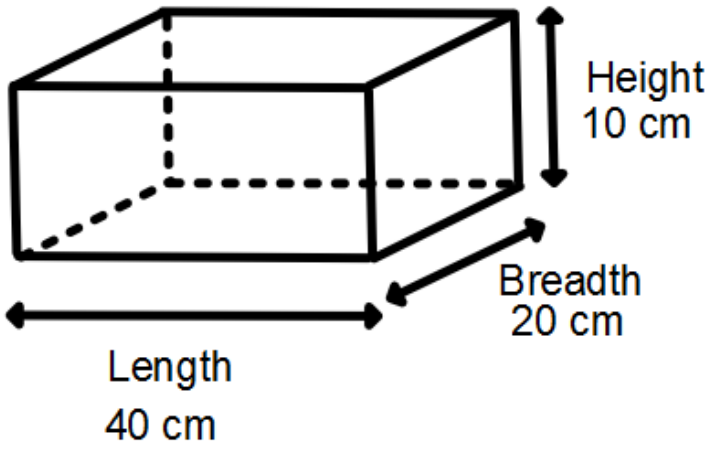
Calculating the Volume of a Cuboid



$1\ cm^3 = 1\ ml$
$1000\ cm^3 = 1\ litre$

Volume of Cuboid = Length x Breadth x Height

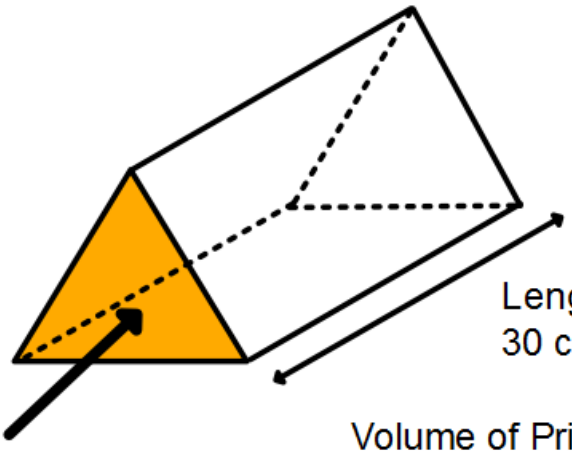
Volume of Cuboid = 40 x 20 x 10 cm^3

Volume of Cuboid = 8000 cm^3

Calculating the Volume of a Prism

A PRISM is any solid shape with two parallel congruent faces (ends) that are usually in the shape of a polygon.

If we know or can find the CSA (cross sectional area) of the prism we can find the volume.



Area
20 cm^2

Volume of Prism = Cross Sectional Area x Length

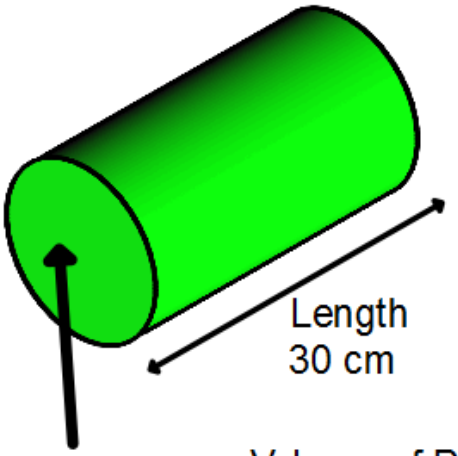
Volume of Prism = 20 x 30 cm^3

Volume of Prism = 600 cm^3

Calculating the Volume of a Cylinder

A cylinder can be thought of as a special prism with circular ends.

So if we are given or can calculate the area of the ends and we know the length we can calculate the volume.



Remember if the area is not given then use

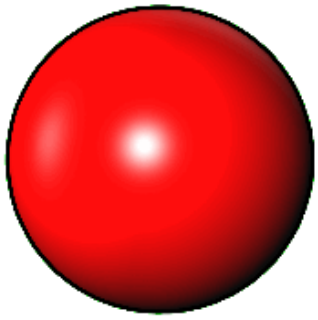
Area of Circle = πr^2

Volume of Prism (Cylinder) = Cross Sectional Area x Length

Volume of Prism (Cylinder) = 20 x 30 cm^3

Volume of Prism (Cylinder) = 600 cm^3

Calculating the Volume of a Sphere



Volume of Sphere = $\frac{4}{3}$ x π x radius^3

Radius = 10 cm

Volume of Sphere = $\frac{4}{3}$ x π x radius (cubed)

