<table>
<tr><th>Year 2 Term Summer 1</th><th>Unit Title: Living things and their habitats</th></tr>
<tr><th>NC Objectives</th><th>Key Knowledge Content</th></tr>
<tr><td rowspan="2">Explore and compare the differences between things that are living, dead, and things that have never been alive.

Identify that most living things live in habitats to which they are suited and describe the habitats.

Identify and name a variety of plants and animals in their habitats.

Describe how animals obtain their food from plants and other animals, using food chains.

Non-statutory notes
Introduce that all living things have characteristics that are essential for keeping them alive and healthy.</td><td>Context of Study
This is the first of four units based on Living things and their habitats, where children will study living things as part of the discipline of Biology. In this unit children will know the differences between things that are living and dead. They will identify and describe habitats for plants and animals as well as describe simple food chains. This unit will next be studied in year 4, 5 and 6. In year 4 children will recognise that living things can be grouped in a variety of ways, explore and use classification keys. In year 5 children will describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird and then in year 6 children will describe how living things are classified into broad groups based on similarities and differences and then be able to give reasons for classifying plants and animals based on specific characteristics.</td></tr>
<tr><td>Knowledge Content
Know that biology is the study of living organisms.

know which items fit into each category:
Living e.g. tree, person, animal, fish, grass
Dead e.g. paper, bunch of flowers, cotton shirt, wooden table
Things that have never been alive e.g. plastic chair, pen, window, stone, metal
Know that living things move, grow, consume nutrients and reproduce
Know that that dead things used to do these things but no longer do
Know that things that never lived have never done these things

Know the acronym MRS GREN
Know the meaning of these terms from this table:

<table><tr><td>MRS GREN</td><td></td></tr></table></td></tr>
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Introduce 'micro-habitat' (a very small habitat, for example for woodlice under stones, logs or leaf litter).

Identify and study a variety of plants and animals within their habitat.

Compare animals in familiar habitats with animals found in less familiar habitats, for example, on the seashore, in woodland, in the ocean, in the rainforest.

Record findings using charts.
Construct a simple food chain that includes humans (e.g. grass, cow, human).

Focus
Classify things by living, dead or never lived.

Know how a specific habitat provides for the basic needs of things living there.

M	Movement	All living things move
R	Respiration	All living things respire
S	Sensitivity	All living things are sensitive
G	Growth	All living things grow
R	Reproduction	All living things reproduce
E	Excretion	All living things excrete
N	Nutrition	All living things need nutrition

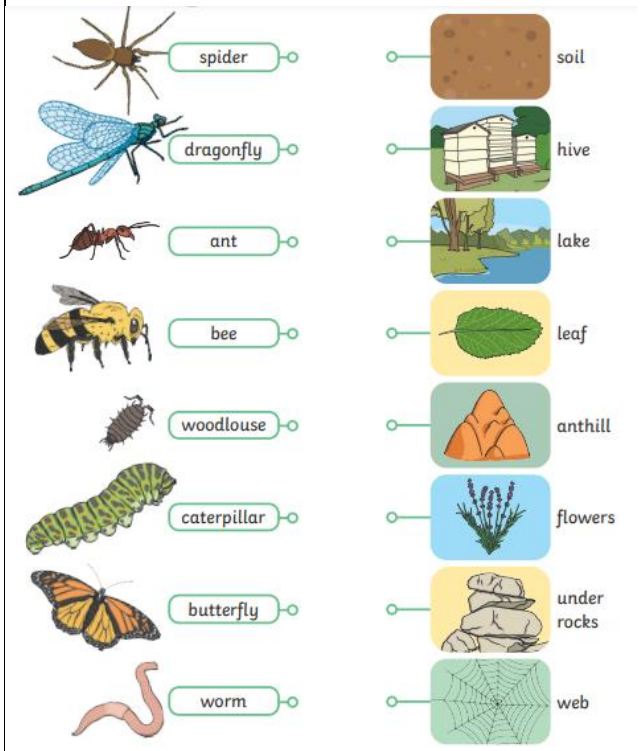
Know that a **species** of animal or plant that is **extinct** no longer has any living members in the world e.g. dinosaurs, **dodo.**
Know that all creatures need **air, food, shelter** and **water** to **survive**.

Know that fish live in the sea/underwater- fish breathe through gills, have fins to swim, swim bladders for buoyancy, eat water insects and other sea creatures e.g. shrimp.

Match living things to their habitat. Name some different sources of food for animals. Know about and explain a simple food chain.	Know that a fox/badger lives in the woodland- they breathe through lungs, has fur for warmth, lives in a den underground, eats creatures found in the habitat e.g. frogs, worms, berries, mice. Know that birds live in trees – birds breathe through lungs, have wings to fly to warmer places **(migrate)** or out of danger, eat worms and slugs found on the ground. Know that animals and plants **survive** in a habitat because of each other. Know that plants and animals live in different places because of their needs. Know the names of these larger habitats and recognise them from photographs: • Ocean • Tropical rainforest • Desert • Woodland • Tundra • Polar ice Know the names of plants in these habitats: • Ocean- coral, seaweed • Rainforest- coffee plant, orchid • Desert- cactus • Woodland- conifer • Tundra- moss • Polar ice- shrubs Know the names of the following mini beasts: • Caterpillar • Spider • Woodlouse • Beetle

- Worm
- Slug
- Bee
- Dragonfly
- Butterfly
- Water boatman
- Pond skater

Know where these mini beasts live:

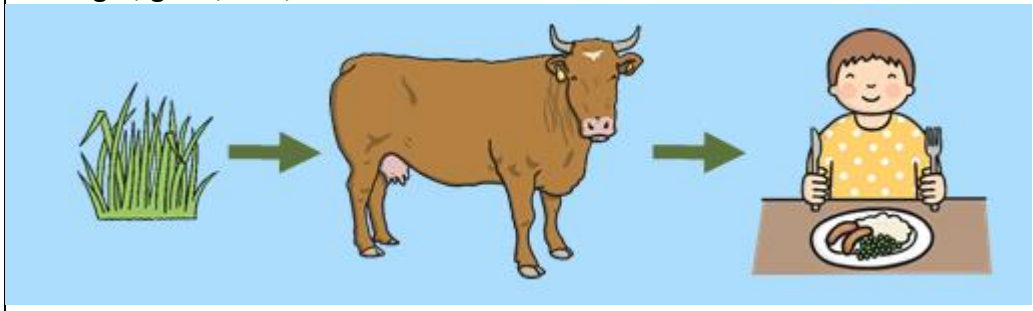


Know that an insect has 6 legs.
Know that a spider has 8 legs and is an arachnid.

