Year	3	Topic	Plants

National Curriculum aims

- Identify and describe the functions of different parts of flowering plants: roots; stem/trunk; leaves; and flowers.
- Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant.
- Investigate the way in which water is transported within plants.
- Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.

Prior learning	Key vocabulary
• Observe and describe how seeds and bulbs grow into mature plants. (Y2 - Plants) • Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. (Y2 - Plants)	photosynthesis, pollen, insect/wind pollination, male, female, seed formation, seed dispersal (wind dispersal, animal dispersal, water dispersal), air, nutrients, minerals, soil, absorb, transport

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE

Key learning

Functions of parts of a plant

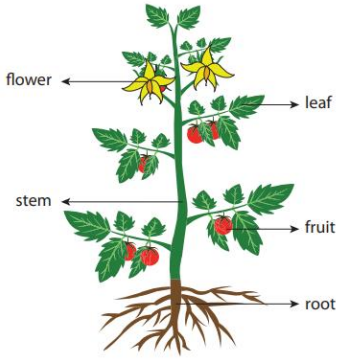
Many plants, but not all, have roots, stems/trunks, leaves and flowers/ blossom.

The roots absorb water and nutrients from the soil and anchor the plant in place.

The **stem** transports water and nutrients/minerals around the plant and holds the leaves and flowers up in the air to enhance photosynthesis, pollination and seed dispersal.

The **leaves** use sunlight and water to produce the plant's food.

Some plants produce **flowers** which enable the plant to reproduce.



This forms **seeds**, sometimes contained in berries or fruits which are then dispersed in different ways.

Key learning

What is required for a plant to grow?	air, light, water, nutrients from soil, and room to grow Different plants require different conditions for germination and growth.
How does a plant get water?	The roots take up water from the soil. The water travels through the stem of the plant to the leaves.
What is pollination? **How does pollen get from one plant to another?**	**Pollen,** which is produced by the male part of the flower, is transferred to the female part of other flowers (pollination). **Insects** - The insect goes to the first flower looking for nectar. Pollen gets stuck to it. When it goes to another flower, the pollen gets stuck to that flower **Wind**- Pollen is blown from one flower to another. **Water** – pollen moved by rain, water

Key Vocabulary with definitions

photosynthesis	The process in which green plants use sunlight to make their own food.	**seed dispersal**	Spreading seeds over a wide area.
pollen	A fine powder produced by certain plants when they reproduce.	**nutrients**	Chemical compounds that plants and animals use to function properly
seed	The small parts produced by plants from which new plants grow.	**Minerals**	Solid substances that occur naturally. They are found on Earth's surface as well as deep underground.
formation	The starting or creation of something.	**absorb**	To take in or suck up like a sponge.
pollination	The process that allows plants to reproduce.	**soil**	A mixture of minerals and organic material that covers much of Earth's surface.

Common misconceptions

Some children may think:

- plants eat food
- food comes from the soil via the roots
- flowers are merely decorative rather than a vital part of the life cycle in reproduction
- plants only need sunlight to keep them warm
- roots suck in water which is then sucked up the stem.

Activities

- Observe what happens to plants over time when the leaves or roots are removed.
- Observe the effect of putting cut white carnations or celery in coloured water.
- Investigate what happens to plants when they are put in different conditions e.g. in darkness, in the cold, deprived of air, different types of soil, different fertilisers, varying amount of space.
- Spot flowers, seeds, berries and fruits outside throughout the year.
- Observe flowers carefully to identify the pollen.
- Observe flowers being visited by pollinators e.g. bees and butterflies in the summer.
- Observe seeds being blown from the trees e.g. sycamore seeds.
- Research different types of seed dispersal.
- Classify seeds in a range of ways, including by how they are dispersed.

