Science Knowledge Organiser

Forces and Magnets - Year 3

Sticky Learning

What you may already know…	What you are going to know by the end of this learning…
• The shape of some materials can be changed when they are stretched, twisted, bent and squashed. • Know how different toys move. • Know what a force is and be able to explain that a push and pull are types of forces. • That when forces are applied to an object they allow them to move or stop moving. • The strength of the force determines how far and fast an object moves.	Compare how things move on different surfaces Notice that some forces need contact between two objects, but magnetic forces can act at a distance 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

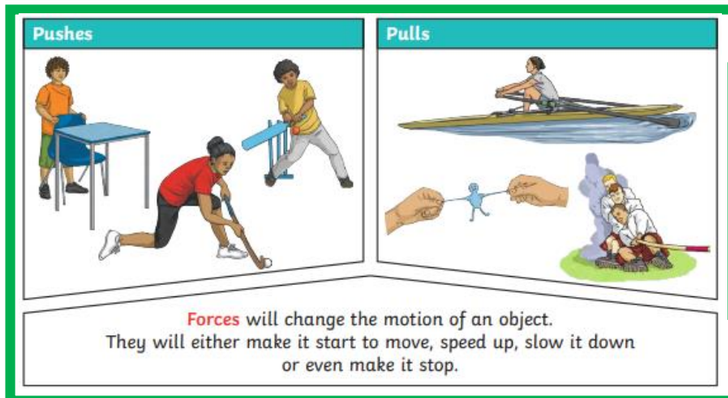
Vocabulary	
attract	If one object **attracts** another object, it causes the second object to move towards it
bendy	an object that bends easily into a curved shape
friction	the **resistance** of **motion** when there is contact between two **surfaces**
force	the **pulling** or **pushing** effect that something has on something else
gravity	the **force** which causes things to drop to the ground
magnet	a piece of iron or other material which **attracts magnetic** materials towards it
magnetic field	an area around a **magnet**, or something functioning as a **magnet**, in which the **magnet's** power to **attract** things is felt
metal	a hard substance such as iron, steel, gold, or lead
motion	the activity of changing position or moving from one place to another
non-magnetic	an object that is not **magnetic**
opposite	**Opposite** is used to describe things of the same kind which are completely different in a particular way. For example, north and south are **opposite** directions
position	The **position** of someone or something is the place where they are in relation to other things
pull	When you **pull** something, you hold it firmly and use **force** in order to move it towards you or away from its previous **position**
push	When you **push** something, you use **force** to make it move away from you or away from its previous position
repel	When a **magnetic** pole **repels** another **magnetic** pole, it gives out a **force** that pushes the other pole away
resistance	a **force** which slows down a moving object or vehicle
squash	pressed or crushed with such **force** that something loses its shape
stretchy	slightly elastic
surface	the flat top part of something or the outside of it
twist	turn something to make a spiral shape

Key Questions

What is a force?
How do forces work?
How do magnets work?

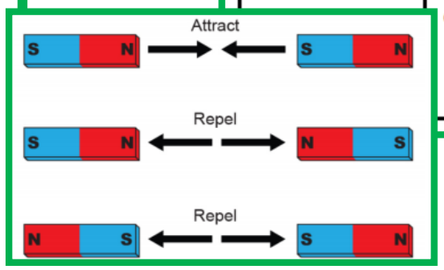
What are forces?

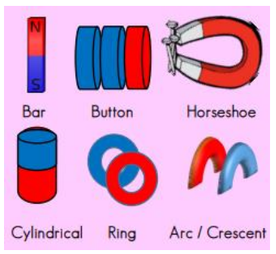
- **Forces** are **pushes** and **pulls.**
- These **forces** change the **motion** of an object.
- They will make it start to move or speed up, slow it down or even make it stop.
- For example, when a cyclist **pushes** down on the pedals of a bike, it begins to move. The harder the cyclist pedals, the faster the bike moves.
- When the cyclist **pulls** the brakes, the bike slows down and eventually stops.



How do magnets work?

- **Magnets** produce an area of **force** around them called a **magnetic field.**
- When objects enter this **magnetic field**, they will be **attracted** to or **repelled** from the **magnet** if they are **magnetic.**
- When **magnets repel**, the **push** each other away
- When **magnets attract,** they **pull** together.





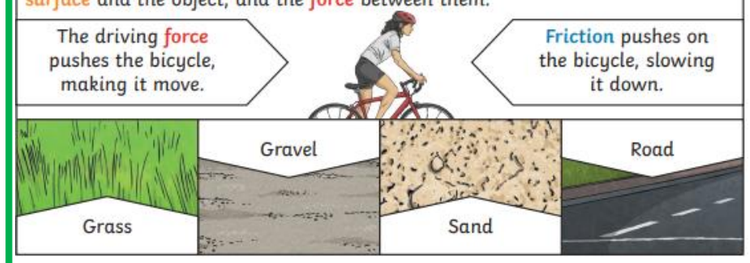
How do different surfaces affect the motion of an object?

- **Forces** act in **opposite** directions to each other.
- When an object moves across a surface, **friction** acts as an **opposite** force.
- **Friction** is a **force** that holds back the **motion** of an object.
- Some **surfaces** create more **friction** than others which means that objects move across them slower.

- On a ramp, the **force** that causes the object to move downwards is **gravity.**
- Objects move differently depending on the **surface** of the object itself and the **surface** of the ramp.

