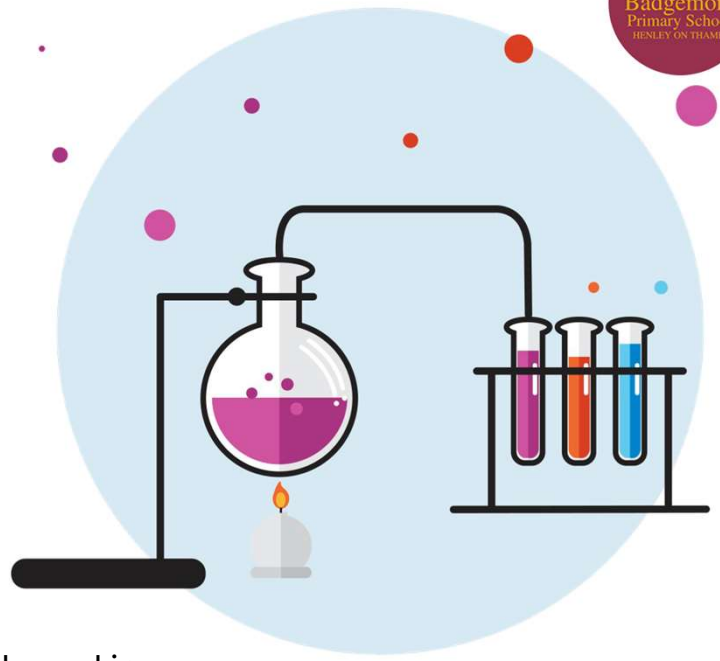
Science | Intent and Implementation



How is science taught?

Science is inquiry based with an overarching question, linked to each year groups topic, used to promote awe and wonder and guide planning along with working scientifically objectives. Where possible, we enhance the children's natural curiosity and nurture this to allow them to ask their own questions and develop skills needed to answer these.

Our science curriculum is designed to enable teachers to deliver engaging and thought-provoking lessons, where learning is facilitated through hands on scientific discovery, in-depth questioning, flexible thinking and problem solving. Therefore, science lessons are practical and exciting.

Science is taught in mixed-ability class groups, where the focus is on all pupils working together on the same lesson content at the same time. Where appropriate scaffolding is used in order to support and challenge pupils and ensure all key concepts are fully understood. Warmups are used to recall prior knowledge from previous years or earlier in the unit and to engage in rich discussion. Using discussion and questioning as a key teaching tool, oracy is promoted and celebrated as well as cross curricular links being made in maths and topic where appropriate.

The main resource used is the national curriculum where knowledge, understanding and skills are taken from and built upon year on year. The Teacher Assessment in Primary Science's (TAPS) assessment plans help inform teacher judgements along with observation/questioning and marking of books. Teachers supplement where appropriate by additional resources such as Explorify, STEM learning and BP Educational Services.

A science unit of work starts and finishes with the overarching question. This acts as assessment for learning for the teacher and allows the children to see their new acquired knowledge. A knowledge organiser is used so children are aware and can map out their learning journey allowing more time to be invested in embedded practical scientific skills. A TAPs assessment is completed every unit (one a half term) to check the children's knowledge and scientific skills and inform the rest of the unit.

Science | Key Concepts

Science | Content Spine

	Autumn	Spring	Summer
Y1	**Animals, including humans** • identify, name and describe the structure of a variety of common animals, including fish, reptiles, birds and mammals • identify and label basic parts of the human body, and say which part is associated with which sense	**Everyday Materials** • identify, name and describe everyday materials • compare and group materials according to simple properties	**Plants** • identify, name and describe the structure of a variety of common wild and garden plants, including trees
	Seasonal Changes • name the seasons, describe typical weather and how the length of the day changes		
Y2	**Animals, including humans** • know that animals have offspring • understand the basic needs of animals • understand the importance of a healthy lifestyle	**Everyday Materials** • compare the suitability of materials for different uses • find out how objects can change shape	**Living Things and Habitats** • explore differences between things that are living, dead and things that have never been alive • name and describe habitats • describe sources of food, using simple food chains **Plants** • describe how seeds and bulbs grow • find out what plants need to grow
Y3	**Light** • identify sources of light • understand how reflections are created • know how shadows are formed • find ways to make shadows change **Rocks and Soils** • compare different rocks • describe how fossils are formed	**Forces and Magnets** • compare how things move • understand how magnets repel or attract • identify magnetic materials • identify poles on a magnet **Animals, Including humans** • identify that animals need the right type of nutrition • identify the use of skeleton and muscles in animals and humans	**Plants** • identify functions of parts of flowering plants • understand water transportation within plants • learn about the life cycle of flowering plants

Science | Content Spine

	Autumn	Spring	Summer
Y4	**Electricity** • identify common uses of electricity • construct simple circuits • recognise conductors and insulators **Sound** • identify sources of sound • describe how sound travels • find patterns related to pitch and volume	**Living Things and Habitats** • classification keys to group animals • changing environments **Animals, including humans** • identify different teeth • describe the digestive system • construct and interpret food chains	**States of Matter** • recognise the differences between solids, liquid and gases and their properties • understand that matter can change states under certain conditions
Y5	**Earth and Space** • describe the movement of the Earth and Moon • explain night and day **Forces** • explain the force of gravity • identify the effects of air and water resistance and friction	**Materials and their Properties** • compare and group materials based on properties • understand about reversible and irreversible change including dissolving, filtering, sieving, evaporating and burning	**Living things and Habitats** • describe differences in life-cycles • describe the process of reproduction in some plants and animals **Animals, including humans** • describe changes as humans develop to old-age
Y6	**Classification** • describe and give reasons for classification **Evolution** • recognise that living things have changed of over time, and that fossils provide information • recognise variation • explain adaptation	**Light** • recognise how light travels and explain how we see things • explain how shadows are formed	**Animals, including humans** • recognise the impact of diet, drugs and exercise • describe the transportation of nutrition • identify and name parts of the circulatory system **Electricity** • explain the variation in the functionality of components • use symbols to draw circuits