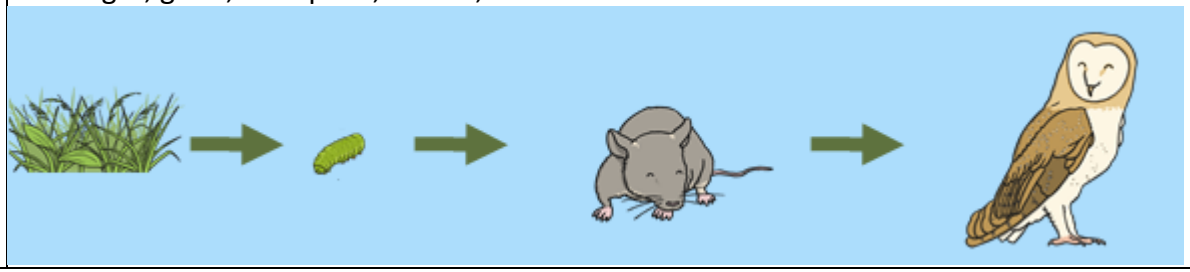
Know that a worm and a slug are not insects.
Know the term microhabitat and that it means a small habitat specific to mini beasts within larger habitats
Know that woodland has many microhabitats - under a log or rock, a leaf pile or under a bush.
Know that a pond is a microhabitat.

Know the terms **omnivore, carnivore** and **herbivore** to describe the eating habits of animals in a food chain.
Know that the arrows on a food chain show the direction that the **energy** travels and means 'is eaten by'.
Know that we use the word **key** to describe the system of sorting animals.
Know the terms: **Energy, Producer, Consumer, Prey, Predator**
Know how to organise and create food chains.

Know the following food chains –
1.Sunlight, grass, cow, human



2. Sunlight, grass, caterpillar, mouse, owl



	WORKING SCIENTIFICALLY Use questions to sort different animals based on their characteristics and habitat. Pupils should look at some habitats and microhabitats in the local area and record their findings.
	STEAM Opportunities -Invite a local gardener in to school to give a masterclass session on planting and caring for seeds and plants -Create clay models or vegetable printing. -Work with school cook to use school produce -Visit a local park or garden centre
	Outcome Topic Test 4 Challenge children to choose a micro-habitat and make it, before placing in it the plants and animals that are found there. They could use either plastic, stuffed animals or make their own from clay or dough.
	Reading Link Once there were giants
	Scientist/Inventor Rachel Carson
Approved Resources	BBC Bitesize Switched on Science CGP

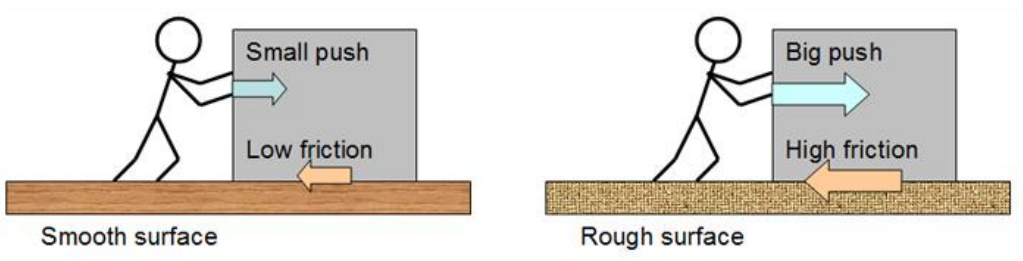
Year 3 Term Spring 1	Unit Title: Forces and Magnets
NC Objectives	**Key Knowledge Content**
Compare how things move on different surfaces. Notice that some forces need contact between 2 objects, but magnetic forces can act at a distance. Observe how magnets attract or repel each other and attract some 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 2 poles	<u>Context of Study</u> This unit is the first of two units where pupils will study forces and magnets, therefore previous knowledge will be limited. It is part of the discipline of **physics**- the study of the processes that shape our world and how we use it. It also links to the discipline of **chemistry**- the study of substances that make up matter. As part of the unit pupils' knowledge will develop of how things move on different surfaces with a focus on the force **friction**. Additionally, pupils will look at magnets and their uses, and what makes **magnetic poles** special, along with the idea that some forces such as magnetic force can act without contact – unlike pushes and pulls, which require direct contact. During this unit pupils further develop their knowledge of everyday materials as they compare and group materials according to whether they are attracted to a magnet, and identify some magnetic materials. Pupils will then build on their knowledge of forces in Year 5, where gravity, air resistance, water resistance will be studied. The knowledge gained in this unit will help pupils understanding of the properties and changes of materials unit in Year 5. <u>Knowledge Content</u> The study of forces and magnetism is part of the discipline of **physics** - the study of the processes that shape our world and how we use it. Know that a force can be thought of as a push or a pull. Know that the very earliest discovery of magnetic materials was in **Ancient Greece.** Know that the word 'magnet' in Greek means **'stone from Magnesia'.** <u>Friction</u> Know that the texture of a surface will affect how another object moves along that surface. Know that smooth surfaces allow things to move quickly but rougher surfaces create a pull that keeps the object stuck there longer.

predict whether 2 magnets will attract or repel each other, depending on which poles are facing.

