR = 2*x* cm
Angle *QPR* = 30°

The area of triangle *PQR* = *A* cm^2

Show that *x* = $\sqrt{2A}$

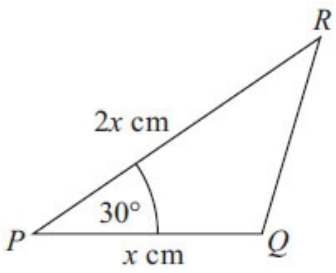


Diagram **NOT** accurately drawn

Q11.

The diagram shows a pyramid.

BCDE is a square with sides of length 10 cm.
The other faces of the pyramid are equilateral triangles with sides of length 10 cm.

(a) Calculate the volume of the pyramid.
Give your answer correct to 3 significant figures.

(b) Find the size of angle *DAB*.

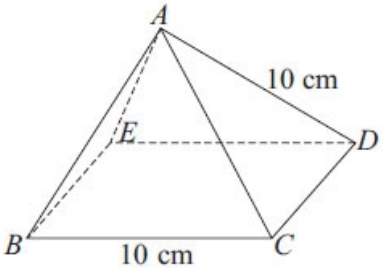


Diagram **NOT** accurately drawn

Q12.

ABCD is a square with a side length of 4*x*
M is the midpoint of *DC*.
N is the point on *AD* where *ND* = *x*

BMN is a right-angled triangle.

Find an expression, in terms of *x*, for the area of triangle *BMN*.
Give your expression in its simplest form.

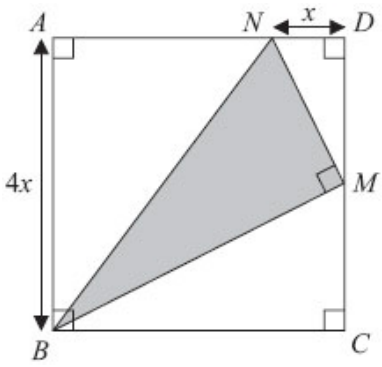
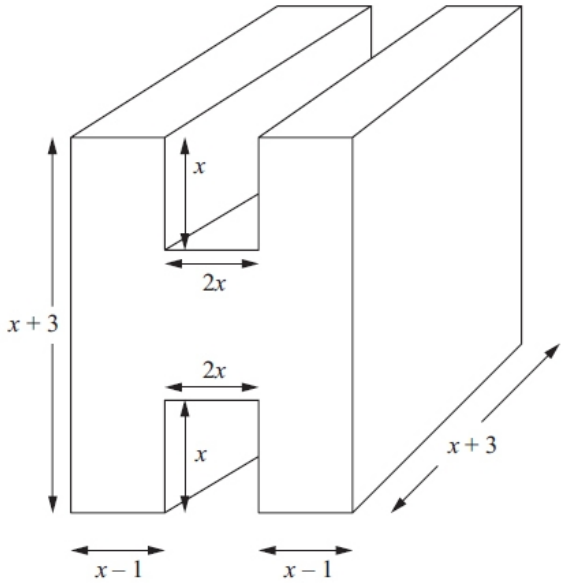


Diagram **NOT** accurately drawn



Q13.

The diagram shows a prism.
All measurements are in cm.
All corners are right angles.
The volume of the prism is V cm^3.

Find a formula for V.

Q14. A water trough is in the shape of a prism.

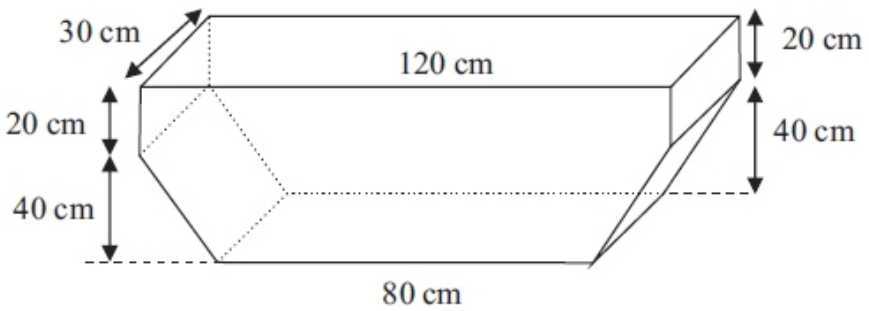


Diagram **NOT** accurately drawn

Hamish fills the trough completely.

Water leaks from the bottom of the trough at a constant rate.
2 hours later, the level of the water has fallen by 20 cm.

Water continues to leak from the trough at the same rate.

How many more minutes will it take for the trough to empty completely?

Answers

1. $360cm^2$
2. 12.7cm
3. $36 - 9\pi$
4. 75π
5. 8,250
6. 1 hour 45 minutes
7. $r = 3x$
8. 4cm
9. 9.95
10. (show that)
11. a) 236 (b) 90
12. $5x^2$
13. $10x^2 + 24x - 18$
14. 200 minutes