

# 7P2 Knowledge Organiser – Forces

## Forces – what are they?

Forces can be a push or pull. The unit for measuring a force is the Newton (N). When a force is exerted on an object it can:

- Change the speed of an object
- Change the direction of movement
- Change its shape

Some forces are contact forces, meaning they have to touch another to exert a force, whereas others are non-contact forces.

## Frictional forces

Whenever objects move against another it feels frictional forces. This acts in the opposite direction to movement. Sometimes friction can be useful, for example between bike wheels and brakes to slow the bike. Other times it can be unhelpful. One good example is air resistance, which is caused when an object moves and hits the molecules in the air. To avoid the slowing effect of air resistance, engineers may try to streamline vehicles.



## Gravity – weight vs. mass

Gravity is a force which attracts objects towards each other. The gravitational pull of an object only becomes noticeable when the object has a lot of mass, e.g. a planet. Gravity is closely related to weight: the force acting on an object due to the pull from gravity. Meanwhile mass is the amount of matter in an object. This is not a force and will not change if the object is transported to other planets.

	Weight	Mass
Force?	Yes	No
Unit.	N	Kg
Change on different planets?	Yes	No

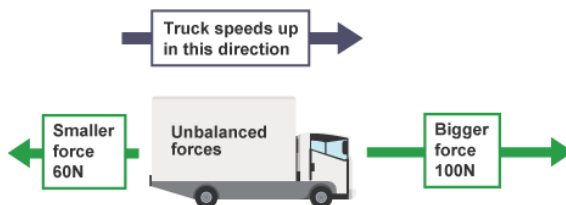
## Balanced and unbalanced forces

When two forces acting on an object are equal in size but in opposite directions, these are balanced.

- Stationary objects stay still
- Moving objects continue at same speed/direction

When two forces are not equal in size, they are unbalanced forces:

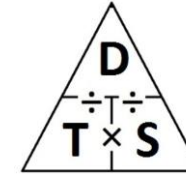
- Stationary objects move in the direction of the resultant force
- A moving object changes speed/direction in the direction of the resultant force



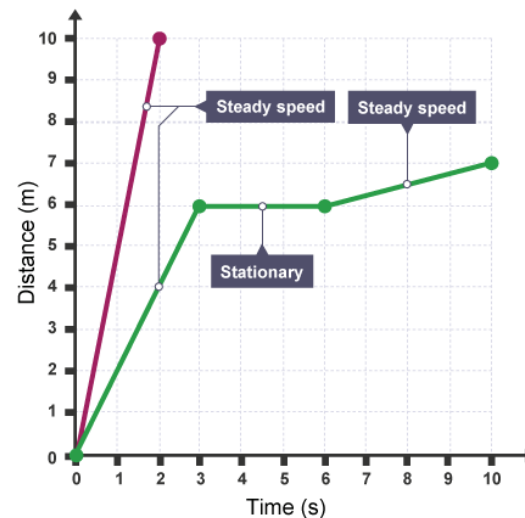
## Motion

The speed of an object is how fast or slow it is. To find average speed:

$$\text{Average speed} = \text{distance} \div \text{time}$$



The standard units we use in physics is **m/s** however these may change; for example if you are measuring the speed of a snail or the speed of a plane.



A distance-time graph is a way to represent the motion of an object. It shows the distance moved from a starting point over time. The gradient of the line is equal to the speed. The steeper the gradient the faster the object is travelling.

## Floating

Objects float in water when their weight (downwards force) is balanced by the upthrust (upwards force) from the water.