Non-statutory notes
Observe that magnetic forces can act without direct contact, unlike most forces, where direct contact is necessary (for example, opening a door, pushing a swing).

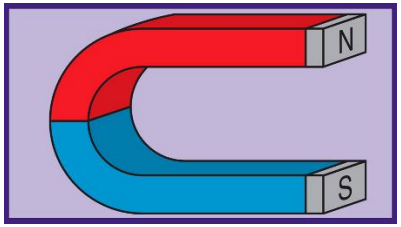
Explore the behaviour and everyday uses of different magnets (for example, bar, ring, button and horseshoe).

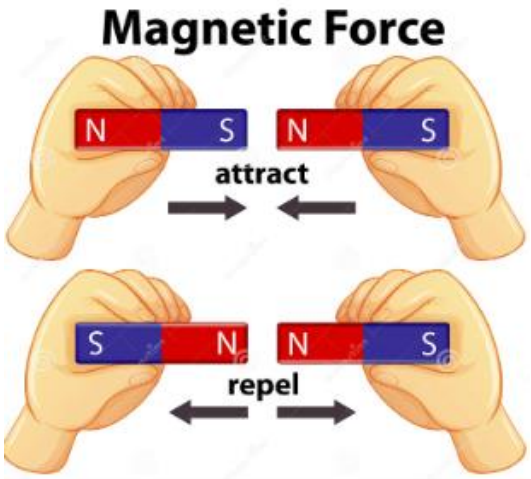
Compare how different things move and grouping them; raising questions and carrying out tests to find out how far things move on different surfaces.

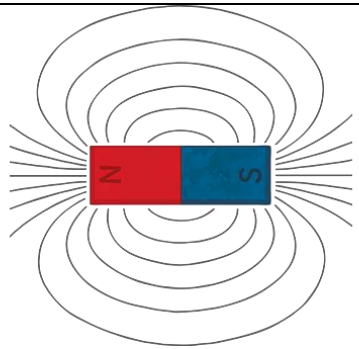


Know that the term **motion** means 'moving from one place to another'
Know that the force between two surfaces rubbing together is called **friction.**
Know that a **balanced** force is when two forces are **equal** and there is no motion.
Know that **accelerate** means to get faster.
Know that **decelerate** means to slow down.
Know that there are also non-contact forces that can act between objects without them touching and that magnetism is an example of a non-contact force.

<u>Magnetism</u>
Know that magnets produce a magnetic force.
Know that a magnet is a piece of **iron** or other material which attracts some metals towards it.
Know that magnets can come in different forms: bar, horseshoe, ring.

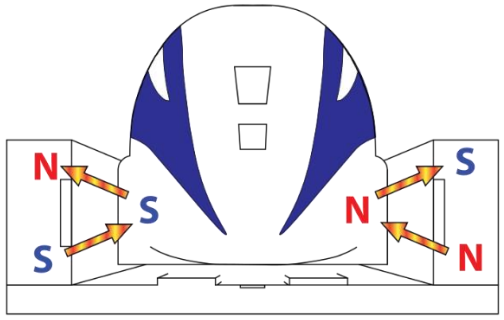


Gather and record data to find answers to their questions; exploring the strengths of different magnets and finding a fair way to compare them. Sort materials into those that are magnetic and those that are not; looking for patterns in the way that magnets behave in relation to each other Identify how properties make magnets useful in everyday items and suggest creative uses for different magnets.	Know that a magnet has two poles - North and South Know that red = North and blue = South. Know that opposite poles attract. Know that same poles repel. Know that **attract** means one object pulling another object towards it. Know that **repel** means one object pushing another object away from it.  Know the rule **'like poles repel, unlike poles attract'.** Know that magnets have a magnetic field around them and that this is the area around a magnet where the magnetic forces work.



Know that magnetic forces can work at a distance and do not need to have contact.
Know that when materials are drawn to magnets this is called **attraction.**
Know that when materials are not drawn to magnets this is called **repulsion.**
Know that when two magnets are close, they create pushing or pulling forces on one another.
Know that forces are strongest at the ends of the magnets.
Know that iron is magnetic, so any metal with iron in it will be attracted to a magnet.
Know that most other metals, like aluminium, copper or gold, are not magnetic.
Know that magnets can only be made out of the metals iron, cobalt and nickel.

Know that magnets are used for many different things today: Compasses, speedometers, fridge magnets and Maglev trains.



	Know the benefits of magnetic materials: sorting through different types of metals, keeping fridge doors sealed, attaching items to whiteboards without damaging them. Examples of how magnets are used:    Know that some 1p and 2p coins are attracted to magnets as they have a thin, copper coating over a steel disc. (Those made before 1992 are magnetic; those made after are not!) Know that most drink cans are made of aluminium and so are not attracted to a magnet. Know that tin cans are attracted to magnets because they have a thin coating of tin over iron. Know what a compass looks like:  Know that: 1. A compass is used to find which direction you are facing. 2. They were invented over 2000 years ago 3. It was often used by sailors and explorers in the past to help find their way

4. The thin metal pin inside is suspended so it can spin freely
5. The pin always points North
6. Now people often use Global Positioning Systems (GPS) rather than a compass
(Recap the 8 points of the compass from Geography)

Know the vocabulary and definitions:

Vocabulary	Definition
Attract:	pull towards
Compass:	a device that aids navigation by pointing to Earth's North and South poles
Contact:	touching
Force:	a push, pull, twist or turn caused when two objects interact with each other
Iron:	a metal that can be made into a magnet
Magnet:	an object or device that attracts iron or another magnetic material
Magnetic:	attracted to a magnet
Magnetic North:	the direction of the Earth's magnetic North pole
Non-contact:	not touching
Non-magnetic:	not attracted to a magnet
Pole:	the area of a magnet where the magnetic force is strongest
Prediction:	what you think might happen in a scientific test

Repel:	push away

WORKING SCIENTIFICALLY

1. Plan an experiment comparing different materials, to see which are magnetic and which are not magnetic.
   Use wood, plastic, rubber, steel, iron, aluminium, glass and rock.
   Record results in a table.