Science | Progression Map – Living Things

Year 1

- point out some differences between humans, other animals and non-living things in terms of features
- recognise and name parts of the body of both humans and animals
- recognise simple changes that take place as an animal gets older
- identify the five senses and the location of each sense organ
- recognise and name the external parts of plants (e.g. leaf, flower)
- recognise that plants are living and need water and light to grow
- describe groups of plants (e.g. trees, grass, moss, pondweed)
- name some local plants and animals
- sort living things from inanimate objects

Year 2

- describe the basic conditions required for plants and animals to survive (food, water, air, warmth, light)
- know that living things grow and reproduce
- compare humans and other animals including comparing babies and toddlers and the young of other animals at different stages
- recognise that a humans appearance changes over time but that some features can be changed
- recognise a variety of basic food types and know that a balance is needed to stay healthy
- recognise similarities and differences between themselves and others and treat others
- understand the need to exercise to stay healthy
- know that different things are found in different places (e.g. ponds, woods etc)
- know that flowering plants produce seeds which grown into new plants
- describe changes observes as plants grow
- identify parts common to plants and point out differences
- sort living things into groups and say why I have put them in a group
- group animals according to their habitat and describe some local and non-local habitats in terms of the animals and plants found there

Year 3

- know that humans need a good supply of air, clean water, a variety of foods and regular exercise to stay healthy
- describe differences between living and non-living things
- have a sound understanding of all basic life processes
- recognise some harmful effects of drugs on the human body
- describe the main functions of the skeleton
- understand the effect of exercise on muscles and heart rate
- know that muscles work in pairs contracting and relaxing to produce movements
- use scientific names for some major organs or body systems and locate the position of these in the body
- explain changes in living things e.g. how light or water affects plant growth
- make careful observations and measurements of plants growing
- recognise that healthy roots and stems are needed for plants to grow well and begin to recognise that the leaves of a plant are associated with healthy growth
- identify the organs of different plants e.g. stamens, stigma and root hairs, and explain their functions
- explain how seeds are dispersed and why they need to be

Year 4

- know that feeding relationships exist between plants and animals in a habitat
- describe this relationship using food chains and terms such as predator and prey
- know that most food chains start with a green plant
- group a range of plants and animals based on knowledge of their similarities and differences
- make and use keys based on observable features to help identify and group living things systematically
- recognise that the shape of teeth makes them useful for different purposes
- recognise that animals have different diets and therefore different teeth
- recognise that diet can affect the health of humans (e.g. some foods can damage teeth)

Science | Progression Map – Living Things

Year 5

- have a good knowledge of all basic life processes
- know how energy is transferred in animals when they digest and absorb food
- know that plants and animals in a local habitat are interdependent and can explain the terms consumer and producer
- describe the life process of reproduction in some animals, including humans
- describe the main stages of the life cycles of humans and flowering plants and point out the similarities
- describe the main functions of parts of plants, including stamen, stigma, style, petal, sepal
- know that green plants need light and water to grow well and that plants produce new material from air and water in their leaves
- know that plants produce flowers which have male and female organs and that seeds are formed when pollen fertilizes the ovum
- describe the process of pollination, fertilization, seed dispersal and germination

Year 6

- know that the blood comes from the heart in arteries and returns to the heart in veins
- know that blood carries oxygen and other essential material around the body
- name the major food groups and some sources for each of these groups
- recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function
- know that there are many micro-organisms such as bacteria which can be beneficial or harmful
- identify one or two species facing extinction and describe a programme to overcome the problem
- describe ways in which nutrients and water are transported within animals
- know there are a great variety of living things and understand the importance of classification
- explain how different organisms are found in different habitats because of differences in environmental factors
- describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals

Science | Progression Map – Physical Processes

Year 1

- know it is dangerous to look at the Sun
- know that the weather changes according to the time (season) of the year
- describe changes during each of the four seasons of the year

Year 2

Year 3

- use my knowledge of physical processes to link cause and effect and explain that a bulb doesn't light because of a break in an electrical circuit
- construct circuits with more than one bulb
- know that the 'amount' of electricity depends on the number of cells
- build a circuit to test which materials let electricity pass through
- explain that metals are good conductors and plastics are good insulators
- draw diagrams, using standard symbols, of simple circuits
- know that sound travels through solids, water and air
- explain that shadows are formed when light from a source is blocked
- explain the difference between loudness and pitch of sounds
- know that vibrations produce sound and suggest how to change the pitch and loudness sounds produced by a range of instruments

Year 4

- use knowledge of physical processes to link cause and effect and explain a push or pull affecting the speed or movement of an object
- describe the direction of forces between magnets or between a spring
- classify materials as magnetic or non-magnetic
- describe how to increase air and water resistance
- explain that friction is a force between two moving surfaces and how it can be increased or decreased
- use a force meter to measure forces accurately
- know gravity as the 'pull' of the Earth on objects

Science | Progression Map – Physical Processes

Year 5

- recognise that when an object falls, air resistance is the frictional force of air on objects and acts in the opposite direction to weight
- explain that the Earth and objects are pulled towards each other and that this gravitational attractions causes objects to have weight
- identify the effects of air resistance, water resistance and friction that act between moving surfaces
- use models to explain effects that are caused by the movement of the earth (e.g. the length of the day or year)
- explain the changes in the appearance of the Moon over a period of 28 days
- describe the movement of the Earth and other planets, relative to the sun in the solar system
- give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic
- identify a range of contexts in which changes take place (e.g. evaporation, condensation)
- explain how to make things dry more quickly using ideas about factors affecting evaporation
- give examples of how heating and cooling materials can cause them to change and that burning can produce new materials
- know that temperature can affect the rate at which evaporation or condensation will take place
- know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution
- demonstrate that dissolving, mixing and changes of state are reversible changes
- use knowledge of how a mixture can be separated to suggest ways in which other similar mixtures might be separated
- explain that the larger the volume of water, the more solid will dissolve
- use my knowledge of solids, liquids and gases to decide how many mixtures might be separated, including through filtering, sieving and evaporating