Future Learning

- Describe the life process of reproduction in some plants and animals. (Y5 - Living things and their habitats)
- Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms. (KS3)

Possible evidence

For ARE

- Can explain the function of the parts of a flowering plant
- Can describe the life cycle of flowering plants, including pollination, seed formation, seed dispersal, and germination Can give different methods of pollination and seed dispersal, including examples
- Can explain observations made during investigations
- Can look at the features of seeds to decide on their method of dispersal
- Can draw and label a diagram of their created flowering plant to show its parts, their role and the method of pollination and seed dispersal

For GD

- Can explain why healthy roots and a healthy stem are needed for plants to grow
- Can explain that differences in plant growth are due to the amount of light and/or water
- Can compare methods of seed dispersal
- Can compare the roots of different plants (e.g. desert plants or rainforest tree. Teacher Note: rainforest trees have very shallow roots as the quality of the soil is more and most of the nutrients are near the surface)

Working scientifically skills covered in this topic

Asking questions	➢ Asking questions about how plants grow and what affects this.
Setting up fair tests	➢ Does the temperature affect how much a plant will grow?
Choosing and using equipment	➢ Using rulers to measure the height of plants.
Observing	➢ Observing what happens to plants growing in different temperatures over time.
Measuring	➢ Measuring the height of the plants in different temperatures (cm).
Recording	➢ Record the height of plants in a bar chart,
Identifying and classifying	➢ Identify the parts of a plant. ➢ Explain the different functions of the parts of a plant. ➢ Identify how seeds are dispersed. ➢ Classify seeds. ➢ Identify the life cycle of a plant.
Explaining results	➢ Explain why some plants grew and others didn't in different conditions.

Year	3	Topic	Animals, including humans

National Curriculum aims

- Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food – they get nutrition from what they eat.
- Identify that humans and some other animals have skeletons and muscles for support, protection and movement.

Prior learning	Key vocabulary
• Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. (Y1 - Animals, including humans) • Identify and name a variety of common animals that are carnivores, herbivores and omnivores. (Y1 - Animals, including humans) • Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). (Y1 - Animals, including humans) • Find out about and describe the basic needs of animals, including humans, for survival (water, food and air). (Y2 - Animals, including humans) • Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. (Y2 - Animals, including humans)	Nutrition, nutrients, carbohydrates, sugars, protein, vitamins, minerals, fibre, fat, water, skeleton, bones, muscles, joints, support, protect, move, skull, ribs, spine

Key Vocabulary with definitions			
nutrition	A plant or animal getting the nutrients it needs to stay healthy	**skeleton**	A skeleton is a structure of bones that support and protect the body of a person or animal.
carbohydrates	A compound made of carbon, hydrogen, and oxygen. It is formed mainly by plants, and it is used in the body to easily produce and	**bones**	The pieces of hard, whitish tissue that makes up the human skeleton or vertebrates.
protein	A substance that is made up of nitrogen, carbon, oxygen, hydrogen, and possibly other elements. Proteins are found in all	**muscles**	A band of tissue in a human or animal's body that has the ability to contract, producing movement.
minerals		**joints**	A place or point where two or more parts come together or are
nutrients	A substance that a plant or animal needs to live and grow	**fat**	A white or yellow oily substance found in some parts of animals or plants. Fat is made of carbon, hydrogen, and oxygen. Butter and lard are fats. Foods with fat, like bacon, often taste good but are not very healthy.

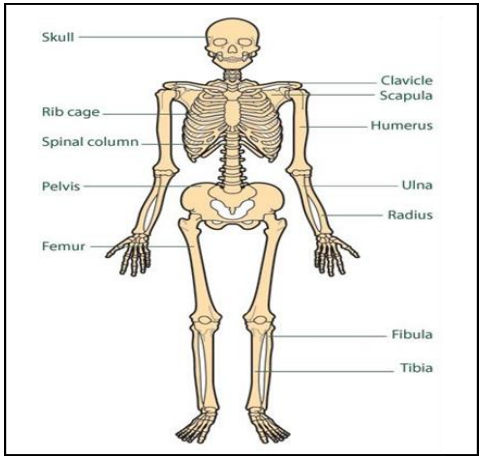
WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE

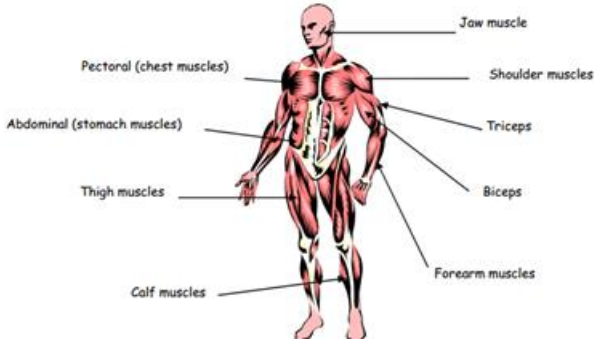
Key learning

Animals, unlike plants which can make their own food, need to eat in order to get the nutrients they need. Food contains a range of different nutrients – carbohydrates (including sugars), protein, vitamins, minerals, fats, sugars, water – and fibre that are needed by the body to stay healthy. A piece of food will often provide a range of nutrients.

