

Forces

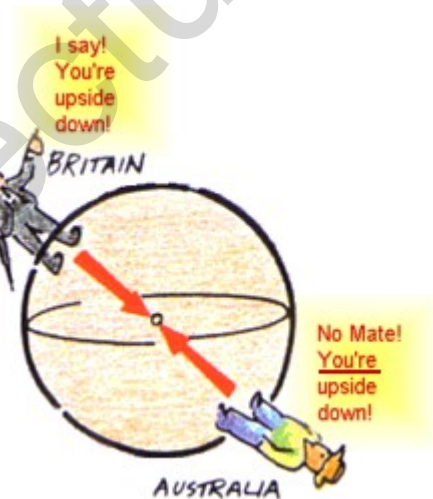
A force is a push or a pull. We measure forces in "Newtons" (N)
named after [Sir Isaac Newton](#) (1642 - 1727).

1 Newton isn't a very big force: it's about the **weight of an apple**.
Forces are vectors, because the direction is important.

Forces can change:-

- the **speed** of an object
- the **direction** that an object is moving in
- the **shape** of an object.

Gravity



is a force that acts **towards the centre of the Earth**.

This means that, wherever you are in the world, "down" is always towards the ground - even though your "down" isn't the same direction as anybody else's.

The gravitational pull of the Earth is what gives objects **weight**.
Thus **weight is a force** - it's how hard the Earth is pulling on an object.

The Earth pulls on every kilogramme with a force of ten Newtons.
We say that the Earth's gravitational field strength (at ground level) is **10 Newtons per kilogramme** (10 N/kg)(Actually, it's more like 9.81, but for GCSE we usually call it 10.)

In other words, an object with a mass of 1kg has a weight of 10N.

Newton's First Law,

says that if the **forces** on an object are **in balance**, the object's **speed** and **direction** of motion **won't change**.

(In other words, if you leave it alone, it'll carry on doing whatever it was doing already.)

If the forces on an object are in balance, then the object's velocity is constant.



This means that if it's not moving, it'll stay still; or if it is moving, it'll continue in a straight line at a constant speed .

Here is a picture of a parachutist, descending **at a constant speed**.

- What forces are acting?
- What can you say about the **size** of the forces?



Newton's Third Law,

says that every **action** has an equal and opposite **reaction**.

In other words, when you push or pull something, it pushes or pulls back at you. Forces are two-way affairs, they're about the way that objects affect each other.

For example, you're **pushing** down on your chair with a force of, maybe, 500N, and the chair is pushing **back** with a force of 500N.
The forces are **balanced**, and as you're already sat still, you stay that way.



Mega Lecture