Year 6

- use ideas to explain how to make a range of changes in an electrical circuit e.g. altering the current
- set up a circuit to investigate ideas
- know that the current flow is the same at all parts of a circuit
- compare and give reasons for variations in how components function e.g. the brightness of a bulb, the loudness of buzzers and the on/off position of switches
- indicate direction of light using straight lines or arrows
- recognise that light from objects can be reflected by a mirror
- identify factors that affect the size and positions of shadows
- 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

Science | Progression Map – Properties of Materials

Year 1

- describe materials using my senses, saying what they look like and what they feel like
- know a range of properties e.g. texture and appearance
- give reasons why a material may or may not be suitable for a certain purpose
- group together objects made of the same common materials and can name the material

Year 2

- identify a range of common materials and know some of their properties (e.g. bendy, waterproof) and their uses
- describe the similarities and differences between materials
- compare materials and sort them into groups describing the reasons using terms such as shiny, hard, smooth
- identify some materials that occur naturally and others that do not
- identify some materials that can be changed by squashing, bending etc. and that some easily change back and that others do not
- describe how the shape of liquids can be changed by pouring them into different containers
- know that ice, water and steam are the same material and describe how water can be changed into ice and steam, and the reverse

Year 3

- sort materials into groups in a variety of ways using their properties
- group rocks according to their observable characteristics such as texture, permeability
- know that soils come from rocks, and that there are different kinds of soils depending on the rock from which they have come
- describe in simple terms how fossils are formed when things that have lived are trapped within rock
- separate materials using magnetism

Year 4

- describe the differences between the properties of solids, liquids and gases and explain how these differences are used to classify substances
- state the characteristics of good thermal insulators and identify everyday uses for these
- recognise and classify changes that can be reversed (e.g. the freezing of water) and that some such as baking of clay cannot be reversed
- know that temperature is a measure how hot or cold things are
- use scientific terms to describe changes (e.g. evaporation, condensation)
- use a thermometer accurately and know that the freezing temperature of water is 0°C and that the boiling point is 100°C
- know that the same material can exist as both a solid and a liquid and that different solids melt at different temperatures
- describe examples of the main processes associated with water changing state that recognise that these processes can be reversed
- explain the water cycle in terms of these processes
- separate materials using magnetism
- demonstrate sieving to separate solid particles of different size
- describe methods to separate materials (e.g. filtration, distillation)
- select appropriate methods for separating mixtures by decanting, sieving or magnetism
- recognise that when solids dissolve into water they form solutions and they break into very small particles that pass through the holes in the filter paper
- describe some factors that affect the rate at which a solid will dissolve

Science | Progression Map – Properties of Materials

Year 5	Year 6
• describe some metallic properties and use these properties to distinguish metals from other solids (e.g. good electrical conductivity) • know that indicators are used to distinguish acids from alkalis • give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic • identify a range of contexts in which changes take place (e.g. evaporation, condensation) • explain how to make things dry more quickly using ideas about factors affecting evaporation e.g. hairdryer warms air and blows evaporated water away • give examples of how heating and cooling materials can cause them to change and that burning can produce new materials • know that temperature can affect the rate at which evaporation or condensation will take place • know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution • demonstrate that dissolving, mixing and changes of state are reversible changes • use knowledge of how a mixture can be separated to suggest ways in which other similar mixtures might be separated • explain why there is a limit to how much solid will dissolve in a liquid • explain that the larger the volume of water, the more solid will dissolve • use my knowledge of solids, liquids and gases to decide how many mixtures might be separated, including through filtering, sieving and evaporation	

Science | Progression Map – Working Scientifically

Year 1

- talk about and draw pictures of what is heard, touched, smelt or tasted
- ask questions about what I see and try to answer these questions
- know how to try and find out things
- give some reasons why things might happen
- put information on a chart
- make some measurements of things that have been observed
- present information about what has been found out

Year 2

- use senses to observe and compare living things, objects and events
- act on suggestions about how to find things out
- find information from books or other sources
- recognise when a test is unfair
- carry our instructions for simple investigations
- describe observations using scientific vocabulary
- make measurements using simple equipment
- compare observations using scientific vocabulary
- say whether what happened was what was expected
- discuss, agree or challenge observations made by others

Year 3

- recognise why it is important to collect data to answer questions
- act on suggestions and put forward ideas about how to find the answer to a question
- carry out a fair test and explain why it was fair
- predict what might happen before carrying our any tests using scientific reasoning
- measure length using scientific equipment
- use scientific vocabulary to describe observations
- record observations, comparisons and measurements using tables, charts, text and labelled diagrams
- give reasons for observations
- look for patterns in my data and try to explain them
- suggest how to make improvements to scientific work

Year 4

- recognise that scientific ideas are based on evidence
- decide on the most appropriate approach to an investigation (e.g. a fair test) to answer a question
- describe how to vary one factor while keeping others the same
- make predictions based upon scientific understanding and reasoning
- select which information to use from sources provided for me
- begin to identify risks in investigations
- make observation using materials and equipment that are right for the task
- record observations using tables and bar charts
- plot points to make line graphs
- use data to interpret patterns in my data
- consider how changing one variable can alter another
- suggest improvements to scientific work and give reasons for these

Science | Progression Map – Working Scientifically

Year 5

- describe how experimental evidence and creative thinking have been combined to provide a scientific explanation
- find an appropriate approach when trying to answer a question
- select from a range of sources of information
- identify the key factors to be considered when completing a fair test for an investigation
- make predictions based on scientific knowledge and understanding
- select apparatus and plan to use it effectively
- make a series of observations, comparisons or measurements with precision
- use appropriate scientific language and conventions to communicate data
- draw conclusions that are consistent with the evidence and relate these to scientific knowledge
- make practical suggestions about how working methods can be improved

