

Non-contact forces

Acting at a distance

A gravitational force acts on a diver jumping off a diving board. It is a **non-contact force**. There are other types of non-contact force. Magnets exert a **magnetic force** on magnetic materials or other magnets without touching them. If you rub a balloon you can pick up bits of paper with it. This is an electric or **electrostatic force**. Magnetic and electrostatic forces are non-contact forces.

Quick question

Identify three forces that act at a distance.

Force fields

In physics a **field** is a special region where something experiences a force. There is a magnetic field around a magnet where magnetic materials experience a force. There are gravitational fields where things with mass experience a force. The further away from the mass, magnet, or charge, the field gets weaker. **Contact forces** only act when the objects are touching each other. Non-contact forces act at any distance, even if the objects are not touching.

Weight and mass

Weight is a force so it is measured in newtons (N). **Mass** is the amount of 'stuff' something is made up of and it is measured in kilograms (kg). You can calculate weight using an equation:

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

On Earth gravitational field strength is about 10 N/kg. This means that, if your mass is 50 kg, for example, then your weight on Earth is:

$$\text{weight} = 50 \text{ kg} \times 10 \text{ N/kg} = 500 \text{ N}$$

Gravitational field strength is different on other planets and stars. Your weight would be different on different planets because g would be different but your mass would remain the same.

Quick question

State the unit of mass and the unit of weight.