

2: Exploring Diversity of Matter by its physical properties

2.1: Why is it important to know the physical properties of the matter?

Metal

- Shiny
- Good conductor of Electricity & Heat
- Can be bent without breaking

Ceramic

- ↳ Clay
- ↳ Poor conductor of Electricity
- ↳ Hard
- ↳ Melt easily
- ↳ Fragile

Main classes of Material

Plastic

- ↳ Lightweight
- ↳ x corrode
- ↳ x melt easily
- ↳ Poor conductor of Electricity & Heat

Fibres

- ↳ Spun into threads
- ↳ Woven into fabric
- ↳ Poor conductor of Electricity & Heat

Glass

- ↳ Transparent
- ↳ Poor conductor of Electricity & Heat
- ↳ Melt easily
- ↳ Fragile

2.2: What are some common physical properties of matter?

Electrical Conductivity

Electrical conductivity : - measure of how easily electric

* Carbon
graphite ↗ low
Diamond

current flows through it
more if
- Ⓛ : - silver / copper / graphite
- Ⓜ : - rubber / plastic

Thermal conductivity

- Thermal conductivity : - measure of how easily heat goes through it
- ☑ : metal
 - ☐ : plastic

Melting point & Boiling point

Melting point : \rightarrow solid state \rightarrow liquid state

Boiling point : \rightarrow liquid state \rightarrow gaseous state

Strength

Strength : \rightarrow ability to support smth without changing its shape permanently

- ☑ : iron + carbon

\Rightarrow steel (metal alloy)

\hookrightarrow 1 main metal

+

metal / non-metal

Hardness

Hardness : \rightarrow resistance to wear, tear & scratches

\rightarrow hard material \rightarrow scratch anything softer than itself

- ☑ : diamond

Flexibility

Flexibility : → ability to bend without breaking
→ return to original shape & size after bending

Density

Density : 密度

↳ mass
volume

2.3 : How do we investigate the density of objects ?

Determining Mass:

Mass : - weight

- SI unit : kilogram (kg)
- other units : g, mg, t

Determining volume :

Volume : - amount of space an object occupies

* units :

- $1\text{ml} = 1\text{cm}^3$
- $1\text{l} = 1000\text{cm}^3$ $100\text{cm} \times 100\text{cm} \times 100\text{cm}$
- $1\text{m}^3 = 1\ 000\ 000\text{cm}^3$

Volume of liquids :

Measure by using : beaker / measuring cylinder
/ syringe / volumetric flask
/ pipette / burette

Volume of solids:

- Regular objects : (E.g: sphere , cube)

↳ use mathematical formula

$$\text{spheres} : \frac{4}{3}\pi r^3$$

$$\text{cylinders} : \pi r^2 h$$

- Irregular objects : ↳ use volume displacement



Putting object in water & measure

* Object : FULLY SUBMERGED in water

Determining length to calculate volume

SI unit of length : m

* other units : - 1 cm = 10 mm

- 1 m = 100 cm

- 1 km = 1000 m

Measuring length :

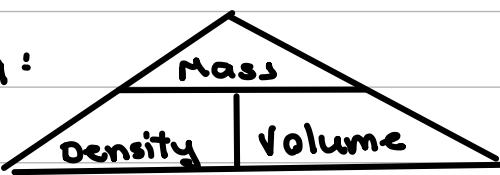
- Measuring Tape: Softer : often seen in tailoring

Hard : often seen for furniture

- Digital calipers : ↳ Measure internal , external diameters & depth of an object

Determining density

Mathematical formula:



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

↳ units : kg/m^3 , g/cm^3

↳ round off to 3s.f.

2.4: What are the effects of different densities ?

Density of an object:
- Float : 密度小于水
- Sink: 密度大于水

!! Every object → diff density !!
(material)

★ The end ★