2. Compare how things move on different surfaces using toy cars.
   Inside- carpet, bubble wrap, sandpaper
   Outside- grass, concrete, soil, tarmac
   Record findings in a bar chart (modelled by the teacher).
   Use results to draw simple conclusions.

STEAM Opportunities
- Design and make clay fridge magnets.
- Visit a local secondary school to experience strong magnets.
- Make a video to show how the poles of a magnet attract and repel.
- Research great explorers who used compasses.
- Represent information about magnets, e.g. a newspaper article on Magnes discovering magnetic rock using IT.

Outcome
Topic Test 3
Gripping Surfaces investigation

Reading Link
Iron Man

Scientist/Inventor
Wright Brothers

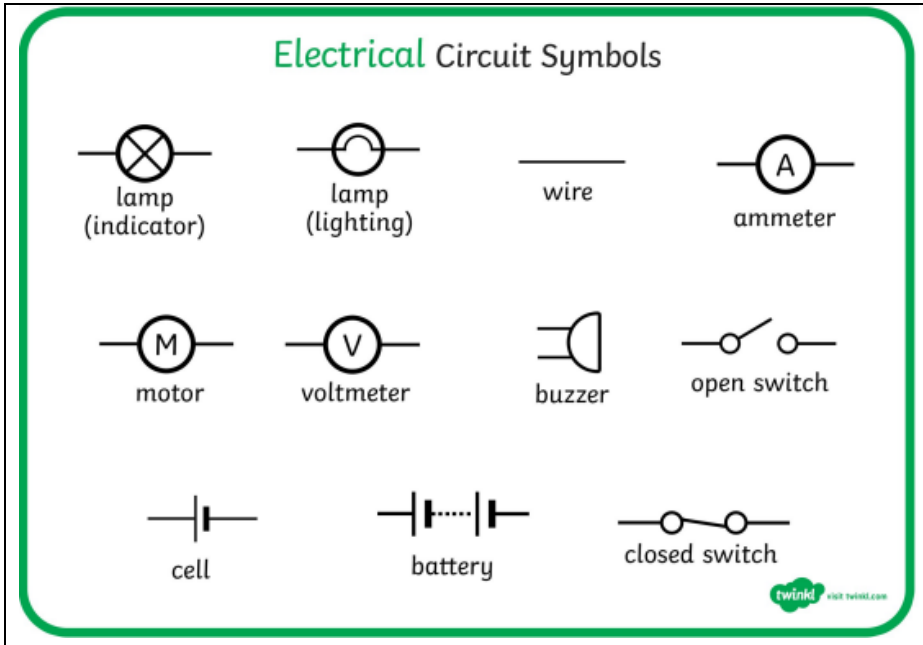
Approved Resources	BBC Bitesize Switched on Science CGP

Year 4 Term Spring 1	Unit Title: Electricity
NC Objectives	**Key Knowledge Content**
Identify common appliances that run on electricity. Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers. Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery. Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit. Recognise some common conductors and insulators,	Context of Study This is the first of two units where children will study electricity as part of the discipline of **physics** - the study of the processes that shape our world and how we use it. Children will have limited prior knowledge before studying this unit. In this Year 4 unit, children revisit some uses of electricity by identifying common **appliances** that run on electricity and the importance of safety before constructing simple circuits where they will identify and name its basic parts. They will also understand how to change a circuit by changing its **components** along with investigating whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery. Children also recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit. Throughout this unit children recognise some common **conductors** and **insulators**, and associate metals with being good conductors. The knowledge acquired in this unit will help pupils to compare and group together everyday materials on the basis of their properties, in terms of conductivity, in Year 5. The second electricity unit is taught in year 6 where children use recognised symbols when representing a simple circuit in a diagram. Children investigate the brightness of lamps or the volume of buzzers with the number and voltage of cells used in the circuit. Children compare and give reasons for variations in how components function.
	Knowledge Content The study of electricity is part of the discipline of **physics** - the study of the processes that shape our world and how we use it. Children already know: -That electricity makes things work. -That you need wires for electricity to work. -That batteries produce electricity. -That electricity can be dangerous. -That batteries are safe to use in the classroom. Know that electricity is the most useful form of **energy**.

and associate metals with being good conductors. Non statutory: Construct simple series circuits, trying different components, for example, bulbs, buzzers and motors, and including switches, and use their circuits to create simple devices. Draw the circuit as a pictorial representation, not necessarily using conventional circuit symbols at this stage; these will be introduced in year 6. Use the terms current and voltage, but these should not be introduced or defined formally at this stage. Pupils should be taught about precautions for working safely with electricity.	Know that mains electricity is produced in **power stations** and carried to houses by overhead power lines. Know that power stations use coal, oil or gas to heat water, produce steam, drive a **turbine** and turn a **generator** to produce electricity.  Video clip: https://www.bbc.co.uk/teach/class-clips-video/primary-science-how-is-electricity-made/zfhfgwx Know that a potato can be used to power a clock.  Know that metals are good **conductors** of electricity. Know that most non-metals do not conduct electricity. They are **insulators**. <u>Appliances</u>

Observe patterns, for example, that bulbs get brighter if more cells are added, that metals tend to be conductors of electricity, and that some materials can and some cannot be used to connect across a gap in a circuit.	Know **appliances** that run on electricity in school and at home and those that do not.  <u>Hazards</u> Know that electricity is dangerous, and know how to be safe using it. Know that **voltage** is the amount of energy delivered by a source of electricity. Know that the voltage of most batteries varies from around 1.5V to 12V. Know that mains electricity in this country is 230V. Know that overhead power cables can carry voltages as high as 400,000V. Know that when water mixes with the salt on our skin it becomes a **conductor**. Know that you must never turn on the lights with wet hands.