Nutrition	
Things animals and humans need to survive	• Water • Food • Air • Shelter
Things humans need to be healthy	• To have a balanced diet of the right amount of different types of food and drink. • To exercise regularly. • To be hygienic.
What is nutrition	Nutrition means animals getting the food they need to grow and be healthy.
Can we make our own food?	No. Humans can't make their own food. Humans get their food by either growing it, hunting it or gathering it.
What is meant by growing food?	Humans can grow their own food by planting seeds that they later harvest.
What is meant by hunting food?	Humans can hunt other animals to eat.
What is meant by gathering food?	Humans can find foods grown in the wild to eat.

Humans, and some other animals, have skeletons and muscles which help them move and provide protection and support.





Key Knowledge	
Skeletons and muscles	
What is a skeleton?	A skeleton is a structure of bones that support and protect the body of a person or animal.
12 common parts of the skeleton we should know	Skull, clavicle, scapula, rib cage, humerus, spinal column, pelvis, ulna, radius, femur, fibula and tibia.
What is a muscle?	A soft tissue in the body that contracts and relaxes to cause movement of the skeleton.
Common muscles we should know	Front: biceps, abdominals, quadriceps Back: triceps, hamstrings and calves.

Common misconceptions

Some children may think:

- certain whole food groups like fats are 'bad' for you
- certain specific foods, like cheese are also 'bad' for you
- diet and fruit drinks are 'good' for you
- snakes are similar to worms, so they must also be invertebrates
- invertebrates have no form of skeleton.

Activities

- Classify food in a range of ways.
- Use food labels to explore the nutritional content of a range of food items.
- Use secondary sources to find out the types of food that contain the different nutrients.
- Use food labels to answer enquiry questions e.g. How much fat do different types of pizza contain? How much sugar is in soft drinks?
- Plan a daily diet to contain a good balance of nutrients.
- Explore the nutrients contained in fast food.
- Use secondary sources to research the parts and functions of the skeleton.
- Investigate patterns asking questions such as:
  - Can people with longer legs run faster?
  - Can people with bigger hands catch a ball better?
- Compare, contrast and classify skeletons of different animals.

Future learning

- Describe the simple functions of the basic parts of the digestive system in humans. (Y4 - Animals, including humans)
- Identify the different types of teeth in humans and their simple functions. (Y4 - Animals, including humans)
- Construct and interpret a variety of food chains, identifying producers, predators and prey. (Y4 - Animals, including humans)
- Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. (Y6 - Animals, including humans)

Possible evidence

For ARE

- Can classify food into those that are high or low in particular nutrients
- Can answer their questions about nutrients in food, based on their gathered evidence
- Can talk about the nutrient content of their daily plan
- Use their data to look for patterns (or lack of them) when answering their enquiry question
- Can give similarities e.g. they all have joints to help the animal move, and differences between skeletons

For GD

- Can name the nutrients found in food and the benefits of these nutrients
- Can state that to be healthy we need to eat the right types of food to give us the correct amount of these nutrients
- Can name some bones that make up their skeleton, giving examples that support, help them move or provide protection
- Can describe how muscles and joints help them to move

Working scientifically skills covered in this topic

Asking questions	➢ Asking questions about if the differences in our bodies affect how we perform.
Setting up fair tests	➢ Can people with longer legs run faster?
Choosing and using equipment	➢ Using stopwatches to measure time.
Measuring	➢ Measuring time it takes to run a certain distance.
Using other sources of information	➢ Use secondary sources to find out the types of food that contain the different nutrients. ➢ Use secondary sources to research the parts and functions of the skeleton.
Recording	➢ Recording time it took to run a distance in a table.
Identifying and classifying	➢ Classifying animals into carnivores, omnivores and herbivores. ➢ Classifying food into different food types ➢ Identifying bones and muscles in the body ➢ Group animals based on their skeletons
Explaining results	➢ Explaining if there was a link between the length of leg and the time it takes to run a distance.

