

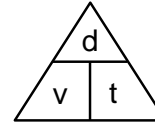


| Key Word | Definition |
|--------------------------|---|
| Speed | Distance Travelled per second Equation symbol: v Units: meters per second (m/s) |
| Distance | Equation symbol: d Units: meters (m) |
| Time | Equation symbol: t Units: seconds (s) |
| Average speed | The average speed calculated between 2 points by experiment |
| Light Gate | Electronic timer |
| Trundle Wheel | Used to measure large distances |
| Force | A push or a pull, can change shape, speed and direction |
| Newtons | The unit of Force (N) |
| Spring balance | The device used to measure a force |
| Resultant Force | The overall effect of multiple forces acting on an object |
| Free Body Diagram | A diagram used to show forces as arrows |
| Unbalanced Force | When the resultant force is <u>not</u> equal to 0N |

Speed Calculations

$$v = \frac{d}{t}$$

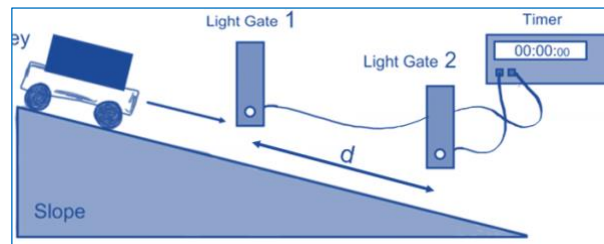
$$\text{speed} = \frac{\text{distance}}{\text{time}}$$



When Answering questions, you must always:

- Write down the information
- Copy the equation from the equation sheet
- Show all working
- Final answer with units and underlined

Average Speed Experiments



Experiment 1 (Above) uses 2 light gates to measure time, and a ruler to measure distance

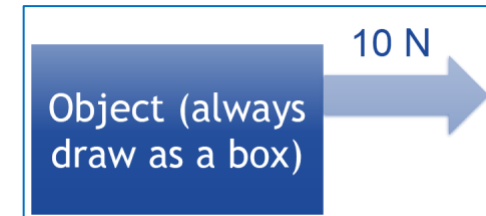
Experiment 2 uses stopwatch to measure time, and a trundle wheel/tape to measure distance

Pros/Cons

- Reliable - Values for t/d are large
- Made accurate by repeating.
- Speed may not be the same for the full distance

Resultant Force

Free Body Diagrams:



If forces are in the opposite directions, subtract them to calculate the resultant force

e.g. $15\text{ N} - 10\text{ N} = 5\text{ N}$ to the Left

If forces are in the same direction, add them together to calculate the resultant force

e.g. $10\text{ N} + 20\text{ N} = 30\text{ N}$ to the Right

Unbalanced Forces

An unbalanced force occurs when there is more force in one direction than the opposite

An Unbalanced force is when the resultant force is not 0 N.

Newtons 2nd Law

When forces acting on car are unbalanced, the car will change speed and/or direction.

If the resultant force acts in the same direction as the car travels, it will increase speed

If the resultant force acts in the opposite direction as the car travels, it will decrease speed

Further Reading

BBC Bitesize Forces (Level 3 and Level 4)



L3



L4



N5

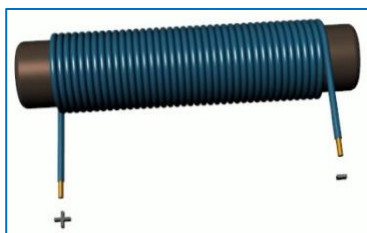
(if your interested)



| Key Word | Definition |
|-------------------------------------|--|
| Balanced Force | When the resultant force is equal to 0N |
| Friction | The force that opposes the motion of an object |
| Mass | The measure of matter in an object Equation symbol: m Units: Kilograms (kg) |
| Weight | The measure of the force due to gravity on an object Equation symbol: W Units: Newtons (N) |
| Gravitational Field Strength | How strong the 'gravity' is on a planet. 10 N/kg on earth |
| Magnetic field | The area around a magnet where magnetic metal will be attracted. |
| Electromagnet | A magnet that can be switched on and off |

Electromagnetic Force

Electromagnetic can be switched on and off
Electromagnets are made by wrapping coils of wire around an iron core and connecting it to a power supply.



Balanced Forces

Balanced forces occur when forces acting on an object are equal and opposite.

A balanced force is when the resultant force is 0 N.

Newton's 1st Law

When forces on a car are balanced it will remain stationary or continue to move at a constant speed in a straight line.

Friction

Friction is a force created when one surface rubs against another.

Kinetic → *Heat*

Friction always acts in the opposite direction to the motion of an object.

| | |
|---------------------------------------|----------------|
| If friction is equal to engine force | Constant speed |
| If friction is less than engine force | Increase speed |
| If friction is more than engine force | Decrease speed |

| Useful | Nuisance | Reducing |
|--|--|--|
| <ul style="list-style-type: none"> • Bike Brakes • Car Tires • Soles of shoes • Rubbing out pencil | <ul style="list-style-type: none"> • Bike chain • Car Engine • Sledge runners • Air resistance • Rope Burns | <ul style="list-style-type: none"> • Lubrication • Reducing the force • Smoothing the surface |

Magnetic Force

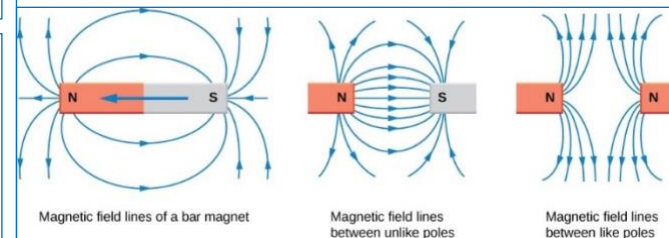
All magnets have 2 poles (ends)

A South pole, and a North pole

North and south poles are attracted to each other, like poles repel each other

Magnets generate a magnetic field

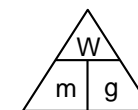
Magnetic field lines show the direction a magnetic metal will move in this field



Mass and Weight

A Gravitational field causes one object (person) to feel a pull to another large object such as planets

$$W = mg$$



Weight = Mass × Gravitational Field Strength

Mass remains constant on all planets.

Weight varies from planet to planet

This is due to the gravitational field strength of different planets. (10 on Earth)