'Bringing Learning to Life: No Limits.No Barriers.'

Ocean Academy Poole
an Aspirations Academy
Self-Worth | Engagement | Purpose

Learning Journey Map

Year: **3** Term: **AUTUMN 2**
Subject: S**CIENCE** Topic: **FORCES AND MAGNETS**

Driving Question: How can I clearly report my findings about magnetic force?
Power Skill: **Skill -** I can select the best way to organise and communicate data from an investigation.

National Curriculum Learning Objectives

- compare how things move on different surfaces
- notice that some forces need contact between two objects, but magnetic forces can act at a distance
- observe how magnets attract or repel each other and attract some materials and not others
- compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials
- describe magnets as having two poles predict whether two magnets will attract or repel each other, depending on which poles are facing.

Key Vocabulary

force	push	pull	twist	balanced
unbalanced	friction	rough/smooth	magnetic force	magnetic field
attract/repel	metal	non-magnetic metal	magnetic metals	N.I.C.S

Key Learning

Thinking Point
Where have you seen forces acting before?

What is a force?
A force is a push, pull or twist acting on an object because of the object's interaction with another object. Forces can make objects stop or start moving. Forces make things move. Whenever an object starts to move or moves faster, it is a force making this happen. Forces can also make things stop moving or slow down.

Balanced forces:
If two forces are balanced, it means the forces are the same size but are acting in opposite directions. If two balanced forces are acting on an object, that object will not change its motion. If it is still, the object will stay still or if it is moving, it will continue moving in the same direction and at the same speed.

Unbalanced forces:
When two forces acting on an object are not equal in size, we say that they are unbalanced forces. Unbalanced forces do change the way something is moving. They can make objects start to move, speed up, slow down or change direction.

How much force?
The amount of force needed to push or pull an object depends on the amount of friction or resistance acting on the object. If an object is very heavy (mass), the size of force acting on the object to push or pull will need to be greater. To push an object across a rough, bumpy surface (like a gravel path) would be very difficult. However, if that same object was on a slippery, smooth surface (like an ice rink), less force would be needed to push it across the surface.

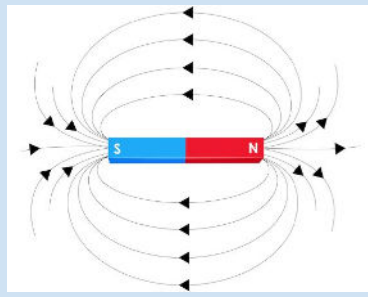
Friction:
Friction is a force that holds back the movement of an object. Friction acts in the opposite direction to the movement of the object.
The amount of friction created by an object moving over a surface depends on the roughness of the surface and the object, and the force between them. For example, if you were riding a bike and stopped pedalling, you would eventually slow down and stop. This is because the friction of the tyres on the surface slows down the motion of the bicycle until it eventually runs out of energy from the force that gave it the forward motion (pedalling). If you were cycling on a particularly bumpy or rough surface, the friction would be greater and the bike would come to a stop sooner than if on a smooth tarmac road.

Thinking Point
Can you think of other examples of friction acting on a moving object?

Explore and Investigate
Friction on a ramp investigation.
Testing which materials are magnetic or not.
Investigating magnetic strength.