Year	3	Topic	Rocks and soil

National Curriculum aims

- Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties.
- Describe in simple terms how fossils are formed when things that have lived are trapped within rock.
- Recognise that soils are made from rocks and organic matter.

Prior learning	Key vocabulary
• Distinguish between an object and the material from which it is made. (Y1 - Everyday materials) • Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. (Y1 - Everyday materials) • Describe the simple physical properties of a variety of everyday materials. (Y1 - Everyday materials) • Compare and group together a variety of everyday materials on the basis of their simple physical properties. (Y1 - Everyday materials) • Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. (Y2 - Uses of everyday materials)	rock, stone, pebble, boulder, grain, crystals, layers, hard, soft, texture, absorb water, fossil, bone, flesh, minerals, marble, chalk, granite, sandstone, slate, soil, types of soil (e.g. peaty, sandy, chalk, clay)

Key Vocabulary with definitions

minerals	A substance formed in the earth that is not of an animal or a plant.	**slate**	A rock that tends to split in smooth layers.
layer	A thickness of something that is spread over a surface.	**soil**	The top layer of the earth's surface
fossil	The shape of a long dead animal or plant found in a rock	**bone**	The hard tissue that forms the skeleton of a person or animal.
sandstone	Rock that is formed mostly of sand and held together with a substance similar to cement.	**absorb**	To take in or soak up.
		texture	The feel or look of a surface. The wood had a rough texture until it was sanded and polished.

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE

Key learning

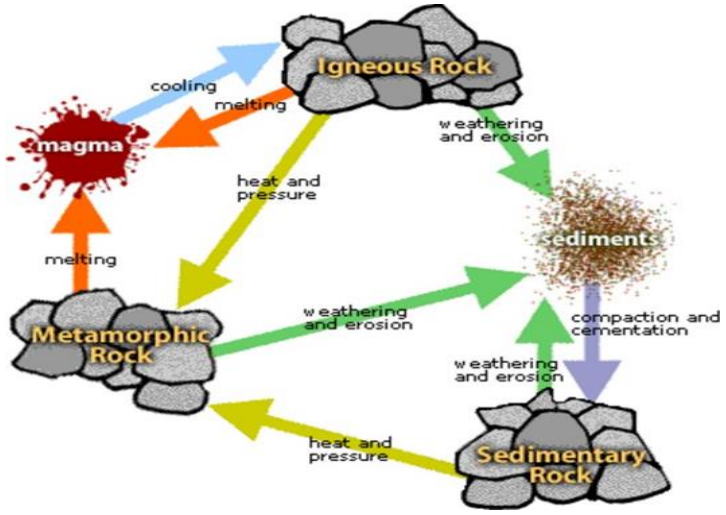
Rock is a naturally occurring material. There are different types of rock e.g. sandstone, limestone, slate etc. which have different properties. Rocks can be hard or soft. They have different sizes of grain or crystal. They may absorb water. Rocks can be different shapes and sizes (stones, pebbles, boulders). Soils are made up of pieces of ground down rock which may be mixed with plant and animal material (organic matter). The type of rock, size of rock pieces and the amount of organic matter affect the property of the soil.

There are three main types of rock	• Sedimentary • Metamorphic • Igneous
Sedimentary	Sedimentary rocks are formed from particles of sand, shells, pebbles, and other fragments of material. Together, all these particles are called sediment. Gradually, the sediment accumulates into layers and over a long period of time hardens into rock.
Metamorphic	Metamorphic rocks are formed under the surface of the earth from themetamorphosis (change) that occurs due to intense heat and pressure (squeezing).
Igneous	Igneous rock is formed when magmacools and solidifies, it may do this above or below the Earth's surface.