	Identify the **hazards** that might be faced in the home. 1. Overloaded plug extension sockets, 2. **Exposed** wires, 3. Damaged sockets, 4. Wires left along the carpet for people to trip over, 5. Electrical appliances and wires near water, 6. Placing metal into electrical appliances or open sockets Know how to prevent these hazards and know not to touch anything they feel is unsafe. <u>Circuits</u> Know that electricity travels through a circuit, and the **various components** that create a **circuit** (Battery, cell, open and closed switches, buzzer, lamp, motor, wire and voltmeter). Know how to create simple circuit using a battery, a bulb and a switch. Know that a **cell** is a power source. Know that a **battery** is a power source that uses chemical reactions to generate power. Know that batteries must be connected in **series** with **positive** terminals connected to **negative** ones. Know that an open switch will not complete the circuit and that a closed switch will complete the circuit. Know that electricity must be able to flow around the circuit for components to work Know the difference between mains electricity and battery powered electricity. Know that the word **current** describes the flow of electricity in a circuit. Know some of these symbols when drawing circuits.

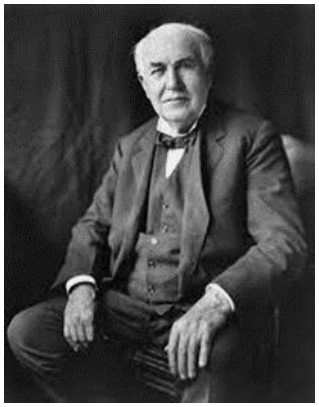


Know if the following circuits work or not.
1. A complete circuit without **switches**.
2. A circuit with wires not connected to the **cell** on one side.
3. A complete circuit with an open switch.
4. A complete circuit with a closed switch.
5. A circuit where the wire is not connected to the **bulb / buzzer / motor**

<u>Static Electricity</u>
Know that static electricity can be created by rubbing a balloon on material or through brushing hair

Thomas Edison

Know that **Thomas Edison** invented the incandescent electric light bulb in 1879 in New Jersey, USA.
Video Clip - https://www.youtube.com/watch?v=0wkjlSZt0ko
Know that Thomas Edison was born in 1847 and died in 1931.
Know that he lived in the state of New Jersey in The United States of America (USA)
Know that he is known as one of the greatest inventors in history.
Know that he invented the light bulb, the phonograph (which could record and play sound) and an early video camera called the **Kinetograph**.
Know that the films were then watched on a Kinetoscope which he also invented.



Picture of Thomas Edison

Picture of the first Edison bulb

WORKING SCIENTIFICALLY

Know that conductors allow electricity to pass through them and that insulators prevent the passage of electricity.
Know that metals such as **copper, iron and steel make good conductors.**
Know that wood, **plastic, paper and rubber are insulators.**
Know how to identify materials that are conductors and insulators.

Plan an investigation to check the conductive properties of materials.
Test the predictions and record in a table.

Material Tested	Conductor	Insulator

STEAM Opportunities

- Venn diagrams appliances that use mains and batteries.
- Read information from SMART meter.
- Bar graph of electrical appliances uses.
- Create a video on how to wire a plug.
- Research historical figures and timelines.

Outcome

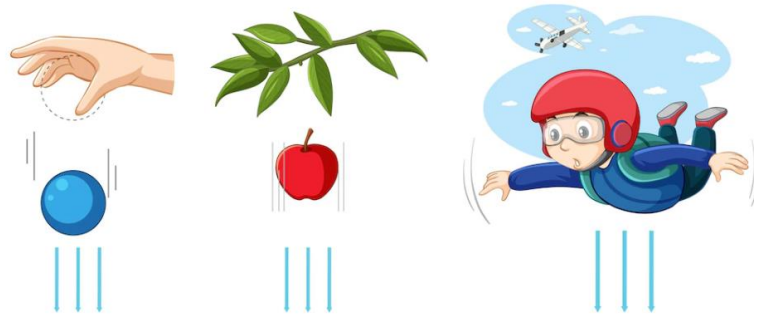
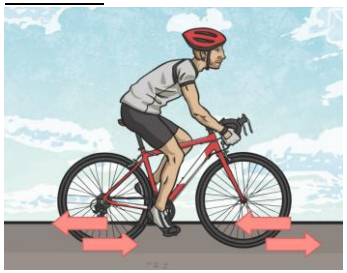
Topic Test 3

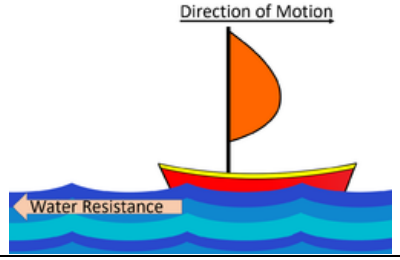
Do all materials conduct electricity?

Reading Link

	Electrical Wizard
	Scientist/Inventor Thomas Edison
Approved Resources	BBC Bitesize Switched on Science CGP

Year 5 Term Spring 1	Unit Title: Forces
NC Objectives	**Key Knowledge Content**
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. **Non-statutory notes** Explore falling objects and raise questions about the effects of air resistance. Explore the effects of air resistance by observing how different objects such	<u>Context of Study</u> This unit is the second of two units where pupils will study forces. It is part of the discipline of physics- the study of the processes that shape our world and how we use it. It also links to the discipline of chemistry- the study of substances that make up matter. In this unit pupils learn about the force of gravity and friction forces, including air and water resistance, pupils will also study how simple machines work. This will build on pupils' knowledge of friction studied in the Year 3 unit of forces and magnets. Pupils have a secure knowledge of resistance and friction and are able to compare how things move on different surfaces. Previous learning also includes knowing that some forces need contact between two objects, but magnetic forces can act at a distance. Pupils know magnets have two poles and that they attract or repel each other. New learning in this unit includes knowing that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. Pupils study the effects of air resistance, water resistance and friction, that act between moving surfaces. By the end of the unit, pupils will know that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. This unit is the precursor to work in Spring 2 where pupils study the movement of the Earth in space. <u>Knowledge Content</u> Children should already: Know that the force between two surfaces rubbing together is called friction. Know what a compass is. Know how magnets work, what a magnetic field is and how they are used. Know what a force is and that some forces do not have to be in contact to act. Know that **forces** are part of the discipline of **physics**- the study of the processes that shape out world and how we use it. <u>Gravity</u> Know that gravity is a force measured in Newtons (N). Know that forces can be measured using a force meter / Newton meter.

