

What is a force?

We cannot physically see forces, but you can often see what they do. Forces can change the **speed** of something, the **direction** it is moving or even its **shape**. An object does not move when the forces acting on it are balanced.

Water Resistance

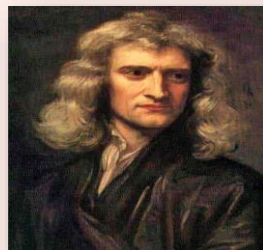
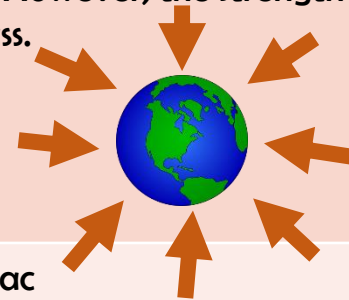
Water resistance is the force responsible for making it difficult for us to move through the water. It acts between a moving object and the water molecules around it, slowing the object down.

Water resistance is a type of friction.



Gravity

Gravity is the force that means that objects are pulled towards the centre of the Earth. All objects exert a gravitational pull. However, the strength of an object's gravitational pull depends on its mass.



It wasn't until 1666 that Isaac Newton first mathematically described the force of gravity, creating Newton's laws of universal gravitation.



Mass is a measure of the amount of 'stuff' inside an object, and is measured in kilograms (kg).

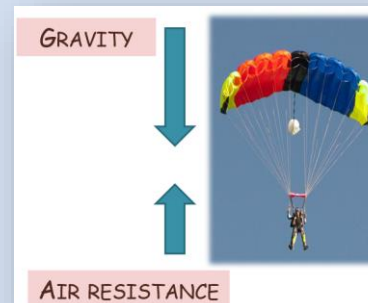
Weight is a measure of the strength of gravity acting on an object. It is measured in newtons (N) with a newton meter.

Air Resistance

On Earth some objects fall faster than others, not because of gravity but because of air. As an object falls, air particles push against the object. This slows it down. We call this pushing force by the air 'air resistance'. Air resistance is a type of friction.

Galileo Galilei (1564-1642) was an Italian scientist and mathematician who investigated this idea.

Sometimes, air resistance is not helpful and we know that objects with larger surface areas create more air resistance. Being more streamlined means that we reduce the surface area so we can reduce air resistance



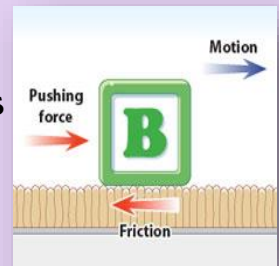
Friction

Friction is a force between two surfaces that are sliding, or trying to slide, across each other.

Friction always works in the direction opposite to the direction in which the object is moving, or trying to move. Friction always slows a moving object down.

There are 3 main factors that will influence the total amount of friction:

- The roughness of the surfaces
- The weight of the object
- The surface area



The study of friction is called tribology

Mechanisms

A mechanism is a device which takes an input motion or force, and outputs a different motion and force.

The point of a mechanism is to make the job easier to do, they do this by allowing a smaller force to have a greater effect. The mechanisms most commonly used in mechanical systems are:

Pulleys



Levers



Gears

