Yr 8 Science P2.3

Section 1- Speed

Speed is how far something moves in a certain time.

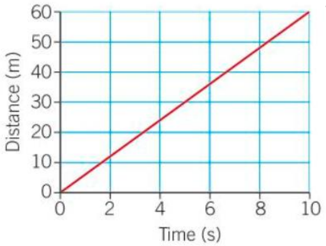
$$\text{speed (m/s)} = \frac{\text{distance travelled (m)}}{\text{time taken (s)}}$$

Speed is measured in **metres per second (m/s)**. Convert distances to metres and time to seconds to get the answer.

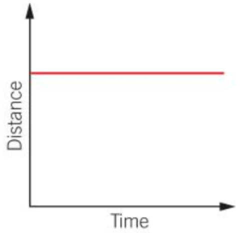
Keyword	Definition
Relative Motion	How fast one object is moving compared to another
Instantaneous speed	The speed at a particular moment
Average speed	The total distance travelled divided by the total time taken.

Section 2 - Motion Graphs

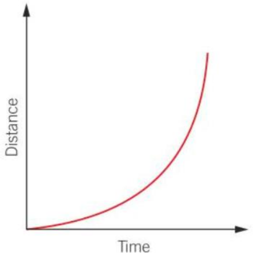
A **distance-time graph** can be used to plot the movement of an object. You can use these graphs to calculate speed, by calculating the steepness of the slope.



This is a simple distance-time graph. The object is moving the same distance every second.

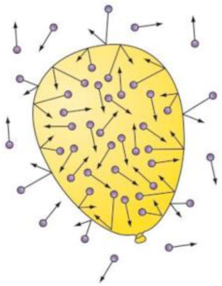


On a distance-time graph the line is horizontal when the object stops. Distance is no longer increasing.



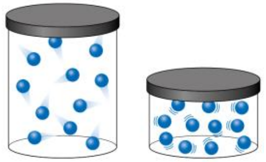
Acceleration tells us how quickly an object is speeding up. The line on a distance-time graph is curved. It is also curved if an object is slowing down.

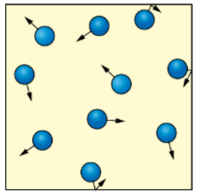
Section 3 - Gas Pressure



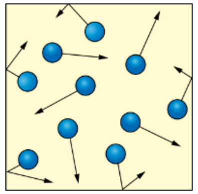
Pressure in gases is created by **collisions** between gas particles and their container. As you inflate a balloon there are more collisions on the inside than on the outside, increased pressure makes the balloon bigger.

This means that decreasing the volume of the container would increase the pressure; as there would be more collisions.





Cool gas, fewer and less energetic collisions.



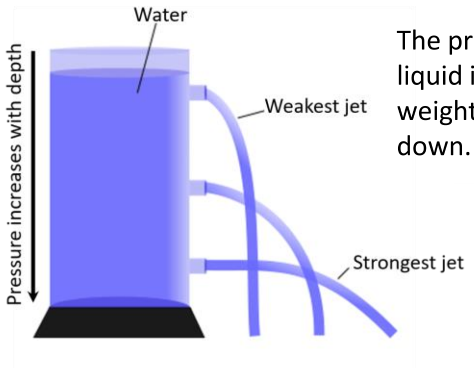
Hot gas, more collisions which are also more energetic.

If you heat a gas, the particles have more energy. This means they will move more quickly and collide with the container more often, so the pressure will increase.

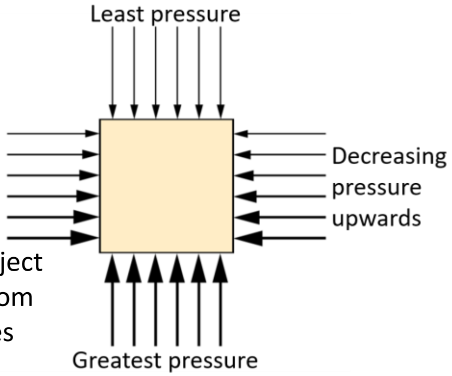
Atmospheric pressure is the pressure acting on us from the air around us. The higher above sea level the lower the air pressure.

Section 4 - Liquid Pressure

Liquids are **incompressible**, all the particles in a liquid are already touching. This means they can pass pressure on. Pressure in liquids acts in all directions.



The pressure at the bottom of a column of liquid is bigger than the top, because of the weight of the liquid molecules pushing down. The pressure increases with depth.



Liquid pressure creates **upthrust.** Liquid particles collide with the bottom of the object pushing it up. If the forces hitting the bottom are greater than the forces hitting the sides and the top, the object floats.

Section 5 - Pressure in solids

Pressure in solids is created by the weight of an object exerting a force on a surface. You can reduce pressure by increasing surface area. Pressure is measured in **newton per metre squared (N/m²)**

Pressure in solids can be calculated using the formula below:

$$\text{pressure (N/m}^2\text{)} = \frac{\text{force (N)}}{\text{area (m}^2\text{)}}$$

For small areas you can use centimetres instead the unit for pressure would be written as newtons per centimetre squared (N/cm²).

Objects	Surface Area	Pressure	Benefit
Football boot studs	Small	High	Increased grip on grass
Snowshoes	Large	Low	Don't sink into snow
Drawing pin	Very small	Very high	Easy to push into a wall

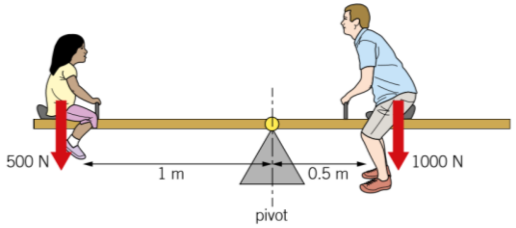
Section 6 -Turning forces

The effect of a turning force is called a **moment**. Turning forces act around a **pivot**.

To calculate moments you use this formula:

$$\text{moment (Nm)} = \text{force (N)} \times \text{perpendicular distance from the pivot (m)}$$

The **law of moments** states that an object is in **equilibrium** when the clockwise moment is equal to the anticlockwise moment.



clockwise moment = force × distance on the right

= 1000 N × 0.5 m

= 500 Nm

anticlockwise moment = force × distance on the left

= 500 N × 1 m

= 500Nm