How to spot each type of rock

Sedimentary	• Usually crumbly and allow water through them • Made of layers and stuck together with mineral crystals • They can contain fossils within their layers
Metamorphic	• Usually hard • May contain tiny crystals or fossils
Igneous	• Very hard • Contain crystals

Sedimentary | Metamorphic | Igneous



Some rocks contain fossils. Fossils were formed millions of years ago. When plants and animals died, they fell to the seabed. They became covered and squashed by other material. Over time the dissolving animal and plant matter is replaced by minerals from the water.

How are fossils formed

How are fossils formed?	• An animal dies, its skeleton settles on the sea floor and is buried by sediment. • The sediment surrounding the skeleton thickens and begins to turn to stone. • The skeleton dissolves and a mould is formed. • Minerals crystallise inside the mould and a cast is formed. • The fossil is exposed on the Earth's surface.

How is soil made

What is soil made from?	• Minerals (small stone fragments: clay, silt or sand) • Organic Matter (decaying plants and animals) • Water (which the nutrients in the minerals and the organic matter dissolve into) • Air (which fills the gaps between the mineral and organic matter parts).
Types of soil	Sandy soil is pale in colour with lots of small air gaps. Water drains through sandy soil easily so it usually feels quite dry. Clay soil is an orange or blue-ish sticky soil with very few air gaps. Water does not drain through it easily. When it rains, puddles stay on top of clay soil for a long time. Chalky soil is a light brown soil. Water drains through it quickly. Peat is different from other soils because it does not contain any rock particles. It is made from very old decayed plants and is dark, crumbly and rich in nutrients (chemicals plants need to grow).

Common misconceptions

Some children may think:

- rocks are all hard in nature
- rock-like, man-made substances such as concrete or brick are rocks
- materials which have been polished or shaped for use, such as a granite worktop, are not rocks as they are no longer 'natural'
- certain found artefacts, like old bits of pottery or coins, are fossils
- a fossil is an actual piece of the extinct animal or plant
- soil and compost are the same thing.

Activities

- Observe rocks closely.
- Classify rocks in a range of ways, based on their appearance.
- Devise a test to investigate the hardness of a range of rocks.
- Devise a test to investigate how much water different rocks absorb.
- Observe how rocks change over time e.g. gravestones or old building.
- Research using secondary sources how fossils are formed.
- Observe soils closely.
- Classify soils in a range of ways based on their appearance.
- Observe how soil can be separated through sedimentation.
- Research the work of Mary Anning.

Future learning

- Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. (Y6 - Evolution and inheritance)
- The composition of the Earth. (KS3)
- The structure of the Earth. (KS3)
- The rock cycle and the formation of igneous, sedimentary and metamorphic rocks. (KS3)

Possible evidence

For ARE

- Can classify rocks in a range of different ways, using appropriate vocabulary
- Can name some types of rock and give physical features of each
- Can devise tests to explore the properties of rocks and use data to rank the rocks with some support
- Can link rocks changing over time with their properties e.g. soft rocks get worn away more easily
- Can explain how a fossil is formed
- Can present in different ways their understanding of how fossils are formed e.g. in role play, comic strip, chronological report, stop-go animation etc.
- Can identify plant/animal matter and rocks in samples of soil

For GD

- Can name the types of rock and give physical features of each
- Can devise tests to explore the properties of rocks and use data to rank the rocks independently
- Can explain how a fossil is formed and the impact of fossils on today's science
- Can explain that soils are made from rocks and also contain living/dead matter
- Can devise a test to explore the water retention of soils independently

Working scientifically skills covered in this topic

Asking questions	➢ Asking questions about rocks and the properties of them.
Setting up fair tests	➢ Devise a test to investigate the hardness of a range of rocks. ➢ Devise a test to investigate how much water different rocks absorb.
Choosing and using equipment	➢ Use measuring equipment to measure how much water is absorbed.
Observing	➢ Observe different types of rocks. ➢ Observe how rocks change over time. ➢ Observe soils closely.
Measuring	➢ Measure how much water was absorbed in different rocks.
Using other sources of information	➢ Research using secondary sources how fossils are formed. ➢ Research the work of Mary Anning.
Recording	➢ Record soil permeability
Identifying and classifying	➢ Identify and classify different rocks. ➢ Classify soils in a range of ways based on their appearance.
Explaining results	➢ Identify types of soil according to permeability

Year	3	Topic	Light

National Curriculum aims

- Recognise that they need light in order to see things, and that dark is the absence of light.
- Notice that light is reflected from surfaces.
- Recognise that light from the sun can be dangerous and that there are ways to protect their eyes.
- Recognise that shadows are formed when the light from a light source is blocked by an opaque object.
- Find patterns in the way that the size of shadows change.