Year 6

- describe evidence for some accepted scientific ideas and explain how the interpretation of evidence by scientists leads to the development of acceptance of new ideas
- use scientific knowledge and understanding to identify an appropriate approach to answering a question
- select and use sources of information effectively
- make enough measurements, comparisons and observations for the task
- choose scales for graphs and diagrams that enable me to show data and features effectively
- select and use appropriate methods for communicating qualitative and quantitative data
- identify measurements and observations that do not fit the main pattern shown
- draw conclusions that are consistent with the evidence and use scientific knowledge and understanding to explain them
- make reasoned suggestions about how working methods could be improved

Science | Knowledge Organiser: Year 1 - Everyday Materials

What should I already know?

They know the properties of some materials and can suggest some of the purposes they are used for.

What will I know by the end of the unit?

Materials have physical properties which can be investigated and compared.	• Distinguish between an object and a material from which it is made • Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock • Describe the simple physical properties of a variety of everyday materials • Compare and group together a variety of everyday materials on the basis of their simple physical properties

Scientific investigation (TAPS)

Perform simple tests to compare and group	• Can children carry out a simple test? • Can children use test results to group materials into those which float or sink?

Key vocabulary

absorbent	able to soak up liquids	**plastic**	a material which is light in weight and does not break easily
bendy	soft and flexible, able to bend	**rock**	the hard substance which the earth is made of
brick	a block of material, usually made of clay	**rough**	uneven and not smooth
dull	a colour or light that is not bright	**shiny**	things are bright and reflect light
elastic	a rubber material that stretches when you pull it and returns to its original size and shape when you let it go	**smooth**	no roughness, lumps, or holes
fabrics	cloth or other material produced by weaving together cotton, wool or other threads.	**soft**	not rough or hard
foil	sheets of metal as thin as paper	**stiff**	firm or does not bend easily
glass	a hard transparent material	**stretchy**	slightly elastic
man-made	things are created by people	**transparent**	if an object is transparent, you can see through it
metal	a hard substance such as iron, steel, gold, or lead	**waterproof**	does not let water pass through it
natural	things that exist in nature and are not made by people	**wood**	the material which forms the trunks and branches of trees
opaque	if an object or substance is opaque, you cannot see through it		

Our Curriculum: STEM Faculty

Science I Knowledge Organiser: Year 1 - Animals including Humans

What should I already know?

- I can make observations of animals.
- I know about similarities and differences in relation to living things.

What will I know by the end of the unit?

Life exists in a variety of forms and goes through cycles - Animals	• Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. • Identify and name a variety of common animals that are carnivores, herbivores and omnivores.
The human body has a number of systems, each with its own function.	• Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets) • Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense

Key vocabulary

backbone	the column of small linked bones down the middle of your back.	**omnivore**	person or animal eats all kinds of food, including both meat and plants.
carnivores	an animal that eats meat.	**temperature**	a measure of how hot or cold something is
cold-blooded	a body temperature that changes according to the surrounding temperature.	**vertebrate**	a creature which has a spine.
environment	all the circumstances, people, things, and events around them that influence their life	**warm-blooded**	a fairly high body temperature which does not change much and is not affected by the surrounding temperature.
gills	the organs on the sides of fish and other water creatures through which they breathe.	**wild**	animals or plants that live or grow in natural surroundings and are not looked after by people.
herbivore	an animal that only eats plants.	**pet**	a tame animal kept in a household.
invertebrate	a creature that does not have a spine, for example an insect, a worm, or an octopus .		

Scientific investigation (TAPS)

Review: Use observations and ideas to suggest answers to questions .	Can you label basic parts of the human body? Can you say which part of the body is associated with each sense?
Review: Identify and classify	Can you name a variety of animals including fish, amphibians, reptiles. birds. mammals? Can you classify animals according to different animal groups and/or what they eat?

Our Curriculum: STEM Faculty

Science I Knowledge Organiser: Year 1 - Plants

What should I already know?

- Plants grow all around us.

What will I know by the end of the unit?

Life exists in different ways and goes through cycles.	• The different names of common plants and trees. • The different parts of a plant e.g stem, root and leaves • Know the difference between something that is dead, alive or never been alive.

Scientific investigation (TAPS)

Observe changes using simple equipment	• Notice the differences and similarities between plants • Label the basic parts of a plant • Plant a seed and watch it grow!

Key vocabulary

plant	a living thing that grows in the earth and has a stem, roots, and leaves.	**flower**	part of the plant that is often colourful and grows at the end of the plant.
bulb	a root shaped like an onion that grows in to a flower or plant.	**leaves**	the part of the plant that are flat, thin and green.
common	something found in large quantities.	**tree**	a tall plant that has a hard trunk, branches and leaves.
wild	plants or animals that grow in natural surroundings, without the care of people	**evergreen**	a tree or plant that has leaves all year round.
stem	the thin part of the plant on which the flowers and leaves grow.	**deciduous**	a tree that looses it's leaves every autumn.
roots	the part of the plant that grows under the soil.		

Science | Knowledge Organiser: Year 2 - Animals including Humans

What should I already know?

- Life exists in a variety of forms and goes through cycles Animals
- The human body has a number of systems, each has it own function

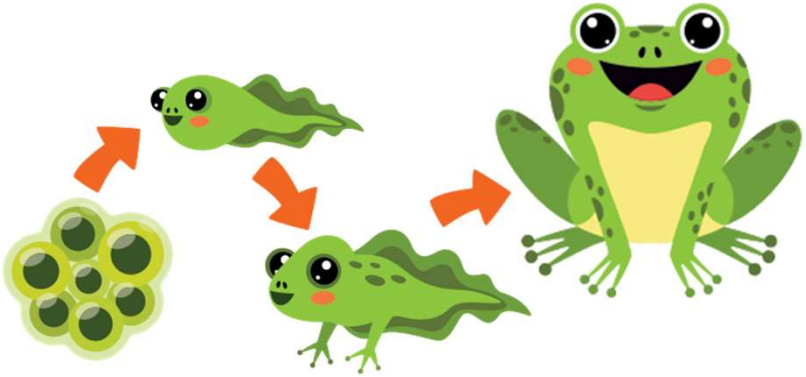
What will I know by the end of the unit?

