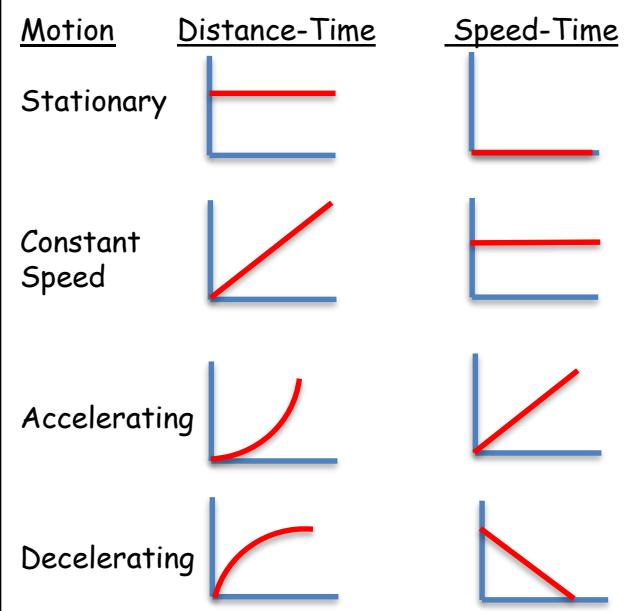


Graphs**Velocity, Acceleration & Weight**

Velocity means speed with a direction.
Units: m/s

Acceleration means the rate of change of velocity. Units: m/s²

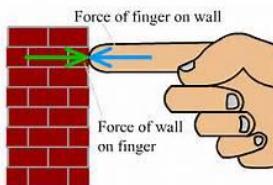
Weight = Mass x Gravity (gravity = 10)
(N)

Forces

Every force has a reaction force which is equal in size, opposite in direction and acts on a different object

Movement

Objects move by applying a force in one direction, the reaction pushes them in the opposite

**Falling Objects**

- When an object is dropped it accelerates as the force of gravity is larger than the force due to air resistance.
- As it gets faster the air resistance increases.
- Eventually the force due to air resistance is equal to the force due to gravity. This is known as terminal velocity.
- At terminal velocity the resultant force is zero.
- The object remains at a constant speed.

Momentum

$$P = m \times v$$

The Law of Conservation of Momentum states that the momentum before an event is equal to the momentum afterwards.

$$P = 0 \text{ kg m/s}$$

$$P = (-20 \times 1) + (10 \times 2) = 0 \text{ kg m/s}$$

**Car Safety**

Stopping Distance = Thinking Distance + Braking Distance

Thinking Distance is the distance travelled before the driver has reacted.

Affected by: Alcohol, drugs, tiredness, age.

Braking Distance is the distance travelled whilst the brakes have been applied.

Affected by: Weather conditions (Ice/Snow), condition of the tyres/brakes, road surface.

Safety Devices - Seat belts, airbags, crumple zones

These devices make the time taken to slow down in the event of a crash longer, which makes the force felt by the driver smaller.

Reaction time

Reaction time for an adult is between 0.2s and 0.9s. It can be tested using a stopwatch.

Springs (Hooke's Law)

When you add a force (weight) to a spring it extends.

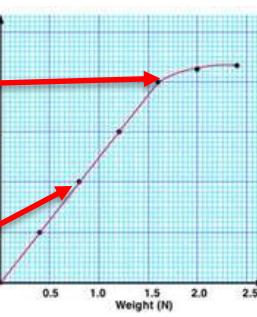
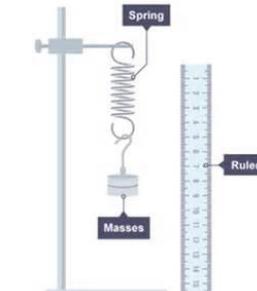
Extension = Stretched length - original length

Force = Constant x Extension
(N) (N/m) (m)

Elastic limit/limit of proportionality.

After this point it is permanently deformed

Proportional (Straight line)

**Moments & Levers (Triple Only)**

Moment = Force x perpendicular distance
If an object is balanced then the clockwise moment is equal to the anti-clockwise moment.

Levers and gears are used to transmit and magnify the force applied.

Pressure in a fluid (Triple Only)

A fluid (liquid or gas) causes a force at right angles to any surface that touches it.

The deeper an object is in a fluid the greater the pressure, this is because there are more particles above it pressing down on it.

The pressure on the underside of a submerged object is greater than the pressure on top, this causes a resultant force = upthrust

