

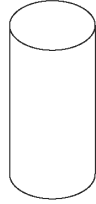
Walking Talking - Volume

1.

Twelve spherical balls, each of diameter 10 cm, are to be packed into containers. There are two types of container available.

Container A

Cylinders: radius 5.5 cm and height 63 cm



Container B

Boxes: cuboids 42 cm by 32 cm by 11 cm



Diagrams not drawn to scale

(a) Calculate the volume of one spherical ball. [2]

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(b) Compare the total volume of empty space when the 12 balls are packed into cylindrical containers, with the total volume of empty space when they are packed into box containers. Assume that the minimum number of containers required is used in each case. [6]

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2.

The sphere and cone below have equal volumes.

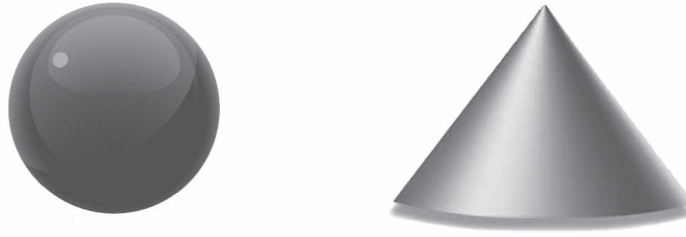


Diagram not drawn to scale

The radius of the sphere is 6.7 cm.

The height of the cone is 10.4 cm.

Calculate the radius of the base of the cone.

Give your answer correct to 1 decimal place.

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3.

A thin hollow container is in the shape of a cylindrical upper part and a conical lower part as shown below.

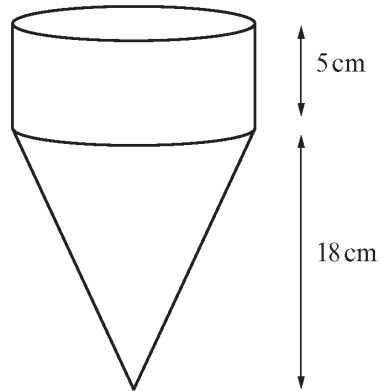


Diagram not drawn to scale

The total capacity of the container is 1244 cubic centimetres.

Calculate the diameter of the cylinder.

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4.

An ornamental garden spike is in the form of a square based pyramid with a cone attached to the centre of its base as shown below.

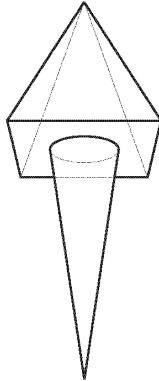


Diagram not drawn to scale

The radius of the base of the cone is 4 cm.
The height of the cone is twice the height of the pyramid.
The volume of the cone is equal to the volume of the pyramid.

(a) Calculate the length of the base of the pyramid.

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(b) The total volume of the spike (cone and pyramid together) is 335.1 cm^3 .

Calculate the total length of the spike (from the tip of the cone to the top of the pyramid).
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5.

A hollow water container is shown below.

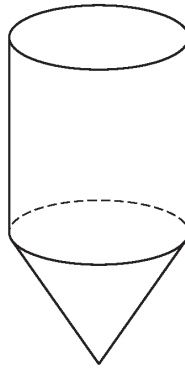


Diagram not drawn to scale

The radius of the circle formed at the join between the cone and the cylinder is 12 cm.
The height of the cylinder is five times the height of the cone.

When full, the container holds 20 litres of water.

Calculate the total height of the container.

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6.

A Christmas decoration consists of a cone resting on a cube.

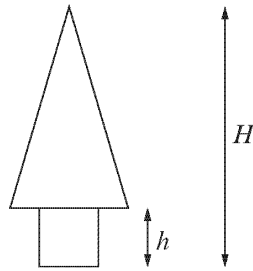


Diagram not drawn to scale

The height of the cube is h cm.
The height of the cone is four times the height of the cube.
The base radius of the cone is equal to the height of the cube.
The volume of the whole decoration is 648.6 cm^3 .

Calculate the overall height H of the decoration.

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7.

(a) Calculate the volume of a sphere with radius 8 cm.

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(b) The volume of a pyramid is one third of the area of the base multiplied by the vertical height.

A pyramid has a rectangular base with length $(3x + 1)$ cm and width x cm and a vertical height of 24 cm. The volume of the pyramid is 192 cm^3 .
Find the dimensions of the base of the pyramid.

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