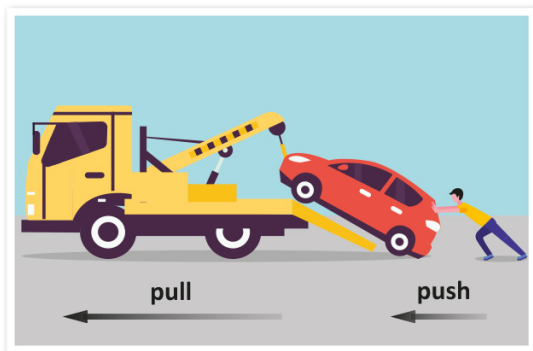


# Mighty Metals

## Forces

A force is a push or pull. Forces cannot be seen, but it is possible to see what forces do. When a force is applied to an object, it can change the object's speed, direction of movement or shape. Some forces are contact forces. This is where objects must be touching each other to apply a force. Non-contact forces, such as gravity and magnetism, act between two objects that are not touching each other. Some forces can be measured in newtons (N) using a force meter.



## Gravity

Gravity is a non-contact force. It pulls objects towards each other. Anything with a mass can pull on another object. The bigger the object's mass, the bigger the gravitational pull. On Earth, gravity pulls everything downwards towards its centre because the Earth has such a large mass. This is why objects on Earth fall to the ground when dropped. The Sun is much larger than Earth, so its gravity causes Earth and the other planets in our Solar System to stay in orbit around it.

## Friction

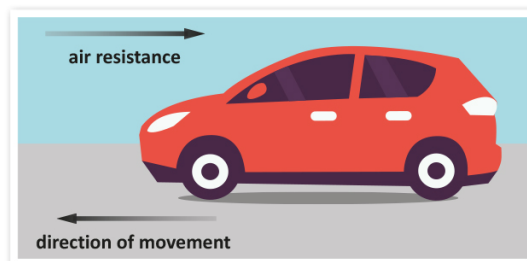
Friction is the force between two surfaces moving across each other. It acts in the opposite direction to movement and always slows down a moving object. Friction is in all places where two surfaces meet, but its force depends on their materials. Normally, smooth surfaces have less friction than rough surfaces. Friction can be a useful force. It keeps our shoes from slipping and stops car tyres from skidding. However, friction produces heat that can cause damage to materials that move across each other.

## Air resistance

Air resistance is a type of friction between air and another material. Parachutes use air resistance in a useful way. Air resistance acts in the opposite direction to gravity, pushing a falling object upwards and slowing down its fall. An open parachute increases the air resistance and slows the fall of a person coming down to land.



Air resistance can also be unhelpful. As a vehicle travels in one direction, air resistance acts in the opposite direction, making it harder for the vehicle to move. Vehicles are designed with streamlined shapes to reduce air resistance and help them to move through the air more easily.

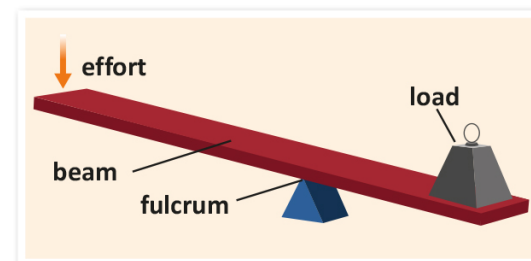


## Magnetism

A magnet is a material or object that produces an invisible magnetic field. A magnetic field causes the force of magnetism that pulls on magnetic materials and attracts or repels other magnets. The two ends of the magnet are where the force is strongest. These are called the north and south poles. Two poles of the same type push each other away, which is called magnetic repulsion. Two opposite poles pull towards one another, which is called magnetic attraction. Earth has a molten metal core made from iron, which produces a magnetic field around the planet and magnetic poles in the north and south.

## Levers

Levers are simple machines that are helpful in everyday life. They can help us to lift heavy loads with less effort. Levers have four main parts. These are the load, effort, beam and fulcrum. Examples of levers include seesaws, scissors, wheelbarrows and fishing rods.



- load** The object being lifted.
- effort** The force that is needed to make the object move.
- beam** The part the force is applied to that lifts the load.
- fulcrum** The point at which the beam pivots.

## Metals

A metal is a solid material, found in rocks. Each metal has different properties but many are strong, tough and hard. Metals can be melted and shaped into different forms, such as screws and cars. They can also be used to conduct electricity and heat. This means they can be used in the home for pans or electric wiring. Some metals, such as iron and nickel, are magnetic. This property makes them useful for motors, computers and headphones. Metals can be mixed to make new materials with different properties. These are called alloys.

## First use of metals timeline

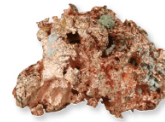
<b>9000 BC</b>	Copper is found and used in western Asia.
<b>6500 BC</b>	Lead is used to make objects in Turkey.
<b>4500 BC</b>	People in western Asia discover how to extract copper from rocks.
<b>4000 BC</b>	Silver is used to make jewellery and early forms of money in Greece and Turkey.
<b>3500 BC</b>	Mining of tin begins in Turkey.
<b>3000 BC</b>	Gold is used as jewellery, statues and death masks in Egypt.
<b>1200 BC</b>	Iron is first used in western Asia to make weapons.
<b>600 BC</b>	High-quality steel is made by metalworkers in India.
<b>500 BC</b>	The Chinese discover how to make hard cast iron in a blast furnace.
<b>1825</b>	Aluminium is extracted from rock for the first time.

## Metals examples

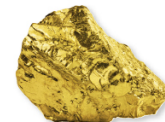
**Aluminium** is one of the most common metals found in the Earth. It is quite soft, strong, light and can be recycled. It is a good conductor of heat and electricity, but it is not magnetic. It is used for many things, including kitchen foil, cans and parts of aircraft.



**Copper** is an excellent conductor of heat and electricity. It is used for wiring and to make pans for cooking. Copper can also be mixed with other metals to make it stronger. In the Bronze Age, copper was mixed with tin to make an alloy called bronze. This was used to make jewellery, swords and knives.



**Gold** is a very rare metal. It is quite heavy but soft and is easy to shape into different forms. When gold is mixed with other metals, like copper or silver, it becomes harder and stronger. It is then used for jewellery and coins. Gold is a very good conductor of electricity and is used inside computers.



**Iron** is a common metal. It is very useful and can be mixed with other metals to make it stronger. Iron is naturally magnetic and can be mixed with carbon to make steel. Iron is also an important mineral for humans, plants and animals. Iron helps the blood to carry oxygen around the body.



## Glossary

<b>air resistance</b>	A force that slows an object down as it moves through the air.
<b>attract</b>	To pull or draw things together.
<b>force meter</b>	An instrument that is used to measure the strength of forces, in newtons.
<b>friction</b>	A force that is created when two surfaces rub against each other. It makes things slow down.
<b>gravity</b>	A force that pulls everything down to the ground on Earth.
<b>mass</b>	A measure of how much matter, or substance, is contained in an object.
<b>mineral</b>	A useful chemical that is formed naturally in the ground.
<b>newton</b>	A unit of measurement used to measure force.
<b>orbit</b>	The path that an object in space takes around another object.
<b>parachute</b>	A piece of equipment made from fabric that a person attaches to themselves to slow their fall from an aircraft.
<b>pivot</b>	A fixed point on which something else turns or balances.
<b>pull</b>	A force that moves something towards a person, animal or object.
<b>push</b>	A force that moves something away from a person, animal or object.
<b>streamline</b>	To shape something so it can move smoothly and quickly through liquids, such as water, or gases, such as air.