Life exists in a variety of forms and goes through cycles— Humans	• notice that animals, including humans, have offspring which grow into adults • find out about and describe the basic needs of animals, including humans, for survival (water, food and air)
The human body has a number of systems, each of which has its own function.	• describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene

Scientific investigation (TAPS)

Recognise growth in humans.

Using their observations and ideas to suggest answers to questions	• Can children compare different hand spans? • Can children suggest answers to their questions about hand spans?



Key vocabulary

backbone	the column of small linked bones down the middle of your back	**life cycle**	the series of changes that an animal or plant passes through from the beginning of its life until its death
balanced diet	a variety of food that you regularly eat	**medicine**	the treatment of illness and injuries by doctors and nurses
bar chart	a chart which uses bars to represent the value of something and comparing it to a different group	**muscles**	something inside your body which connects two bones and which you use when you make a movement
bones	the hard parts inside your body which form your skeleton	**offspring**	a person's children or an animal's young
disease	an illness which affects people, animals, or plants	**pet**	a tame animal kept in a household
exercise	When you exercise, you move your body energetically in order to get fit and to remain healthy	**pictogram**	a simple drawing that represents something
farm	an area of land used to produce crops or to breed animals and livestock	**skeleton**	the framework of bones in your body
healthy	well and not suffering from any illness	**survive**	continue to exist
hygiene	keeping yourself and your surroundings clean, especially in order to prevent illness or the spread of diseases		

Science | Knowledge Organiser: Year 2 - Everyday Materials

What should I already know?

- Materials have physical properties which can be investigated and compared.

What will I know by the end of the unit?

The physical properties of materials determine their uses	• identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for different uses
Materials have physical properties which can be investigated and compared	• find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching

Scientific investigation (TAPS)

Use knowledge and understanding of properties of materials to compare suitability for different uses	
Ask simple questions and recognising that they can be answered in different ways	• Can children discuss/use different ways to test how waterproof materials are? • Can children compare materials on the basis of waterproofness?
Links to changing shape of materials or pushing forces	
Perform simple tests to answer questions	• Can the children begin to be systematic in their testing? • Can the children use their tests to suggest answers to questions?

Key vocabulary

absorbent	able to soak up liquids	**plastic**	a material which is light in weight and does not break easily
bendy	soft and flexible, able to bend	**rock**	the hard substance which the Earth is made of
brick	a block of material, usually made of clay	**rough**	uneven and not smooth
dull	a colour or light that is not bright	**shiny**	things are bright and reflect light
elastic	a rubber material that stretches when you pull it and returns to its original size and shape when you let it go	**smooth**	no roughness, lumps, or holes
fabrics	cloth or other material produced by weaving together cotton, wool or other threads.	**soft**	not rough or hard
foil	sheets of metal as thin as paper	**stiff**	firm or does not bend easily
glass	a hard transparent material	**stretchy**	slightly elastic
man-made	things are created by people	**transparent**	If an object is transparent, you can see through it
metal	a hard substance such as iron, steel, gold, or lead	**waterproof**	does not let water pass through it
natural	things that exist in nature and are not made by people	**wood**	the material which forms the trunks and branches of trees
opaque	if an object or substance is opaque, you cannot see through it		

Science | Knowledge Organiser: Year 2 - Living Things and Habitats

What will I know by the end of the unit?	
Habitats provide living things with what they need.	• 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 how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other • identify and name a variety of plants and animals in their habitats, including microhabitats • describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food

Scientific investigation (TAPS)

Identify and name a variety of plants and animals in their habitats, including micro-habitats	
Identifying and classifying	• Can children use spotter sheets to identify plants/animals? • Can children identify the types of plants/animals they are looking for?
Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants	
Gather and record data to help in answering questions.	• Can children identify where plants and animals live? • Can children make a record of where plants and animals live? • Can children discuss why they might live in chosen habitat?

Key vocabulary

biomes	a natural area of vegetation and animals	**omnivore**	person or animal eats all kinds of food, including both meat and plants
carnivore	an animal that eats meat	**plant**	a living thing that grows in the earth and has a stem, leaves, and roots
depend	if you depend on someone or something, you need them in order to be able to survive physically	**source**	where something comes from
food chain	a series of living things which are linked to each other because each thing feeds on the one next to it in the series	**tree**	a tall plant that has a hard trunk, branches, and leaves
habitat	the natural environment in which an animal or plant normally lives or grows	**vegetation**	plants, trees and flowers
herbivore	an animal that only eats plants		
invertebrate	a creature that does not have a spine, for example an insect, a worm, or an octopus		
microhabitat	a small part of the environment that supports a habitat, such as a fallen log in a forest		
minibeast	a small invertebrate animal such as an insect or spider		
offspring	a person's children or an animal's young		

Science | Knowledge Organiser: Year 2 - Plants

What should I already know?