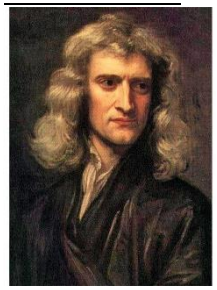
as parachutes and sycamore seeds fall. Experience forces that make things begin to move, get faster or slow down. Explore the effects of friction on movement and find out how it slows or stops moving objects, for example, by observing the effects of a brake on a bicycle wheel. Explore the effects of levers, pulleys and simple machines on movement. Find out how scientists, for example, Galileo Galilei and Isaac Newton helped to develop the theory of gravitation. Explore falling paper cones or cupcake cases, and	Know that the bigger the force applied (pull) the longer the spring stretches and the bigger the reading and thus the force. Know that any two objects have a force of gravity between them. Know that gravity gives weight to objects with mass and causes them to fall towards the centre of the Earth when dropped.  Know that the force of gravity on the Moon is less than that on the Earth. Know that gravity holds Earth and the other planets in their orbits around the Sun. Know that objects with greater mass have a stronger force of gravity. Know that weight is the force of gravity on an object and therefore changes depending on where you are. Know that objects appear to float in space because of the lack of gravity. <u>Friction</u>  Know that friction is a force which occurs when any two things rub against each other for example your two hands rubbing together.

design and make a variety of parachutes and carry out fair tests to determine which designs are the most effective. Explore resistance in water by making and testing boats of different shapes. Design and make products that use levers, pulleys, gears and/or springs and explore their effects.	Know that the size of the friction force can be very big; two rough surfaces will generate more friction than two smooth surfaces. Know that air and water resistance are known as drag forces. Know that these depend on the shape, size and speed of the object that is moving through the air or water. <u>Air Resistance</u>  Know that air resistance is the frictional force air exerts against a moving object. Know that as an object moves, air resistance slows it down. Know that the faster the object's motion, the greater the air resistance exerted against it. Know that air resistance affects all moving objects. <u>Water Resistance</u> Know that modern submarines have a teardrop-shaped hull, which is the best shape to help them reduce water resistance.  

Know that when you go swimming, there is friction between your skin and the water. This is known as water resistance.
Know that when something is in water, there are two forces acting on it. Its weight and the force of the water pushing up, the upthrust.
Know that if the weight is equal to or less than the upthrust, it floats.
Know that if the weight of an object is greater than the upthrust, it sinks.
Know that things that float are 'buoyant'.
Know that ‘buoyancy’ is the ability of an object to float in liquid or the air.
Know that a buoy is a floating object that is used to show ships and boats where they can go and to warn them of danger.

Know that streamlining jet planes or submarines reduces the air or water resistance, allowing the objects to move through air or water much better.

<u>Isaac Newton</u>



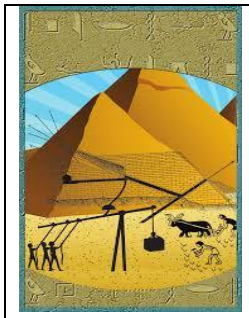
know that Sir Isaac Newton (1642 - 1726) was an English mathematician and scientist.
Know that Sir Isaac Newton first set out the laws of gravity.
Know that he is said to have 'discovered' the concept of gravity when sitting under a tree and an apple fell to the ground near him.
Know that Newton also discovered that white light was made from a range of colours.

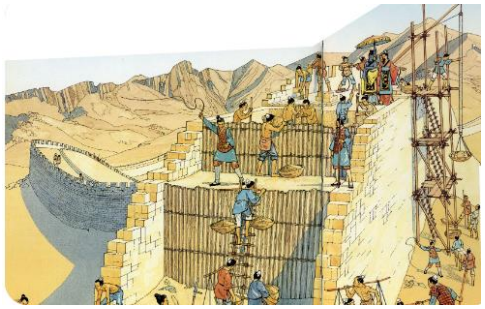
Galileo Galilei

Know that Galileo Galilei (1564 - 1642) was a scientist from Italy.
Know that Galileo discovered that everything falls at the same speed. In 1658 he dropped two balls of different masses from the leaning tower of Pisa.
Know that he discovered they hit the ground at the same time.
Know that this contradicted the ideas of Archimedes and the accepted view that heavy objects fall faster than light objects.

Machines

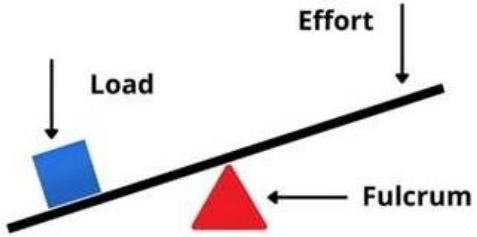
Know that the ancient Greeks, Egyptians, Indians and Chinese all used simple machines to build marvellous structures like the pyramids and the Great Wall of China.

