Density | Revision Booklet

Volume

What is volume?

- The amount of space that an object takes up.

How do we accurately measure volume?

- Beaker
- Dropper
- Graduated cylinder

What is the S.I. unit of volume?

- Millilitres (ml) / centimetre cubed (cm^3)

How do we calculate the volume of a regular shaped object?

- The volume of a regular-shaped object can be found by measuring the length, width and height of the object using a ruler and using the formula: volume = length x width x height

How do we calculate the volume of an irregular shaped object?

- The volume of an irregular-shaped object can be found by finding the volume of liquid that flows from the overflow can into a graduated cylinder.
- Remember a graduated cylinder is designed to be read accurately if the bottom of the meniscus read

Mass

What is mass?

→ The amount of matter inside an object

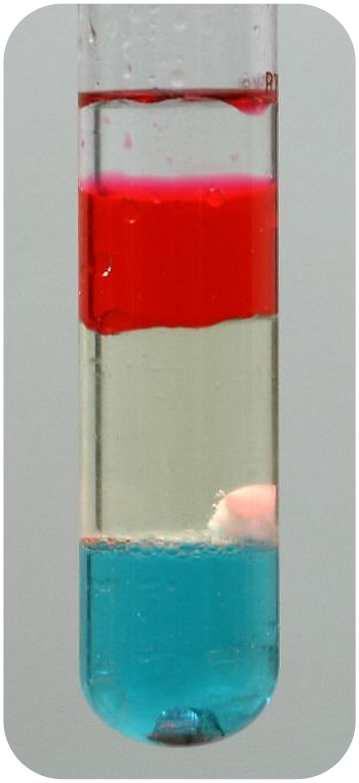
How do we accurately measure mass?

→ Mass balance

What is the S.I. unit of volume?

→ Kilogram (kg)

Introduction to Density



What is density?

→ Mass of 1cm³ of a substance.

Examples:

→ Iron – density = 7.874 g/cm³

→ Polystyrene – density = 1.05 g/cm³

How do we accurately calculate density?

→ Formula: density = mass/volume

What is the S.I. unit of density?

→ Grams per centimetre cubed (g/cm³)

Example 1 – Calculating Density

A dry stone is placed on a balance. The mass is found to be 36g. Using a graduated cylinder of water, the volume of the stone is found to be 12cm³. What is the density of the dry stone?

Solution

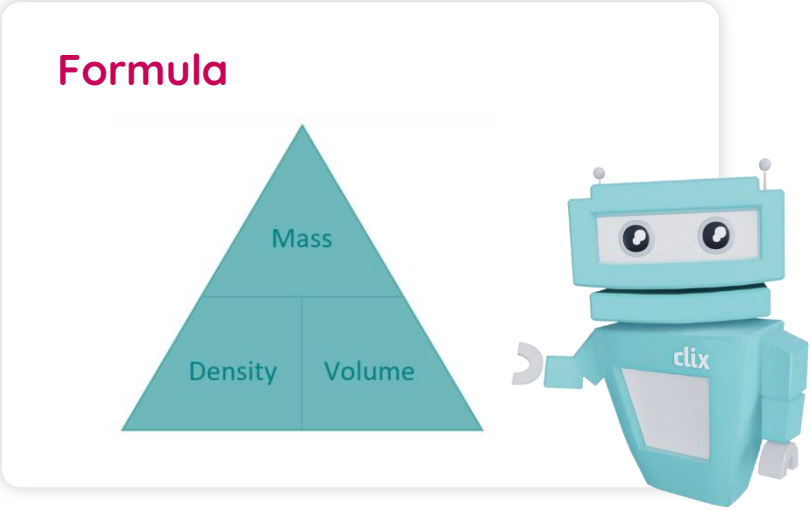
Density = $\frac{Mass}{Volume}$

Mass = 36g

Volume = 12cm³

Density = 36g/12cm³

Density = 3 g/cm³



Example 2 – Calculating Volume

What is the volume of a stone a stone of mass 30g and density 2.5g/cm³?

Solution

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

Mass = 30g , Density = 2.5g/ cm³

Volume = $\frac{30g}{2.5g/cm^3}$

Volume = 12 cm³

Example 3 -Calculating Mass

What is the mass of a piece of metal that has a density of 20g/cm³ and a volume of .5cm³?

Solution

Mass = Density x Volume

Density = 20g/cm³ , Volume = 0.5cm³

Mass = 20g/cm³ =x 0.5

Mass = 10g

Importance of Density

Density can help us predict if something will float or sink in water. The density of water is 1 g/cm3. If a substance has a lower density than water, it will float. For example, oil has a density of 0.93 g/cm3. If a substance has a higher density than water, it will sink. For example, iron has a density of 7.874 g/cm3.

Engineers use the density of objects to design lower density objects. For example, aircraft use metals of low density and the MacBook Air and suitcases are made of low-density components to keep them as light as possible.