UNIT C4 *Volumes* Data Sheets

Data Sheets

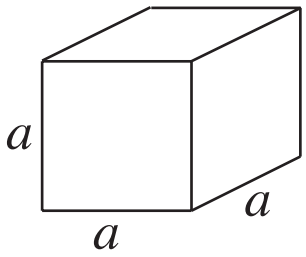
C4.1 Volume of Cube, Cuboid, Cylinder and Triangular Prism
C4.2 Volume: Example 1
C4.3 Mass, Volume and Density
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Data Sheet C4.1 *Volume of Cube, Cuboid, Cylinder and Triangular Prism*

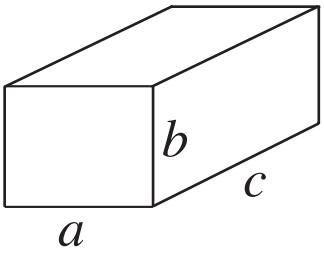
Cube

$$V = a^3$$



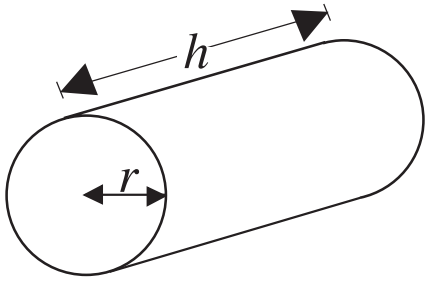
Cuboid

$$V = a\,b\,c$$



Cylinder

$$V = \pi\, r^2 h$$



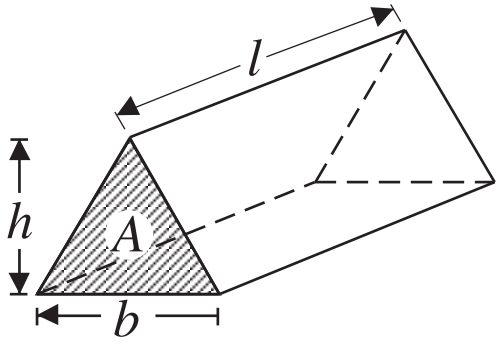
Triangular prism

Either

$$V = A\,l$$

or

$$V = \frac{1}{2} b\,h\,l$$

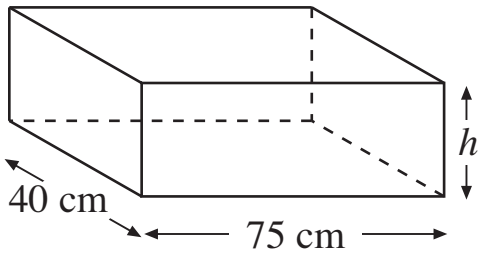


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Data Sheet C4.2

Volume: Example 1

Problem



(a) What is the area, in cm^2, of the base of the tank shown above?

Water is poured into the tank, to a height of 15 cm.

(b) Calculate, in cm^3, the volume of water in the tank.

(c) If the tank holds 84 litres when full, calculate the height, h, in cm, of water when the tank is full.

Solution

(a) Area of base = ☐ cm × ☐ cm = ☐ cm^2

(b) Volume = ☐ cm × ☐ cm^2 = ☐ cm^3

(c) When full, the tank holds 84×1000 cm^3 of water,

so

h cm × ☐ cm^2 = ☐ cm^3

$$h = \frac{\square}{\square} \text{ cm}$$

$$= \square \text{ cm}$$

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Data Sheet C4.3 *Mass, Volume and Density*