Prior learning	Key vocabulary
• Explore how things work. (Nursery – Light) • Talk about the differences in materials and changes they notice. (Nursery – Light) • Describe what they see, hear and feel whilst outside. (Reception – Light) • Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. (Y1 - Animals, including humans) • Describe the simple physical properties of a variety of everyday materials. (Y1 - Materials)	light, light source, Sun, sunlight, dangerous, shadow, reflection, opaque, translucent, transparent

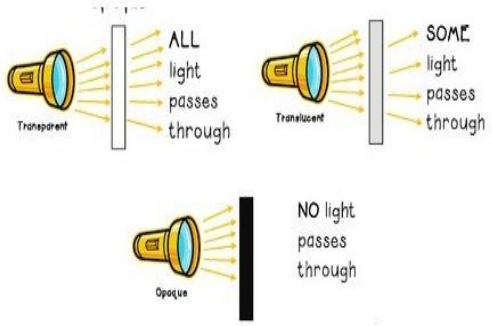
Key Vocabulary with definitions			
Light	The form of energy that makes it possible for the eye to see. The sun produces light	**Reflection**	When light bounces off a surface
Light source	An object that make its own light	**Opaque**	An object that lets no light pass though.
Sun	The star in the middle of our solar system. The earth and other planets revolve around it and receive heat and light from it.	**Translucent**	An object that lets some light pass though
Sunlight	The light of the sun; sunshine.	**Transparent**	An object that lets all light pass though
Shadow	A dark area where light from a light source is blocked by an opaque object		

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE

Key learning

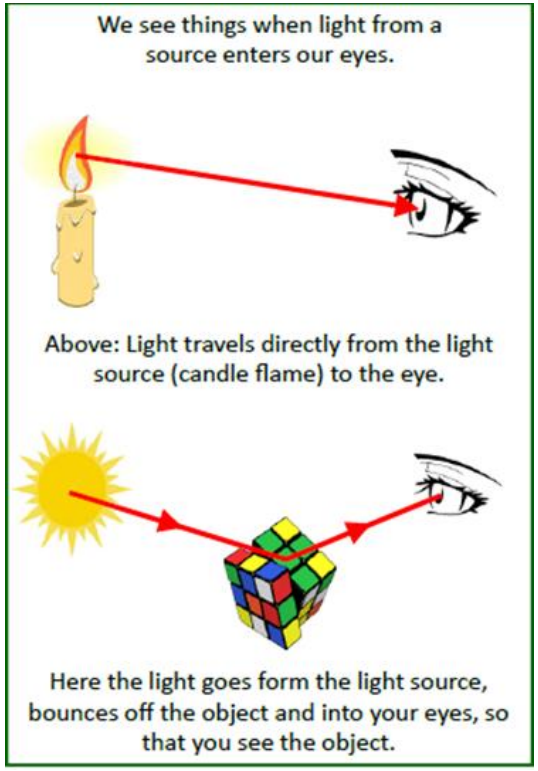
We see objects because our eyes can sense light. Dark is the absence of light. We cannot see anything in complete darkness. Some objects, for example, the sun, light bulbs and candles are sources of light. Objects are easier to see if there is more light. Some surfaces reflect light. Objects are easier to see when there is less light if they are reflective.

The light from the sun can damage our eyes and therefore we should not look directly at the sun and can protect our eyes by wearing sunglasses or sunhats in bright light.