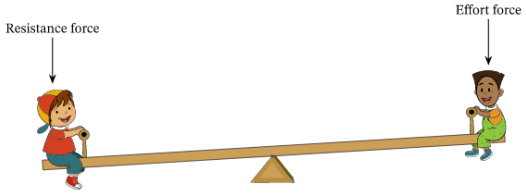




Levers

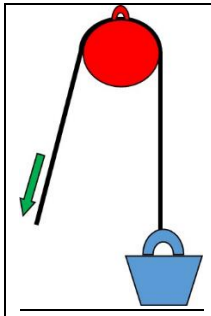
Know that a lever is a simple mechanism used to move or lift objects.
Know that the nearer the fulcrum to the load then the less effort is needed.
Know that a seesaw works because the fulcrum is in the middle.
Know how to label the diagram showing a lever, load, effort and a fulcrum.





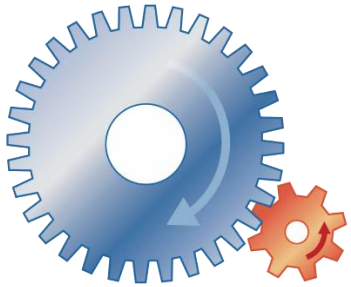
Pulleys

Know that a pulley is a device consisting of a wheel over which a rope or chain is pulled in order to lift heavy objects.
Know that when someone raises a flag up a flagpole a pulley system is used.



Gears

Know that gears are toothed wheels that lock together and turn each other.
Know that gears are often different sizes.
Know that a number of gears connected together are called a gear train
Know that small gears rotate faster than large ones and need less effort to move.
Know that gears on a bike enable us to go faster than we could normally move without using up a lot of energy.
Know that some racing bikes can have as many as 27 or 33 speed gears.



Know the vocabulary:

Vocabulary	Definition
Air Resistance	The resistance of air to forward movement

Force Meter	An instrument for measuring forces
Friction	The force made when two objects rub against each other
Gravity	The force that attracts a body towards the centre of the Earth
Newton	The unit of force
Non-contact Force	A force that does not need to touch an object to work, e.g. magnetic force
Reliable	Something that can be depended on
Water Resistance	The resistance of water to forward movement
Weight	The force with which something is attracted to the Earth

<u>WORKING SCIENTIFICALLY</u>

- Explore resistance in water by making and testing boats of different shapes.
- Explore falling cupcake cases, and design and make a variety of parachutes and carry out fair tests to determine which designs are the most effective.
- Explore the effects of air resistance by observing how different objects such as parachutes and sycamore seeds fall.

<u>STEAM Opportunities</u>

- Use slow-motion video, e.g., parachute falling to help explain science concept of air resistance.
- Use appropriate equipment, e.g., Newton meters.
- Speak to someone who skis, mountain climbs or any other sport that requires understanding of forces.
- Visit a local museum to look at machinery.

	<u>Outcome</u> Topic Test 3 Boat investigation
	<u>Reading Link</u> The Tin Snail
	<u>Scientist/Inventor</u> Isaac Newton
Approved Resources	BBC Bitesize Switched on Science CGP

<table>
<tr><th>Year 6 Term Spring 1</th><th>Unit Title: Electricity</th></tr>
<tr><th>NC Objectives</th><th>Key Knowledge Content</th></tr>
<tr><td rowspan="2">Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit.

Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches.

Use recognised symbols when representing a simple circuit in a diagram

Non statutory:
Construct simple series circuits, to help them to answer questions about what happens when they try different components,</td><td>Context of Study
This is the second of two units where children study electricity as part of the discipline of physics - the study of the processes that shape our world and how we use it. This unit builds on the Year 4 work on electricity, looking at the scientific use of symbols for components in a circuit, as well as considering the effect in more detail of changing components in a circuit. From Year 4 children are able to identify common appliances that run on electricity, they have a secure knowledge of simple series electrical circuits including that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit. They know some common conductors and insulators, and associate metals with being good conductors. In Year 6 children will learn how to use recognised symbols when representing a simple circuit in a diagram, how to associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. Pupils compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches.</td></tr>
<tr><td>Knowledge Content
The study of electricity is part of the discipline of physics - the study of the processes that shape our world and how we use it.

Children already know:
- That a complete circuit is required for a bulb to light.
- That batteries produce electricity.
- That an electric current passes through a circuit.
- That metals are good conductors.
- That some devices run off mains and some off batteries.
- That batteries have two ends

Know that electricity is created by generators which can be powered by gas, coal, oil, wind or solar.</td></tr>
</table>

for example, switches, bulbs, buzzers and motors.

Learn how to represent a simple circuit in a diagram using recognised symbols.

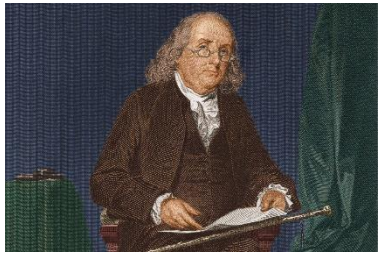
Pupils should be taught to take the necessary precautions for working safely with electricity.

Work scientifically by systematically identifying the effect of changing one component at a time in a circuit; designing and making a set of traffic lights or a burglar alarm.

Picture of an electric generator

Know that the electrical energy can be **converted** into other types of energy such as light, heat, movement or sound.
Know that electricity is dangerous, so be careful when using electrical appliances.

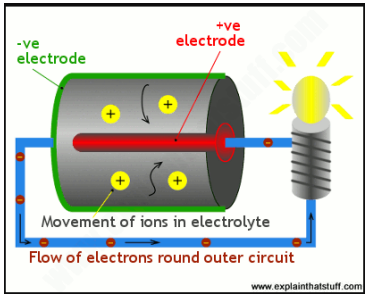
<u>Scientists</u>
Know that American scientist **Benjamin Franklin** carried out important experiments relating to electricity in the 1700s.
Know that he conducted an experiment to show that lightning was electricity- He flew a kite in a thunderstorm and tied a metal key to the string to conduct the electricity.
Know that lightning hit the kite and Franklin received an electric shock- it showed that lightning was electrical.
Know that it took until 1879 for people to find a way to turn electrical power into light - American inventor **Thomas Edison** invented the electric light bulb in this year.