Resources:
Friction ramp, measuring tape/metre stick, magnets, variety of metals

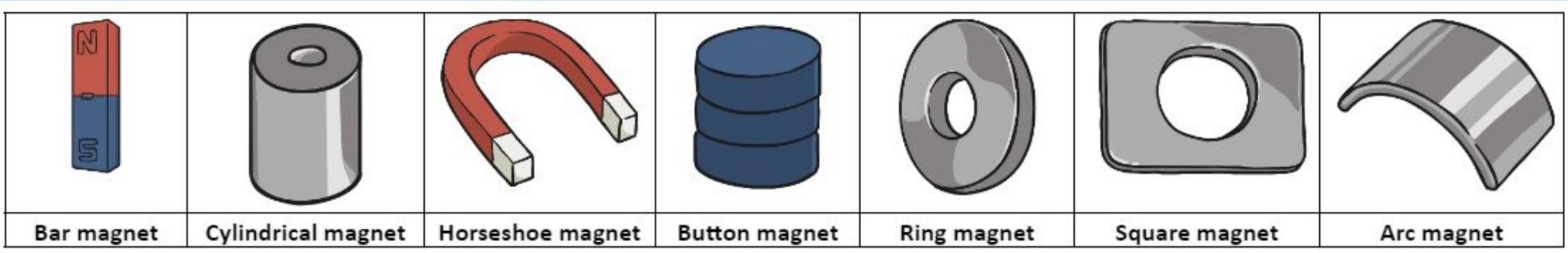
Key Learning



What is a magnet and a magnetic field?

A magnet is a special type of object. It produces an area of magnetic force around itself, called a magnetic field. The magnetic force in a magnet flows from the North pole to the South pole. This creates an invisible magnetic field around a magnet.
If certain materials enter this magnetic field, they will be attracted to the magnet. This will cause the materials to stick to the magnet.

For example, as you move a magnet towards a steel nail, the nail will eventually enter the magnetic field around the magnet, it will 'jump' towards the magnet and stick. The magnetic force within the magnetic field pulled the nail towards it. Therefore, the steel nail is magnetic!
The stronger the magnet is, the larger its magnetic field will be. Therefore, it will be able to attract magnetic objects from further away and hold heavier weights of magnetic objects.
There are lots of types of magnets and they have varying magnetic strength, shape and size:

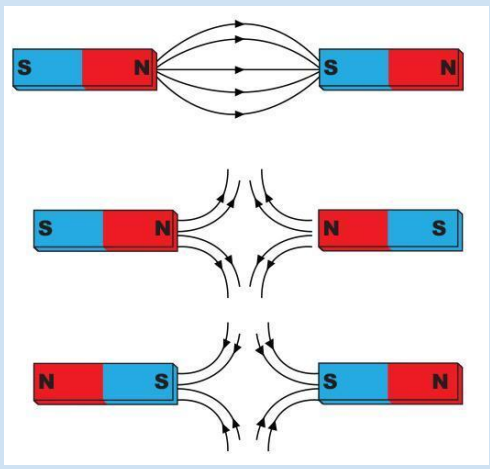


Which materials are magnetic?

Magnetic materials are always made of metal, but not all metals are magnetic.
Iron is magnetic, so any metal with iron in it will be attracted to a magnet. Steel contains iron, so anything made of steel will be attracted to a magnet. Most other metals, for example aluminium, copper and gold, are NOT magnetic.
Metals, which contain iron and are therefore magnetic, are: Iron, cobalt, steel and nickel. A good way to remember this is: 'I Can See Nick'. You can test if a material is magnetic by holding a magnet close to it to see if it attracts or not.

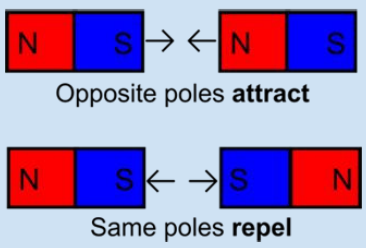
What are magnetic poles?

All magnets, regardless of their shape and size, have two different parts called the poles. There is a north pole and a south pole.
The magnetic force in a magnet flows from the North pole to the South pole. This creates a magnetic field around the magnet. Magnetic force is strongest at the ends of the magnet.



Attract or repel?

Have you ever held two magnets close to each other? They do not act like most objects. Have you noticed that, if you try to push the South poles together, they repel each other? If you try to push the North poles together, they also repel each other. However, if you push the North and South poles together they attract and pull together – with magnets, opposites attract.



Thinking Point

When do you think it is useful to use a magnet?