Key Knowledge Recognise that they need light in order to see things and that dark is the absence of light.	
What is a light source?	A light source is something that makes its own light. • the sun • the stars • flames • electric lights • some animals (e.g. fireflies/glow worms)
Reflection	• Notice that light is reflected from surfaces. • Light bounces off some materials better than others. • Shiny objects reflect light well. • Misconceptions: things you may think are light sources but actually reflect light are the moon, a mirror or shiny objects.
Sun safety	• It is not safe to look directly at the sun, even when wearing sun glasses. • Recognise there are ways to protect our eyes from the sun's harmful rays.
Shadows	• When light from a source is blocked by an opaque object, you get a shadow. • If an object is moved closer to the light source, the shadow gets bigger. • If an object is moved further away from the light source, the shadow gets smaller.

Shadows are formed on a surface when an opaque or translucent object is between a light source and the surface and blocks some of the light. The size of the shadow depends on the position of the source, object and surface.



Common misconceptions

Some children may think:

- we can still see even where there is an absence of any light
- our eyes 'get used to' the dark
- the moon and reflective surfaces are light sources
- a transparent object is a light source
- shadows contain details of the object, such as facial features on their own shadow
- shadows result from objects giving off darkness.

Activities

- Explore how different objects are more or less visible in different levels of lighting.
- Explore how objects with different surfaces, e.g. shiny vs matt, are more or less visible.
- Explore how shadows vary as the distance between a light source and an object or surface is changed.
- Explore shadows which are connected to and disconnected from the object e.g. shadows of clouds and children in the playground.
- Choose suitable materials to make shadow puppets.
- Create artwork using shadows.

Future learning

- Recognise that light appears to travel in straight lines. (Y6 - Light)
- Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye. (Y6 - Light)
- Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes. (Y6 - Light)
- Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them. (Y6 - Light)

Possible evidence

For ARE:

- Can describe patterns in visibility of different objects in different lighting conditions and predict which will be more or less visible as conditions change
- Can clearly explain, giving examples, that objects are not visible in complete darkness
- Can describe and demonstrate how shadows are formed by blocking light
- Can describe, demonstrate and make predictions about patterns in how shadows vary

For GD

- Can describe how we see objects in light and can describe dark as the absence of light
- Can state that it is dangerous to view the sun directly and state precautions used to view the sun, for example in eclipses
- Can define transparent, translucent and opaque
- Can describe how shadows are formed

Working scientifically skills covered in this topic

Asking questions	➢ Ask questions about light sources. ➢ Ask questions about how shadows are formed ➢ Ask questions about materials that light can pass through/not pass through
Setting up fair tests	➢ Devise a test to investigate the affect the distance from a light source has on a shadow ➢ Devise a test to investigate the affect of different lighting conditions on visibility ➢ Make predictions on visibility according to lighting conditions
Choosing and using equipment	➢ Use measuring equipment (metre stick/ruler) to measure distance from a light source to an object
Observing	➢ Observe how visibility changes over the course of a day. ➢ Observe the shadows formed by clouds
Measuring	➢ Measure the difference in shadow sizes compared to distance from light source
Using other sources of information	➢ .History of shadow puppets/shadow puppet theatres ➢ Understanding sun safety
Recording	Using a table to record results Using a line graph to interpret results.
Identifying and classifying	➢ .Different types of light sources ➢ Different types of surfaces according to visibility
Explaining results	Why distance from an object affects size of shadows. The effect of light on visibility

	Year	3	Topic	Forces and magnets

National Curriculum aims

- 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.

Prior learning	Key vocabulary
• Explore how things work. (Nursery – Forces) • Explore and talk about different forces they can feel. (Nursery – Forces) • Talk about the differences between materials and changes they notice. (Nursery – Forces) • Explore the natural world around them. (Reception – Forces) • Describe what they see, hear and feel whilst outside. (Reception – Forces) • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 - Uses of everyday materials)	Force, push, pull, twist, contact force, non-contact force, magnetic force, magnet, strength, bar magnet, ring magnet, button magnet, horseshoe magnet, attract, repel, magnetic material, metal, iron, steel, poles, north pole, south pole

Key Vocabulary with definitions			
Force	A push or a pull	**attract**	To come together
Magnet	An object that has the power to pull items made of iron toward itself.	**repel**	To force away/apart
Magnetic	Can be attracted to a magnet	**metal**	Any solid mineral element that exhibits certain characteristics such as the ability to conduct heat or electricity. Most metals
Contact force	Physically touching something	**poles**	The end of a magnet. A magnet has a north and south pole

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE

Key learning

A force is a push or a pull. When an object moves on a surface, the texture of the surface and the object affect how it moves. It may help the object to move better or it may hinder its movement e.g. ice skater compared to walking on ice in normal shoes.