Picture of Benjamin Franklin


Picture of Benjamin Franklin's experiment

Conductors and Insulators (Revision from Materials in Year 5)
Know that some materials let electricity pass through them easily.
Know that these materials are known as **electrical conductors**.
Know that many metals, such as copper, iron and steel, are good electrical conductors.
Know that the parts of electrical objects that need to let electricity pass through are always made of metal.
Know that metal is used in plugs to allow electricity to **transfer** from the wall socket, through the plug, and into a device such as a radio or TV.
Know that some materials do not allow electricity to pass through them.
Know that these materials are known as **electrical insulators**.
Know that plastic, wood, glass and rubber are good electrical insulators.
Know that this is why they are used to cover materials that carry electricity.
Know that the plastic covering that surrounds wires is an electrical insulator.
Know that it stops you from getting an electrical shock.

Circuits (Some revision from Year 4)
Know that any break in a circuit will reduce the current to zero throughout the whole circuit.
Know that to make the **representation** of circuits clearer, symbols are used.
Know that electricity can flow through the **components** in a complete electrical circuit.
Know that a circuit always needs a **power source**, such as a battery, with wires connected to both the positive (+) and negative (-) ends.

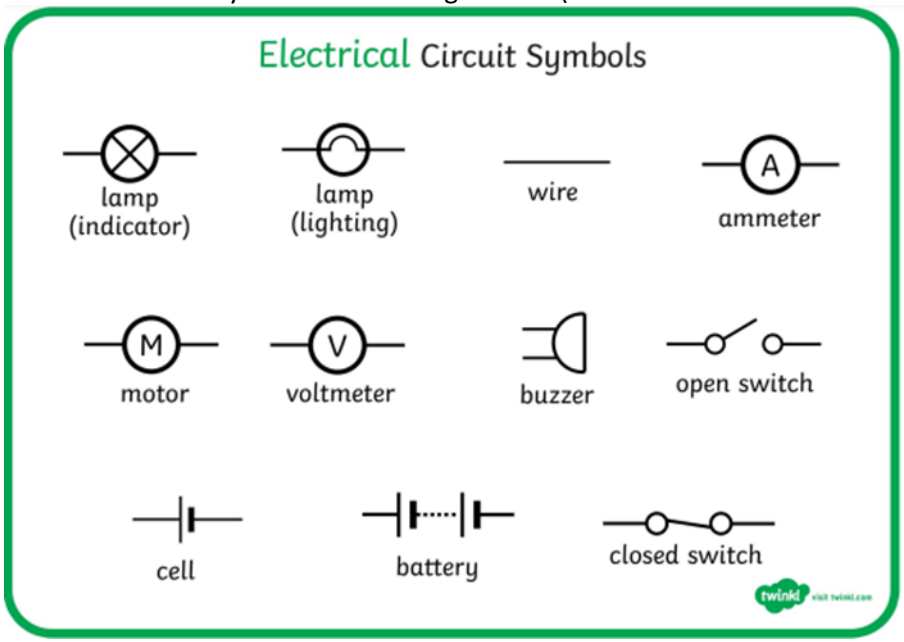


Know that a battery is made from a collection of **cells** connected together.
Know that a circuit can also contain other electrical components, such as **bulbs, buzzers or motors**, which allow electricity to pass through.

Know that electricity will only travel around a circuit that is **complete**. (That means it has no gaps).
Know that you can use a **switch** in a circuit to create a gap in a circuit. This can be used to switch it on and off.
Know that when a switch is open (off), there is a gap in the circuit and electricity cannot travel around the circuit.
Know that when a switch is closed (on), it makes the circuit complete and electricity can travel around the circuit.

Know that when drawing circuit diagrams, rather than drawing detailed components, we use simple symbols to represent the different components.
Know that electricity flows through a circuit, with the **volt** being the push that moves **electrons** along the wires.
Know that electrons are what makes up electricity (they are negatively charged particles).
Know that the more volts there are in a circuit, the more power there is travelling through it.
Know that the higher the volts, the brighter a lamp and the louder a buzzer.
Know that when a bulb has too much electricity going through it, it can **blow**.

Know the correct symbols for drawing circuit: (Revision from Year 4 Electricity Unit).



Know the following vocabulary and definitions:

Vocabulary	Definition
Cell	A single battery that supplies power to the circuit
Circuit	An electrical circuit is a complete route which an electric current can flow around.
Voltage	The voltage of an electrical current is its force measured in volts.
Volt	A volt is a unit used to measure the force of an electric current.
Battery	Batteries are small devices that provide the power for electrical items such as torches and children's toys.
Complete	Something (a circuit) that doesn't have any gaps in it
Components	The individual parts of an electrical circuit such as a bulb or wire
Current	The flow of electricity through a wire or circuit
Filament	The very thin wire, like that in a fuse, and that is inside a bulb
Fuse	A safety device that will melt and make a break in a circuit if there is too much electricity
Series circuit	Components that are connected one after another on the same loop of the circuit are connected in series. The current that flows across each component connected in series is the same.

	<u>WORKING SCIENTIFICALLY</u> Note - ensure children are confident with their understanding of how circuits work before designing circuits. Practical work then supports what they already know and is not used to teach knowledge. Draw and design circuits using the correct symbols then build them. Systematically identify the effect of changing one component at a time. Predict and test outcomes.
	<u>STEAM Opportunities</u> - Invite in to class an electrician to talk to children about their job, health and safety, training. - Take photographs and create video clips of circuits. - Design, make, test, evaluate and advertise an electrical game. - Reading and calculating electricity bills.
	<u>Outcome</u> Topic Test 3 How does the amount of voltage in a circuit affect the volume of the buzzer?
	<u>Reading Link</u> Goodnight Mister Tom
	<u>Scientist/Inventor</u> Nikola Tesla
Approved Resources	BBC Bitesize Switched on Science CGP