

# Measurements

## Length

The unit of length is meter (m) and is the distance between two points.

**1 dm** = 1/10 or  $10^{-1}$  m

**1 cm** = 1/100 or  $10^{-2}$  m

**1 mm** = 1/ 1000 or  $10^{-3}$

**1 micrometer** = 1/  $10^6$  or  $10^{-6}$

**1 nanometer (nm)** = 1/  $10^9$  or  $10^{-9}$

**For large distances:**

**1 kilometre (km)** = 1000 m

**1 gigameter (Gm)** =  $10^9$  m = 1 billion metres

**Area of a square** =  $S^2$

**Area of a rectangle** = L x W

**Area of a triangle** =  $\frac{1}{2}$  x base x height

Area of a circle =  $\pi r^2$

Volume = length x width x height

**Note:** Always read the bottom of the meniscus

- The unit of time is measured in seconds
- The unit of energy is joules ( J )

## Scalar and vectors

A scalar quantity has magnitude (size) only. For example:

- Time
- Distance
- Speed
- Mass
- Pressure
- Energy
- Temperature

A vector quantity has both magnitude and direction. For example:

- Velocity
- Weight
- Acceleration
- Momentum

## **Mass and weight**

**Mass:** Is the measure of the amount of matter in it. It can be stated that mass is a measure of the quantity of matter in an object at rest relative to an observer.

The standard unit of mass in **kilograms (kg)**

**Weight:** A gravitational force on an object that has mass. Weight is measured in **newtons (N)**

Gravity is a force that can act through space, that is there does not need to be contact between the Earth and the object on which it acts as it does when we push or pull something.

## **Weight and Gravity**

The weight of an object is the force of gravity acting on it which gives it an acceleration  $g$  when it is falling freely near the Earth's surface.

$$F = ma$$

$$W = mg$$

**Where:**  $m$  is *mass*,  $a$  is the *acceleration due to gravity*, and  $g$  is *gravitational acceleration*.

**Gravitational field strength:** Force per unit mass

## **Density**

**Density** = Mass / Volume

**Density:** The mass per unit volume.

Its SI unit is **kg/ cm<sup>3</sup>**

**Mass** = Volume x Density

**Volume** = Mass / Density

## Extension in springs

