

YEAR 9 FORCES, PRESSURE & MOMENTS

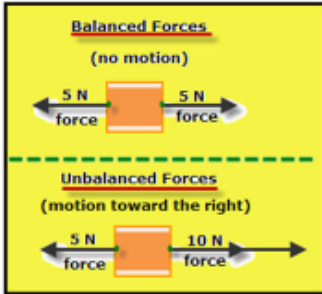
REVISION OF FORCES

- A force is a push, pull or turn.
- A force can change the shape, direction or speed of an object.
- Weight is a force and is measured in Newtons.
- The upward force that acts on things in a liquid is called upthrust.
- Friction occurs when any two surfaces move against each other and tries to stop the movement.
- Drag forces oppose the thrust force and slow the car.
- A thrust force makes the car move forward.

SPEED

- This is the rate at which someone or something moves.
- It can be calculated by finding the time taken to travel a certain distance.
- It is measured in metres per second (m/s).

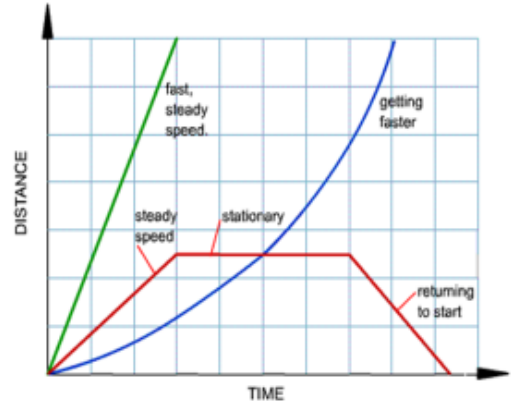
BALANCED & UNBALANCED FORCES



Balanced forces produce no change in movement.

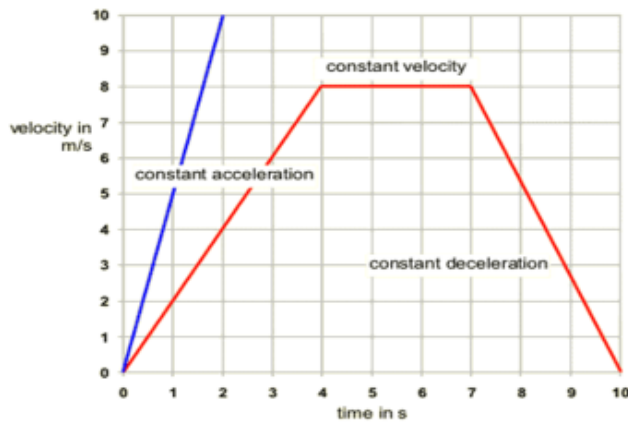
Unbalanced forces change the speed and/or moving objects.

DISTANCE TIME GRAPHS



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SPEED TIME GRAPHS



PRESSURE

- Pressure is the force per unit area.
- Pressure = $\frac{\text{force (in N)}}{\text{area (m}^2 \text{ or cm}^2)}$
- If the area is in m^2 , the pressure is in N/m^2 .
- An elephant will exert less pressure than a person wearing high heels. This is because the weight of the elephant is spread over a larger surface area.

PRESSURE IN LIQUIDS & GASES

- Pressure in liquids and gases act in all directions.
- The particles in the liquids and gases are moving all of the time and are hitting the walls of container or other things they come into contact with causing pressure.
- Gases can be compressed, but liquids cannot be compressed.

Terminal Velocity

- Freefalling object initially accelerate due to gravity, but friction (/air resistance) increases with speed until the forces are balanced (resultant force = 0 N). Then, the object is falling at its **terminal velocity**.

LEVERS & MOMENTS

- Forces can be used to turn objects around pivots. A pivot is also known as a fulcrum. Levers work by magnifying the force that is put in or the distance that it moves.
- A turning force is called a moment.
- Moments are measured in Newton metres (Nm) or Newton centimetres (Ncm).
- When an object is balanced:
the total clockwise moment = total anti-clockwise moment
- This is the Principle of Moments.
- Cranes use the principle of moments. The moment from the load is balanced by the moment from the concrete blocks to stop the crane from toppling over.