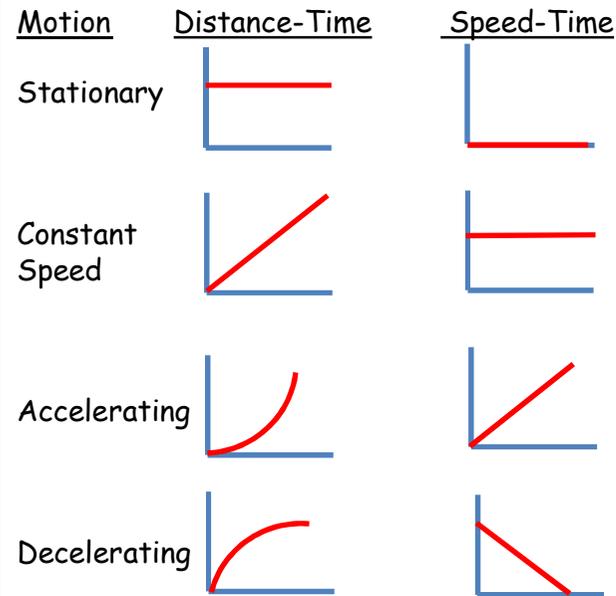


Graphs



Velocity, Acceleration & Weight

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

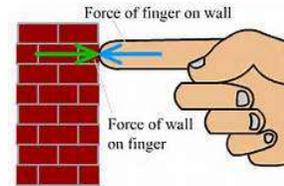
Acceleration means the rate of change of velocity. Units: m/s²

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



Springs (Hooke's Law)

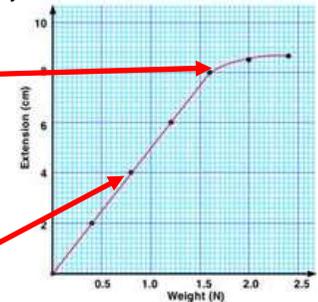
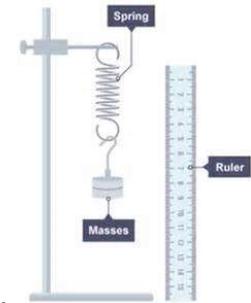
When you add a force (weight) to a spring it extends.

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)



Falling Objects

1. When an object is dropped it accelerates as the force of gravity is larger than the force due to air resistance.
2. As it gets faster the air resistance increases.
3. Eventually the force due to air resistance is equal to the force due to gravity. This is known as terminal velocity.
4. At terminal velocity the resultant force is zero.
5. 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.

$P = 0 \text{ kgm/s}$

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



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.

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