$$\text{Mass} = \text{Volume} \times \text{Density}$$

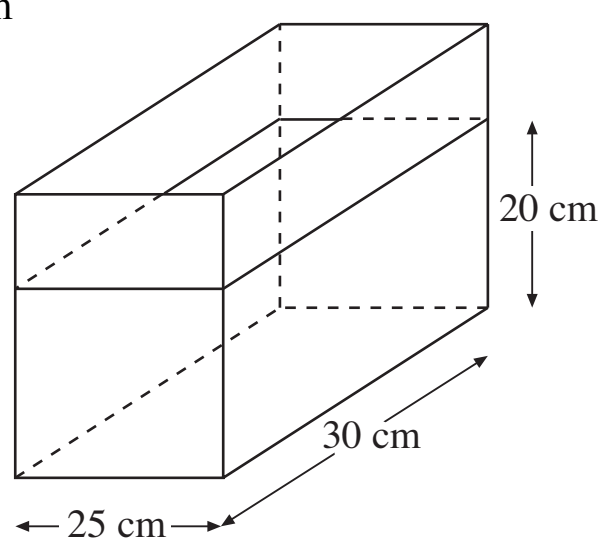
$$\text{Volume} = \frac{\text{Mass}}{\text{Density}}$$

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

Note: Density of water $= 1\ \text{g/cm}^3$

Problem

Find the mass of water in the fish tank.



Solution

Volume, $V = 25 \times 30 \times 20 =$ ☐ cm^3

Mass = Volume × Density

= ☐ × 1

= ☐ grams

= ☐ kg

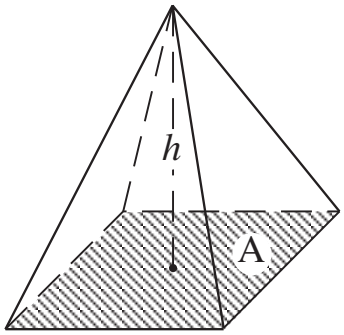
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Data Sheet C4.4 *Volume of Pyramid, Cone and Sphere*

The volumes of a pyramid, a cone and a sphere are found using the following formulae.

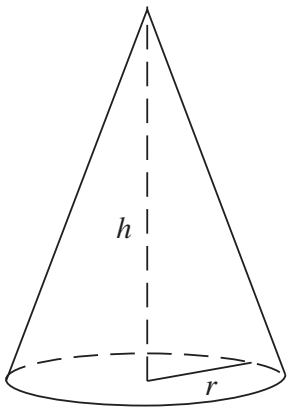
Pyramid

$$V = \frac{1}{3} A h$$



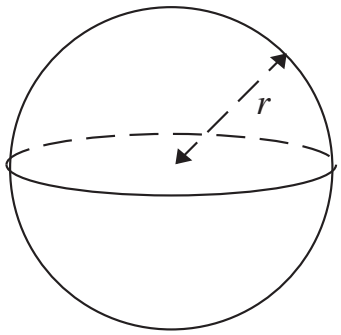
Cone

$$V = \frac{1}{3} \pi r^2 h$$



Sphere

$$V = \frac{4}{3} \pi r^3$$



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Data Sheet C4.5

Volume: Example 2

Problem

A cone and a sphere have the same radius of 12 cm.

If the cone and sphere have the same volume, find the height of the cone.

Solution

If height of cone is h, then

$$\text{Volume of cone} = \frac{1}{3}\pi \times \square^2 \times h = \square\, \pi h \text{ cm}^3$$

$$\text{Volume of sphere} = \frac{4}{3}\pi \times \square^3 = \square\, \pi \text{ cm}^3$$

As the volumes are equal,

$$\square\, \pi h = \square\, \pi$$

$$h = \frac{\square}{\square}$$

$$= \square \text{ cm}$$

So the height of the cone is $\square$ cm.

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Data Sheet C4.6 *Dimensions*

The area of a circle is given by $A = \pi r^2$ where r is the radius of the circle.

(a) What are the dimensions of (i) r and (ii) A ?

(i) r is a length, so its dimensions are $L^{\square}$.

(ii) A is an area, so its dimensions are $L^{\square}$.

(b) What are the dimensions of π ?

The dimensions of the formula $A = \pi r^2$ must be consistent, so

$$[A] = [\pi] \times [r^2]$$

i.e. $L^{\square} = [\pi] \times L^{\square}$

Hence $[\pi] = \dfrac{L^{\square}}{L^{\square}} = L^{\square}$ $\left(= \square \right)$

Thus π has $\square$ dimensions.

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