Key Knowledge

Different surfaces create different amounts of friction. 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.



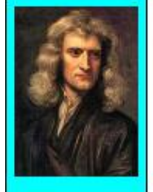
Science Knowledge Organiser

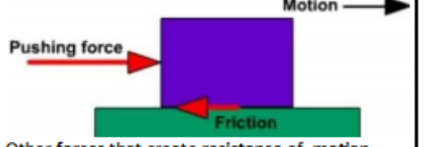
Forces - Year 5

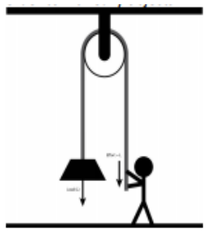
Sticky Learning

What you may already know…	What you are going to know by the end of this learning…
• The shape of some materials can be changed when they are stretched, twisted, bent and squashed. • Know how different toys move. • Know what a force is and be able to explain that a push and pull are types of forces. • That when forces are applied to an object they allow them to move or stop moving. • The strength of the force determines how far and fast an object moves. • Friction is the resistance of motion when there is contact between two surfaces • The force that causes objects to move downwards towards the ground is gravity. • That magnets have poles, and that opposite poles attract, while similar poles repel.	• Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object • Identify the effects of air resistance, water resistance and friction, that act between moving surfaces • Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect • Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird • Describe the life process of reproduction in some plants and animals

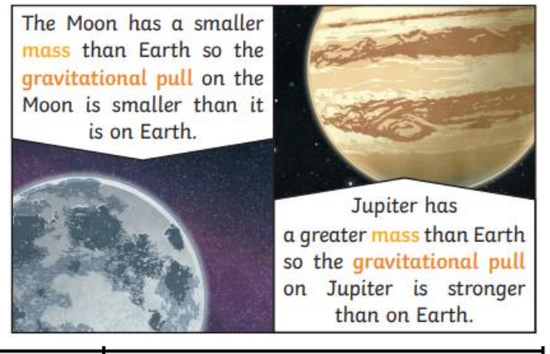
Vocabulary	
forces	a force is the pulling or pushing effect that something has on something else.
physics	the scientific study of forces
gravity	the force which causes things to drop to the ground.
orbit	the curved path in space that is followed by an object going round a planet, moon, or star.
mass	A measure of the amount of matter in an object (measured in grams and kilograms). This stays the same whether you are on Earth or in space (often confused with weight)
matter	The physical part of the universe consisting of solids, liquids and gases
weight	The force of gravity on an object. This changes whether you are on Earth or in space. (Often confused with mass)
friction	the force that makes it difficult for things to move freely when they are touching each other.
air resistance	Air resistance is a type of friction between air and another material (this is sometimes called drag).
water resistance	a force that slows things down that are moving through water
upthrust	an upward push or thrust
buoyancy	the ability that something has to float on a liquid or in the air.
mechanism	a part, often consisting of a set of smaller parts, which performs a particular function.
Fulcrum	The point where a lever turns (also called a pivot)

Galileo Galilei (1564 - 1642) 	Italian scientist Discovered that if two objects of similar shape and size are dropped, they will fall at the same rate.
Sir Isaac Newton (1642 - 1726) 	English mathematician and scientist. Developed Newton's Law of **universal gravitation.** 'discovered' the concept of gravity when sitting under a tree and an apple fell to the ground near him.

What are **forces?**	
	• **Forces** are pushes and pulls. • These **forces** change the **motion** of an object. • They will make it start to move or speed up, slow it down or even make it stop. • For example, when a cyclist pushes down on the pedals of a bike, it begins to move. The harder the cyclist pedals, the faster the bike moves. • When the cyclist pulls the brakes, the bike slows down and eventually stops. • **Friction** is a **force** - it is the **resistance** of **motion** when one object rubs against another.  • Other **forces** that create **resistance** of **motion** include **water resistance** and **air resistance.**



What is **gravity** and air **resistance?**	
	• **Gravity is** the **force** that pulls objects to the centre of the Earth. • Air **resistance** pushes up on the parachute, **opposing** the force of **gravity .** This makes the parachute land more slowly. 



What is water **resistance?**	
	• Water **resistance** is the **friction** that is created between water and an object that is moving through it. • Some objects can move through water with less **resistance** if they are **streamlined.** 

Key Knowledge

Examples of forces in action:

Water resistance and air resistance are forms of friction. Friction is sometimes helpful and sometimes unhelpful. For example, air resistance is helpful as it stops the skydiver hitting the ground at high speed. Friction on a bike chain can make the bike harder to pedal so it is unhelpful.

What are examples of **mechanisms?**	
 lever  pulley  gear  spring	• **Levers** allow us to do heavy work with less effort . For example, trying to pick up a large heavy box is difficult, however if a **lever** is used it becomes much easier to move it. • **Pulleys** also allow us to do heavy work - objects are attached to ropes and **pulley** wheels, and so instead of lifting heavy object upwards, we can pull on the **pulley** rope downwards. • **Gears** are toothed wheels. Their 'teeth' can fit into each other so that when the first wheel turns, so does the next one. This allows **force**s to move across a **surface.** • **Springs** can be stretched by pulling them or squashed by pushing them. The greater the **force** pulling or pushing the **spring,** the greater the force the **spring** uses to move back to its normal shape.