

Forces

Knowledge organiser

Year 5

Contact forces

A **force** is a **push** or **pull** that acts upon an object. Forces are all around us, even though we can't see them. They help us move things, change their shape or change their direction. For example, when you kick a ball, you apply a force to make it move.

Contact forces require physical contact between objects to work, such as pulling a rope or pushing a door open.



Pull: When you apply force to move something **towards** you (e.g., pulling a rope in tug of war).



Push: When you apply force to move something **away** from you, like pushing a door open.

Non-contact forces

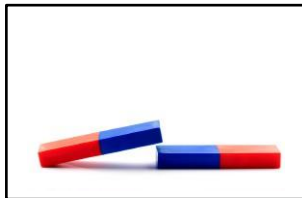
Non-contact forces are forces that can act on objects without any physical contact between them.

This means the objects do not need to touch for the force to act.

Gravity and **magnetism** are examples of non-contact forces.



Attract: Magnets can **pull** certain objects, like iron, **towards** themselves without touching them.



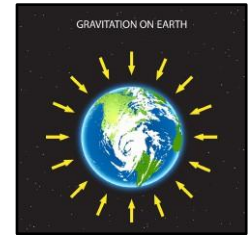
Repel: Magnets can also **push** each other **away** if you try to bring together the same poles.

Gravity

Gravity is a non-contact force that acts between objects, pulling them towards each other. On Earth, gravity pulls everything towards the ground.

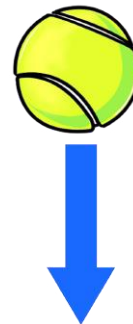


When we throw a ball up into the air, gravity acts between the ball and the Earth. It slows the ball down as it rises, stops it for a moment at its highest point, and then pulls it back down to the ground.



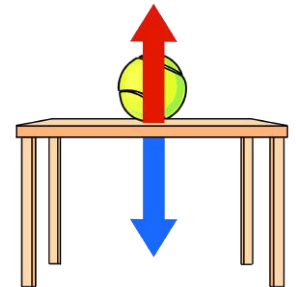
Gravity acts everywhere on Earth, pulling objects towards the ground no matter where you are.

Balanced forces



A ball falls because the force of **gravity** **pulls** it down towards the ground.

When the ball is **supported** and **resting on a table**, it is still being pulled down by gravity, but the table pushes back up with an equal force. When these forces are **balanced**, the ball stays still on the table and doesn't move.

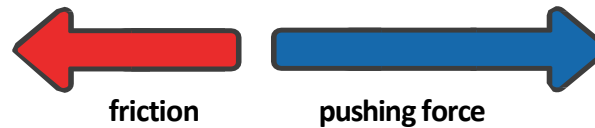


Friction

Friction is a force that happens when two things rub against each other. It tries to **stop them from moving**.

It always works **against movement**. If you push a toy car, the friction between the wheels and the floor will eventually **make it stop**.

Without friction, things would keep moving forever unless something else stopped them.



Smooth surfaces (like ice or polished wood) have fewer bumps, so there's **less friction**. Things can slide more easily.



Rough surfaces (like sandpaper or a carpet) have lots of tiny bumps. These bumps catch on each other, creating **more friction** and making it harder to slide things.



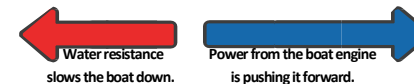
Air resistance

Air resistance is a **frictional force** that slows objects down as they move through the air. The weight of an object does not change how much air resistance it experiences, but the **surface area** does. Objects with a larger surface area experience greater air resistance, slowing them down more.



A skydiver can feel the friction of the air slowing them down as they fall. When they open their parachute, the large surface area increases air resistance, slowing the skydiver even more as they fall.

Water resistance



Water resistance is a **frictional force** that **slows** objects down as they move through water. Just like air resistance, water resistance is greater for objects with a larger surface area.

Many animals, such as fish and dolphins, have **streamlined body** shapes that allow them to move more easily and quickly through water by **reducing water resistance**.



Mechanisms

Simple machines help us do work more easily by changing the way **force** is applied. The **mechanism**, such as a **lever, gear or pulley**, is the part that allows us to **lift, move or change the direction** of objects with less effort.

Levers



A **lever** is a **mechanism** made of a rigid bar that turns around a balance point. By placing the balance point in the right spot, you can **use less force to lift a heavier object**. Examples of levers include a see-saw in a playground and scissors.



Gears



Gears are **wheels with teeth that fit together**. When one gear turns, the other gear turns too. This can change the speed and direction of movement, or the amount of effort we need to use. Gears can be used to **make difficult tasks easier**. Gears on bicycles help you to pedal uphill. In clocks, one gear can control all the hands at the same time.



Pulleys



A **pulley** is a **wheel with a groove** for a rope or cable. Pulleys help **lift heavy objects** by **changing the direction of the force** you use.

When you pull the rope, the pulley lifts the object. Pulleys are used in flagpoles (to raise a flag), cranes (to lift building materials), and window blinds.



Newton



Sir Isaac Newton studied forces and how things move. We measure forces with a Newton meter - the unit of force, the newton (N), is named after him. When we weigh an object, we are measuring the force of gravity pulling it down.



Key vocabulary

attract	balance	compare	fair test
force	grip	interpret	machine
prediction	pull	push	repel
rough	smooth	surface	variable

