

## Year 7 Knowledge Organiser Forces

### Key vocabulary:

**Deformation:** Changing shape due to a force.

**Newton:** Unit for measuring forces (N).

**Resultant force:** Single force which can replace all the forces acting on an object and have the same effect.

**Friction:** Force opposing motion which is caused by the interaction of surfaces moving over one another. It is called 'drag' if one is a fluid.

**Tension:** Force extending or pulling apart.

**Compression:** Force squashing or pushing together.

**Contact force:** One that acts by direct contact.

**Non-contact force:** One that acts without direct contact.

**Field:** The area where other objects feel a gravitational force.

**Fluid:** A substance with no fixed shape, a gas or a liquid.

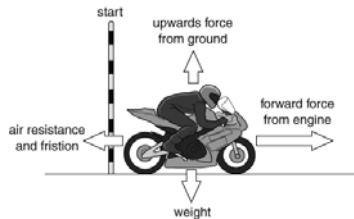
**Upthrust:** The upward force that a liquid or gas exerts on a body floating in it.

**Atmospheric pressure:** The pressure caused by the weight of the air above a surface.

### Unbalanced Forces

**unbalanced forces** on an object:

- a stationary object will start to move
- a moving object will change its speed or direction.



### Mass & Weight

Mass is the amount of substance in an object measured in kilograms (kg). Weight is a force caused by gravity pulling on the mass. The newton (N) is the scientific unit used to measure forces, and so it is also used as the unit weight.

Wherever you take an object, its mass will not change but its weight depends on the force of gravity. An object on the Moon would have a smaller weight than on Earth.

### Gravity and gravitational fields

Gravity is not as strong on the Moon because the Moon has a much smaller mass than the Earth. If you went to the Moon your mass would not change, but your weight would be less than on Earth because the Moon's gravity is weaker.

**Gravity** is the force of attraction between two masses. The force of gravity is stronger if:

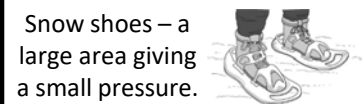
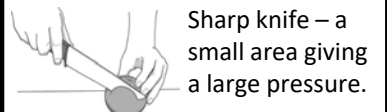
- the objects have large masses
- the objects are close together.

On Earth, gravity pulls on every kilogram of mass with a force of about 10 N.

$$\text{weight (N)} = \text{mass (kg)} \times \text{gravitational field strength (N/kg)}$$

### Pressure

**Pressure** is the amount of force pushing on a certain area. For a certain area, the bigger the force, the bigger the pressure. For a certain force, the bigger the area, the smaller the pressure.



$$\text{pressure} = \text{force} \div \text{area}$$

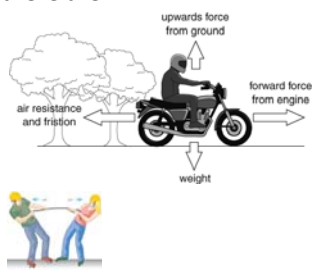
**Pressure in fluids:** Both gases and liquids are fluids. Fluids can flow. Pressure in fluids acts in all directions. The particles in fluids are moving all the time and hitting the walls of containers and other things they come into contact with. The force of the collisions causes pressure, which acts in all directions.

**Floating and sinking:** You can decide if something will float by working out its density, and the density of the fluid. If the density of the object is less than the density of the fluid, it will float. The density of water is 1 g/cm<sup>3</sup>, so objects with densities less than 1 g/cm<sup>3</sup> will float in water.

### Balanced forces

**Balanced forces** are forces on an object that are the same size but work in opposite directions. If forces are balanced:

- a stationary object stays stationary
  - a moving object continues to move at the same speed and in the same direction.
- If there are



### Measuring Forces

**Elastic** materials will stretch with a force and then return to their original shape when the force is taken away. Springs are elastic. The extension of a spring is the difference between its original length and its stretched length.

The extension of a spring is **proportional** to the force on it. This is called **Hooke's Law**.

If the spring is stretched too far, the extension stops being proportional to the force. If it is stretched even further, it goes beyond its **elastic limit**. The spring will no longer return to its original length when the force is removed.