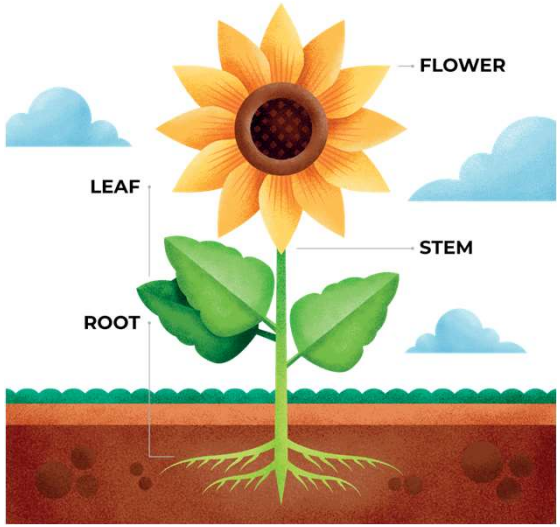
- Life exists in different ways and goes through cycles

What will I know by the end of the unit?

Life exists in a variety of forms and goes through cycles—Plants	• observe and describe how seeds and bulbs grow into mature plants • find out and describe how plants need water, light and a suitable temperature to grow and stay healthy

Scientific investigation (TAPS)

Describe how plants needs water, light and a suitable temperature to grow and stay healthy	
Observe closely, using simple equipment	• Can children observe closely, noticing differences and similarities? • Can children measure and compare the height of plants?

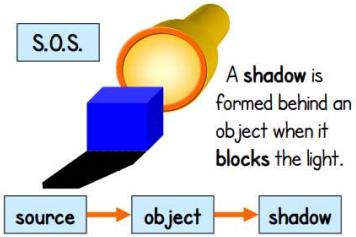


Key vocabulary

branches	parts that grow out from the tree trunk and have leaves, flowers, or fruit growing on them	**nutrients**	substances that help plants and animals to grow
bulb	a root shaped like an onion that grows into a flower or plant	**petal**	thin coloured or white parts which form part of the flower
common	something that is found in large numbers or it happens often	**plant**	a living thing that grows in the earth and has a stem, leaves, and roots
crop	plants such as wheat and potatoes that are grown in large quantities for food	**reproduce**	when an animal or plant produces one or more individuals similar to itself
deciduous	a tree that loses its leaves in the autumn every year	**roots**	the parts of a plant that grow under the ground
evergreen	a tree or bush which has green leaves all the year round	**seed**	the small, hard part from which a new plant grows
flower	the part of a plant which is often brightly coloured and grows at the end of a stem	**stem**	the thin, upright part of a plant on which the flowers and leaves grow
flowering	trees or plants which produce flowers	**tree**	a tall plant that has a hard trunk, branches, and leaves
fruit	something which grows on a tree or bush and which contains seeds or a stone covered by a substance that you can eat	**trunk**	the large main stem from which the branches grow
garden	a piece of land next to a house, with flowers, vegetables, other plants, and often grass	**vegetable**	plants such as cabbages, potatoes, and onions which you can cook and eat
herb	a plant whose leaves are used in cooking to add flavour to food, or as a medicine	**wild**	animals or plants that live or grow in natural surroundings
leaf / leaves	the parts of a tree or plant that are flat, thin, and usually green		

Our Curriculum: STEM Faculty

Science I Knowledge Organiser: Year 3 - Light



What should I already know?

- I know that some things produce light, such as lamps or candles.

What will I know by the end of the unit?

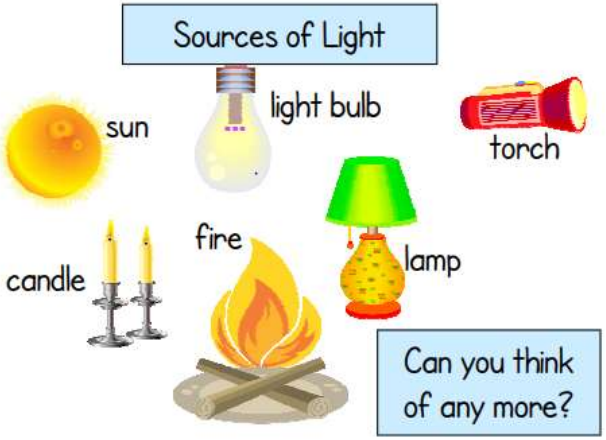
Light can be reflected & absorbed. Light enables us to see.	• A light source is something that emits light by burning, electricity or chemical reactions. • Light travels in straight lines. • I recognise that I need light in order to see things. • I know that dark is the absence of light. • I know that light is reflected from surfaces. • I recognise that light from the sun can be dangerous and that there are ways to protect my eyes. • I understand that shadows are formed when the light from a light source is blocked by a solid (opaque, transparent, translucent) object . • I can find patterns in the way that the size of shadows change.

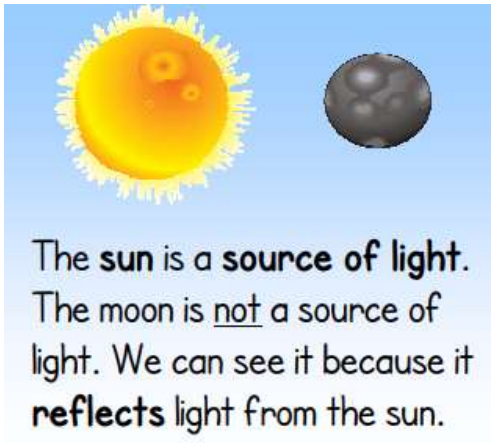
Scientific investigation (TAPS)

Do: Gather and record data to answer questions.	• Can you make a series of careful observations? • Can you record your observations in a systematic way that relates to the question?

Key vocabulary

angle	the direction from which you look at something.	**mirror**	a flat piece of glass which reflects light, so that when you look at it you can see yourself reflected in it.
bright	a colour that is strong and noticeable, and not dark.	**opaque**	if an object or substance is opaque, you cannot see through it
chemical reaction	a process that involves changes in the structure of something.	**reflects**	sent back from the surface and not pass through it.
dark	the absence of light.	**shadows**	a dark shape on a surface that is made when something stands between a light and the surface.
dim	light that is not bright.	**source**	where something comes from.
electricity	a form of energy that can be carried by wires and is used for heating and lighting, and to provide power for machines.	**surface**	the flat top part of it or the outside of it.
emits	to emit a sound or light means to produce it.	**translucent**	if a material is translucent, some light can pass through it.
light	a brightness that lets you see things.	**transparent**	if an object or substance is transparent, you can see through it.