A magnet attracts magnetic material. Iron and nickel and other materials containing these, e.g. stainless steel, are magnetic. The strongest parts of a magnet are the poles. Magnets have two poles– a north pole and a south pole. If two like poles, e.g. two north poles, are brought together they will push away from each other – repel. If two unlike poles, e.g. a north and south, are brought together they will pull together – attract.

What is a force?	A force is either a push or a pull.
Forces can make things...	• Speed up • Slow down • Change shape • Change direction
A force that speeds something up	The child is pushing the car to speed it up. 
A force that slows something down	The girl is pulling the dog to slow it down. 
A force that changes the shape of something	The can is being squeezed so that it changes shape and becomes smaller. 
A force that changes the direction of something	When the ball is hit with the racket, it will change direction. 

For some forces to act, there must be contact e.g. a hand opening a door, the wind pushing the trees. Some forces can act at a distance e.g. magnetism. The magnet does not need to touch the object that it attrac ts.

Most metals however are not attracted to magnets, these include copper, silver, gold, magnesium, platinum, aluminium and more.

Metals such as iron, nickel and cobalt are attracted to magnets.

Why is magnetism different?	All of the forces above needed contact between two objects for them to happen. **Magnetic forces can act at a distance.**
Magnets have a North Pole and a South Pole	South Pole North pole 
Magnets attract or repel each other	Attract:  Repel:  North and south attract. But north and north or south and south will repel.

Types of magnet	
Bar	
Ring	
Button	
Horseshoe	

Common misconceptions

Some children may think:

- the bigger the magnet the stronger it is
- all metals are magnetic.

Activities

- Carry out investigations to explore how objects move on different surfaces e.g. spinning tops/coins, rolling balls/cars, clockwork toys, soles of shoes etc.
- Explore what materials are attracted to a magnet.
- Classify materials according to whether they are magnetic.
- Explore the way that magnets behave in relation to each other.
- Use a marked magnet to find the unmarked poles on other types of magnets.
- Explore how magnets work at a distance e.g. through the table, in water, jumping paper clips up off the table.
- Devise an investigation to test the strength of magnets.

Future Learning

- Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. (Y5 - Forces)
- Identify the effects of air resistance, water resistance and friction, that act between moving surfaces. (Y5 - Forces)
- Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. (Y5 - Forces)
- Magnetic fields by plotting with compass, representation by field lines. (KS3)
- Earth's magnetism, compass and navigation. (KS3)

Possible evidence

For ARE:

- Can use their results to describe how objects move on different surfaces
- Can use their results to make predictions for further tests e.g. it will spin for longer on this surface than that, but not as long as it spun on that surface
- Can use classification evidence to identify that some metals, but not all, are magnetic
- Through their exploration, they can show how like poles repel and unlike poles attract, and name unmarked poles

For GD:

- Can use test data to rank magnets
- Can give examples of forces in everyday life
- Can give examples of objects moving differently on different surfaces
- Can name a range of types of magnets and show how the poles attract and repel
- Can draw diagrams using arrows to show the attraction and repulsion between the poles of magnets

Working scientifically skills covered in this topic

Asking questions	➢ What materials are magnetic? ➢ Are there different types/strengths of magnets? ➢ Where are forces present in everyday life?
Setting up fair tests	➢ Investigate how objects move on different surfaces ➢ Investigate the strength of different magnets
Choosing and using equipment	➢ Using magnets. ➢ Forceometer/newton metre
Observing	➢ The attraction and repulsion between magnets.
Measuring	➢ The distance a magnets can work on an object (tape measure) ➢ The distance an object travels on a surface (tape measure)
Using other sources of information	➢
Recording	Using a table to record results Drawing diagrams using arrows to show attraction and repulsion.
Identifying and classifying	➢ Different types of magnets ➢ Classify materials according to whether they are magnetic (venn/carolldiagrams)
Explaining results	To use data from tests to rank magnets