GCSE - Numeracy and Mathematics Topic: Volume & surface area of a sphere, cone or pyramid	Tier: Higher	Grade: A/A*

Starter:

Find the surface area of a cube with sides measuring 25cm.

What would the volume of this cube be?

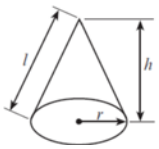
Top Tips!

These formulae are given if you remember to look at the formula list on the first page of the exam paper!

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

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

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



Curved surface area of cone = πrl

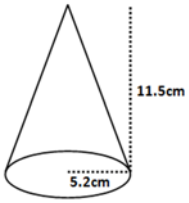
The formula for the volume of a pyramid is not, so you must learn:

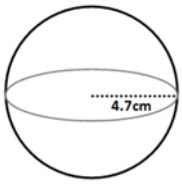
volume of a pyramid = $\frac{1}{3}$ x area of base x height

Remember that a hemisphere is just half a sphere!

Skills:

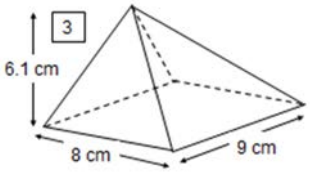
1) Find the volume of the following shapes:





2) Find the surface area of the sphere in Q1.

3) Find the volume of the following pyramid:



Examination Question:

2016 Summer Unitised U1 Higher Q 15

Two solid, identical spheres are attached to the ends of a solid cylinder, as shown below.

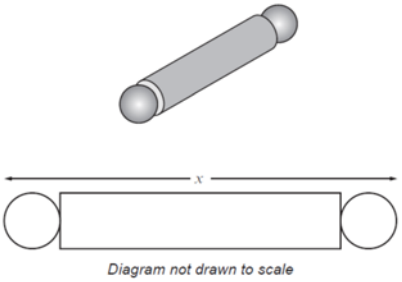


Diagram not drawn to scale

The radius, *r*, of each sphere is the same as the radius of the cylinder.
The length of the cylinder is 9*r*.
The volume of the whole object is 3340 cm^3.
Calculate the total length , *x*, of the object. (6)

Assessment for Learning

Video / QR code

GCSE - Numeracy and Mathematics Topic: Volume & surface area of a sphere, cone or pyramid	Tier: Higher	Grade: A/A*

Starter:

Find the surface area of a cube with sides measuring 25cm.

Area of 1 face = $25^2 = 625cm^2$

A cube has 6 faces that are the same , so the surface area is 625 x 6 = $3750cm^2$

What would the volume of this cube be?

$25^3 = 15625cm^3$

Top Tips!

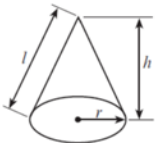
These formulae are given if you remember to look at the formula list on the first page of the exam paper!

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

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

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

Curved surface area of cone = πrl



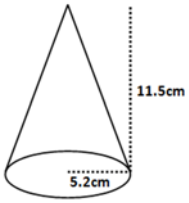
The formula for the volume of a pyramid is not, so you must learn:

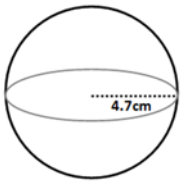
volume of a pyramid = $\frac{1}{3}$ x area of base x height

Remember that a hemisphere is just half a sphere!

Skills:

4) Find the volume of the following shapes:



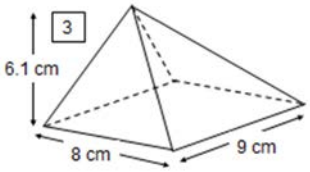


$\frac{1}{3} \times \pi \times 5.2^2 \times 11.5$ $\frac{4}{3} \times \pi \times 4.7^3$

$=325.6cm^3$ $= 434.9cm^3$

5) Find the surface area of the sphere in Q1. $4 \times \pi \times 4.7^2 = 277.6cm^2$

6) Find the volume of the following pyramid:



Area of base = 8x7 = $72cm^2$

Volume = $\frac{1}{3} \times 72 \times 6.1$

$=146.4cm^3$

Examination Question:

2016 Summer Unitised U1 Higher Q 15

Two solid, identical spheres are attached to the ends of a solid cylinder, as shown below.

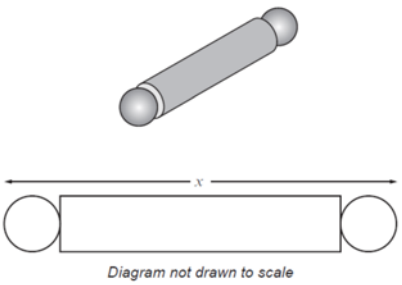


Diagram not drawn to scale

The radius, *r*, of each sphere is the same as the radius of the cylinder.
The length of the cylinder is 9*r*.
The volume of the whole object is 3340 cm^3.
Calculate the total length , *x*, of the object. (6)

Volume of sphere = $\frac{4}{3}\pi r^3 \times 2 = \frac{8}{3}\pi r^3$

Volume of cylinder = area of circle x length

Total volume = $\frac{8}{3}\pi r^3 + 9\pi r^3 = \frac{35}{3}\pi r^3$

$\frac{35}{3}\pi r^3 = 3340$

$\pi r^3 = 3340 \div \frac{35}{3} = \frac{2004}{7}$

$r^3 = \frac{2004}{7} \div \pi = 91.12757 \ldots\ldots$

$r = \sqrt[3]{91.12757 \ldots\ldots} = 4.5cm$

Length of cylinder = 9r

9 x 4.5 = 40.5cm

Length of 2 spheres = 4r

4 x 4.5 = 18cm

Total lengh of object = 40.5 + 18 = 58.5cm

Assessment for Learning

Video / QR code


GwE