

KNOWLEDGE ORGANISER

Changing Speed

If the driving force is bigger than the resistive forces acting on an object, the object will speed up (**accelerate**).

When the driver presses the accelerator in a car, the driving force increases so the car speeds up.



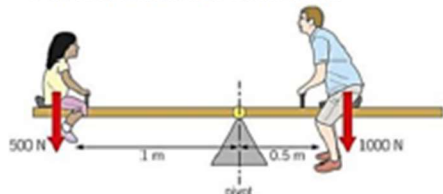
If the resistive forces on an object are larger than the driving force, the object will slow down.

When the person releases their parachute, the force of air resistance is larger than their weight so they will slow down.



TURNING FORCES

- A turning force acts a certain distance from a pivot.
- The turning effect of a force is called a moment.
- **moment (Nm) = force (N) x perpendicular distance from the pivot (m)**
- **Law of moments: total clockwise moment = total anticlockwise moment**
- You can work out if a see-saw is going to be balanced by calculating the clockwise and anticlockwise moments.



Calculating moments:

Clockwise = $1000\text{ N} \times 0.5\text{ m} = 500\text{ Nm}$

Anticlockwise = $500\text{ N} \times 1\text{ m} = 500\text{ Nm}$

The moments are equal; see-saw balances.

- All the weight of an object seems to act through a point called the centre of mass (or centre of gravity). If the centre of gravity is directly above the pivot, there is no turning force.

FLUID PRESSURE

- Gases and liquids contain atoms or molecules that collide with the surface to produce fluid pressure.
- **fluid pressure (N/m^2) = $\frac{\text{force (N)}}{\text{area (m}^2\text{)}}$**
- You increase gas pressure if you squash or heat a gas. The same amount of gas in a smaller volume results in more collisions between air molecules and container walls, so the pressure is higher.

ATMOSPHERIC PRESSURE

- You do not feel the pressure on your body exerted by air as it is cancelled out by the pressure of gases and liquids in your body pushing out.
- Atmospheric pressure near the ground is higher than pressure higher up. This is why mountaineers often take oxygen tanks when they climb.

LIQUID PRESSURE

- Liquids are incompressible; particles are very close and there is very little space between them.
- The pressure in liquids acts in all directions.
- The pressure increases as you go deeper because the weight of the water above you gets bigger.
- Upthrust acts on any object that is floating or submerged in a liquid.
- Two factors that affect the upthrust on a floating object; area and pressure.
- **Why does a rubber duck float?** There are lots more water molecules hitting the bottom of the rubber duck than there are air molecules hitting the top. The water pressure is higher than the air pressure. This produces upthrust that keeps the duck afloat if the area is big enough. The duck floats when upthrust is the same as the weight of the duck.

STRESS: A measure of how much force is applied over a certain area.

- **stress (N/m^2) = $\frac{\text{force (N)}}{\text{area (m}^2\text{)}}$**
- If a force is applied over a smaller surface area (high heels/ studs on football boots) you produce a bigger stress.
- Stresses can break the surface of a material, which produces a scratch.

