

Forces

N4

Effects of Forces

Forces can only be detected by their effects.

They can **change**:

- the **shape** of an object e.g. squeezing plasticine
- the **speed** of an object e.g. kicking a football from rest
- the **direction of movement** of an object e.g. hitting a tennis ball with a racquet.

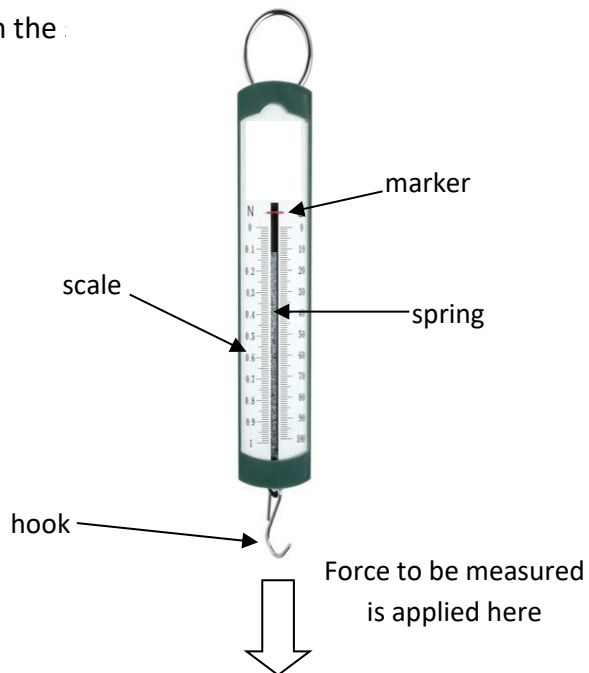
N4

N5

Measurement of Forces

Forces are measured in units called **newtons (N)**. Force is a **Vector** quantity.

Forces can be measured with a newton balance. This instrument depends on the effect of a force on the :



- The force to be measured is applied to the hook which is attached to the spring.
- The force causes the spring to stretch.
- The greater the force, the greater the stretch of the spring and the further the marker moves across the scale.

Friction

N4

Introduction to Friction

Friction is a **resistive** force, which **opposes** the direction of motion of an object. This means that it acts in the **opposite** direction to motion.



Friction acts between any two surfaces in contact.

When one surface moves over another, the force of friction acts between the surfaces and the size of the force depends on the surfaces, e.g. a rough surface will give a lot of friction.

Air friction is usually called **air resistance** or **drag**. It depends mainly on two factors:

- the shape and size of the object
- the speed of the moving object.

Air resistance **increases** as the speed of movement **increases** (as the object accelerates).

N4

Increasing Friction

Where friction is used to **slow** an object down, it should be **increased**.

This can be achieved by:

- choosing surfaces which cause high friction e.g. sections of road before traffic lights have higher friction than normal roads
- increasing the surface area and choosing a shape to increase air friction, e.g. parachute.



Decreasing Friction

Where friction is making movement difficult, friction should be reduced.

This can be achieved by:

- lubricating the surfaces with oil or grease
- separating the surfaces with air, e.g. a hovercraft
- making the surfaces roll instead of slide, e.g. use ball bearings
- streamlining the shape of the object to reduce air friction (aerodynamic teardrop shape).



