

1) Speed

$$\text{Speed} = \frac{\text{Distance (m)}}{\text{Time (s)}} \\ \text{metres per second (m/s)}$$

Average speed is the total distance travelled/total time taken.

You may need to convert units so remember:

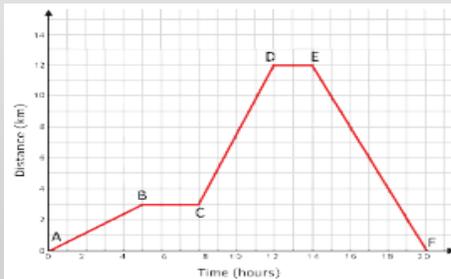
- 1 km = 1000 m
- 1 minute = 60 seconds
- 1 hour = 60 minutes (so 3600 seconds)

2) Distance-Time Graphs

Distance-time graphs can show what is happening to the position of an object.

- **Straight diagonal line** shows the object is moving at a **constant speed**
- The steeper the slope the faster the object is moving, e.g. C-D below is steeper than A-B.
- **Horizontal line** shows the object is **stationary** (not moving).

- A – B constant speed
- B – C stationary
- C – D constant speed
- D – E stationary
- E – F constant speed



- A curve means the object is accelerating or decelerating:



- A – accelerating
- B – constant speed
- C – decelerating
- D - stationary

3) Mass

- Mass is the **amount of matter** an object is made up of.
- Mass is measured in **kilograms (kg)**.
- Mass is not affected by gravitational field strength so the value of mass will stay the same when the location of the object changes.

4) Weight

- Weight is the **force** acting on an object **due to gravity**.
- Weight is measured in **Newtons (N)**.
- Weight **depends on the gravitational field strength** acting on the object so if the location of an object changes, then its weight may change
- **Gravity on Earth = 10 N/kg**

$$\text{Weight (N)} = \text{mass (kg)} \times \text{gravitational field strength (N/kg)}$$

For example: an object on Earth has a mass of 5 kg. The gravity on Earth is 10 N/kg. What is the object's weight?

- Weight = mass x gravitational field strength
- Weight = 5 kg x 10 N/kg
- Weight = 50 N

5) Pressure

Pressure is a measure of **how much force is acting on an area**.

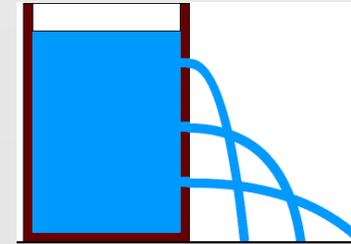
$$\text{Pressure (N/m}^2\text{)} = \frac{\text{Force (N)}}{\text{Area (m}^2\text{)}}$$

Pressure can also be measured in Pascals (Pa) which is the same as N/m².

A **smaller area** will create a **greater pressure** with the **same force** acting on it. For example, if you wear ice skates they have a small area that touches the floor compared with snow shoes which have a larger area so you do not sink.

6) Pressure in Liquids

- Pressure in a liquid is different at different depths.
- **Pressure increases as depth increases.**
- The pressure at a particular depth of a liquid depends upon the **weight (force) of water** above it.



The bottom hole has a greater water pressure as it has more water above it so more weight. This is shown as the water spurts out almost horizontally.

Water pressure is important for deep sea divers and submarines.

7) Pressure in Gases

Pressure in a gas is caused when gas **particles hit the walls of their container**.

- The more often the particles collide with the walls, the higher the pressure.
- If the **temperature** of the gas increases then pressure increases as:
 - Particles have more kinetic energy
 - Particles move faster
 - Particles collide with the walls of their container more frequently
- If the gas is **compressed** then pressure increases as:
 - More particles in a given volume
 - Particles collide with the walls of their container more frequently
- Sometimes the pressure gets so high that the container will burst, e.g. if you put too much air into a balloon or tyre.