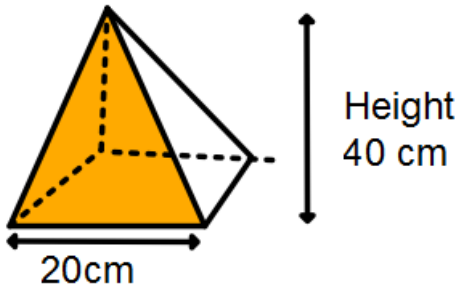
Volume of Sphere = $\frac{4}{3}$ x 3.14 x 10 x 10 x 10

Volume of Sphere = 4186.67 cm^3

Calculating the Volume of a Pyramid

A pyramid is any solid shape with a polygon as its base and triangular sides with a common vertex.

It is possible to calculate the volume of a pyramid as long as we know the area of its base.



Volume of Pyramid = $\frac{1}{3}$ x Base Area x Height

Area of base = L x B

A_{base} = 20 x 20

A_{base} = 400cm^2

$V_{Pyramid} = {}^1/_3 A_{base} \times H$

$V_{Pyramid} = \frac{1}{3} \times 400 \times 40$

$V_{Pyramid}$ = 5333.333...cm^3

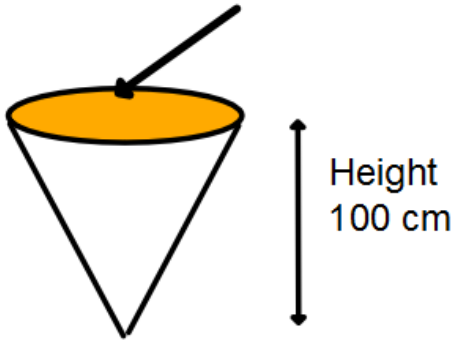
$V_{Pyramid}$ = 5300cm^3 to 2sf

Calculating the Volume of a Cone

A cone can be thought of as a special kind of pyramid - one with a circular base!

We calculate the volume in the same way.

Area of base = 600 cm^2



Volume of Cone = $\frac{1}{3}$ x Base Area x Height

Volume of Cone = $\frac{1}{3}$ x 600 x 100

Volume of Cone = 200 x 100 cm^3

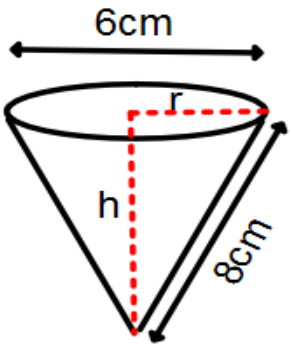
Volume of Cone = 20000 cm^3

Remember if the area is not given then use

Area of Circle = π r ^{2}

Pythagoras and Volume

If we are given the slant height of a pyramid or cone rather than the perpendicular height then we need to use the Pythagoras Theorem to find the height needed.



Create a right angled triangle with the two heights and the radius.

$h^2 = s^2 - r^2$

$h^2 = 8^2 - 3^2$

$h^2 = 55$

$h = 7.4\text{cm}$

$V_{cone} = {}^1/_3 \ \pi \ r^2 \times h$

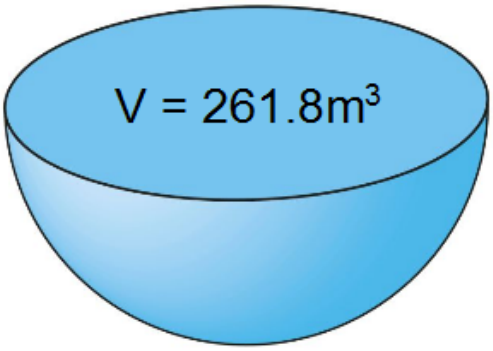
$V_{cone} = 1/3 \times \pi \times 3^2 \times 7.4$

$V_{cone} = 69.896\ldots$

$V_{cone} = 70\text{cm}^2$ to 2 sf

Working Backwards with Volume

Sometimes we know the volume of a shape and need to find a missing dimension.



$V_{hemisphere} = {}^4/_3 \times \pi \times r^3 \div 2$

$261.8 = {}^4/_3 \times \pi \times r^3 \div 2$

$261.8 \times 2 = {}^4/_3 \times \pi \times r^3$

$(261.8 \times 2) \div ({}^4/_3 \times \pi) = r^3$

$r = \sqrt[3]{(261.8 \times 2) \div ({}^4/_3 \times \pi)}$

$r = 5.000\ldots$

$r = 5\text{m}$