Our Curriculum: STEM Faculty

Science I Knowledge Organiser: Year 3 – Rocks and Soil

What should I already know?

- I can identify and compare the suitability of a variety of everyday materials for particular uses.
- I know some materials can be changed by squashing, bending, twisting and stretching.

What will I know by the end of the unit?

Different rocks have different properties and the formation of soil & fossils can be explained.	• I can describe in simple terms how fossils are formed when things that have lived are trapped within rock. • I know that soils are made from rocks and organic matter.
Materials have physical properti es which can be investigated and compared.	• I can compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. • Non-permeable rocks haves no spaces between the particles, so water cannot pass through. • Permeable rocks have spaces between the particles that allow water to pass through. • I know and can describe how the main types of rock at the Earth's surface are formed: igneous, metamorphic and sedimentary.

Scientific investigation (TAPS)

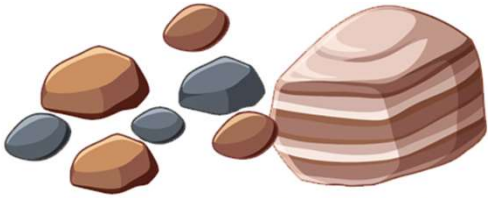
Review: Reporting on findings from enquiries.	• Can you group rocks based on properties? • Can you talk about/draw a diagram/write about your findings? • Can you draw conclusions about the least/most wearing rock?

Key vocabulary

rock	is a large mass of stone.	**chalk**	a white, soft earthy limestone
soil	upper layer of the earth in which plants grow.	**flint**	a hard stone that can be shaped into blades, knives and spears for hunting.
sedimentary	rock formed from layers of sand, stones or mud.	**granite**	a very hard kind of rock.
metamorphic	rock that has changed by heat or pressure.	**sandstone**	sedimentary rock made up of sand or quartz grains and cemented together.
igneous	rocks formed by the actions of a volcano.	**volcano**	a mountain with a hole at the top that is formed by molten lava bursting through.
permeable	allowing liquids or gases to pass through.	**erosion**	is the wearing away of the earth's surface by wind or water.
impermeable	opposite of permeable (waterproof).	**drainage**	a property of soil, whether it allows water to pass through easily or not.
gravel	small stones mixed with coarse sand.	**mineral**	a substance which is taken out of the ground e.g. iron ore is mined and manufactured into metal products.
clay	a sticky kind of earth that can be made into pottery or bricks.	**fossil**	is the remains or the impression left by a prehistoric plant or animal left in a rock.

Magma

Igneous Rock



Sediment

Sedimentary Rock

Our Curriculum: STEM Faculty

Science I Knowledge Organiser: Year 3 – Forces and Magnets

What should I already know?

- I know I can push and pull objects to make them move

What will I know by the end of the unit?

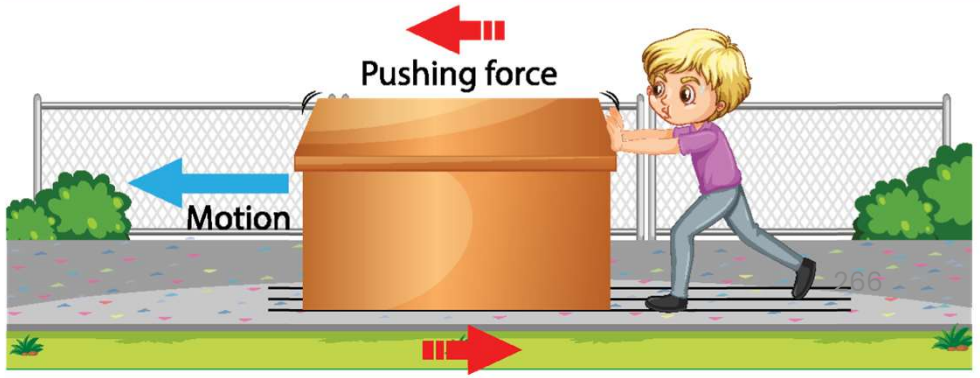
There are contact and non-contact forces; these affect the motion of objects.	• I can compare how things move on different surfaces . • I know that some forces need contact between two objects, but magnetic forces can act at a distance. • I know friction causes objects to slow down and the energy becomes heat. • I know if the forces are balanced on an object it will stay still or continue to move in the same way. • I know if the forces are unbalanced on an object, it will move, change speed, direction or shape. • Il know magnets attract some materials and not others. • I can 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. • I know magnets have north and south poles. These attract each other but two north or two south poles repel each other.

Scientific investigation (TAPS)

Plan: Set up simple practical enquiries, comparative and fair tests	• Can you decide on an approach to compare magnet strength?
Do: Gather, record and present data (in a table or bar chart) to help in answering questions	• Can you make an accurate record of your measurements? • Can you use your results to explain how the car moves on different surfaces?
Review: Using results to draw simple conclusions, suggest improvements and raise further questions.	• Can you use results to predict and explain what may happen on the next attempt? • Can you suggest improvements?

Key vocabulary

force	a push or pull on an object which can cause it to move, change speed, direction or shape. measured in newtons (n).	**mass**	the amount of matter contained in an object. g, kg.
magnet	a material or object that produces a magnetic field. it attracts or repels magnetic objects, including iron.	**gravity**	the area around a large object when a weight can be felt.
attract	to pull towards. opposite of repel.	**air resistance**	the frictional force of air against a moving object.
repel	to push away. opposite of attract.	**water resistance**	the frictional force of water against a moving object.
propel	the act of driving or pushing forward.	**acceleration**	increase in the rate or speed of something.
friction	the resistance of motion when one object rubs against another.	**balanced force**	two forces of equal size acting in opposite directions on an object.
weight	the force due to gravity on objects.	**unbalanced force**	two forces of unequal size acting in opposite directions.



Science | Knowledge Organiser: Year 3 – Animals including Humans

What should I already know?

- The basic needs of animals for survival are water, food and air.
- It is important for humans to exercise, eat the right amounts of different types of food, and stay clean.

What will I know by the end of the unit?

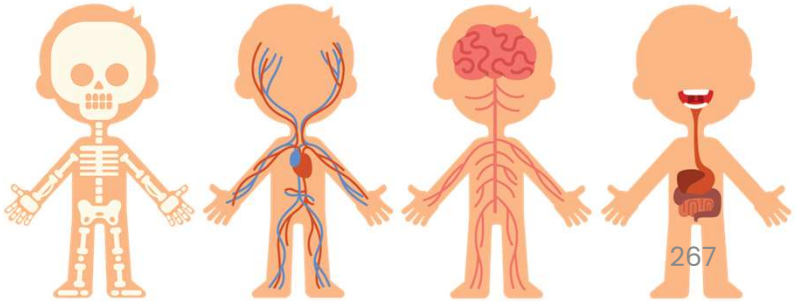
Life exists in a variety of forms and goes through cycles	• I know that animals, including humans, need the right types and amount of nutrition. • There are 5 main food groups (fibre, protein, fats, carbohydrates and dairy) needed for a balanced diet. • I know that animals, including humans, cannot make their own food; they get nutrition from what they eat.
The human body has a number of systems, each with its own function.	• I know that humans and some other animals have skeleton(vertebrates) and muscles for support, protection and movement. • Muscles work in pairs to move a joint. One muscle contracts (gets shorter) whilst the other relaxes (gets longer). • There are over 650 muscles in the human body. • There are 206 bones in an adult human's body. • I know blood carries water, nutrition and oxygen.

Scientific investigation (TAPS)

Plan: Ask relevant questions and use different types of scientific enquiries to answer them.	• Can you turn questions into a form that can be investigated? • Can you use your findings to make further predictions?

Key vocabulary

vertebrate	animals which have a backbone or spine including mammals, birds, reptiles, amphibians and fishes.	**arteries**	muscular tubes that transport blood away from the heart to other parts of the body. type of blood vessel.
invertebrate	animals which do not have a backbone or spine including jelly fish, earthworms and tarantulas.	**veins**	tubes that carry blood towards the heart once oxygen is transported to muscles.
organ	a group of tissues that has a specific and vital function e.g. brain, lungs, liver, stomach, heart.	**vitamin/ nutrient**	substance essential for maintenance of life 4 nutrient and growth.
muscle	a band or bundle of fibres that can contract and relax to allow the body to move.	**hydration**	ensuring the body has enough water.
bone	hard whitish tissue which make up the human skeleton.	**white blood cell**	type of blood cell that fights infection.
joint	where two or more bones join together.	**red blood cell**	type of blood cell that carries oxygen around the body.
tendons	cords that join muscles to bones.	**circulatory system**	combination of heart, blood and blood vessels that transport blood around the body.
blood	blood red liquid which carries oxygen to and carbon dioxide from tissues in the body.	**saturated fats**	types of fats, considered to be less healthy, that should only be eaten in small amounts.
heart	a muscular organ that pumps blood around the body to and from tissues.	**unsaturated fats**	fats that give you energy, vitamins and minerals
lungs	pair of organs within the ribcage where oxygen is added to the blood and carbon dioxide is removed.		



Our Curriculum: STEM Faculty

Science I Knowledge Organiser: Year 3 – Plants

What should I already know?

I know plants go through cycles and can observe and describe how seeds and bulbs grow into mature plants.

What will I know by the end of the unit?

- I can identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers.
- I understand how water is transported within plants.
- I know the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.
- Pollination occurs when pollen from the anther is transferred to the stigma by bees and other insects.
- The pollen travels down and meets the ovule. When this happens, seeds are formed - this is called fertilisation.
- Seeds are then dispersed so that germination can begin again.

Scientific investigation (TAPS)

Do: Make systematic and careful observations and measurements using standard units.	• Can you use simple apparatus to measure water/height? • Can you record your measurements?
Review: Use straightforward scientific to answer questions or to support their findings.	• Can you make careful observations? • An you use observations to suggest how water is transported?

Key vocabulary

absorb	soak up or take in.	**nutrients**	substances that help plants and animals to grow.
anther	the part of a stamen that produces and releases the pollen.	**ovule**	a small egg petal thin coloured or white parts which form part of the flower.
bulb	a root shaped like an onion that grows into a flower or plant.	**petal**	thin coloured or white parts which form part of the flower
carbon dioxide	a gas produced by animals and people breathing out.	**pollen**	a fine powder produced by flowers. it fertilises other flowers of the same species so that they produce seeds.
deciduous	a tree that loses its leaves in the autumn every year.	**pollination**	to pollinate a plant or tree means to fertilise it with pollen. this is often done by insects.
dispersed	scattered, separated, or spread through a large area.	**roots**	the parts of a plant that grow under the ground.
dissect	to carefully cut something up in order to examine it scientifically.	**seed**	the small, hard part from which a new plant grows
evergreen	a tree or bush which has green leaves all the year round.	**stem**	the thin, upright part of a plant on which the flowers and leaves grow
fertilisation	in plants, where pollen meets the ovule to form a seed.	**stigma**	the top of the centre part of a flower which takes in pollen.
germination	if a seed germinates or if it is germinated, it starts to grow	**transported**	taking something from one place to another.
life cycle	the series of changes that an animal or plant passes through from the beginning of its life until its death.	**trunk**	the large main stem from which the branches grow.
mature	when something matures, it is fully developed.	**vegetation**	plants, trees and flowers.

Our Curriculum: STEM Faculty

Science I Knowledge Organiser: Year 4 - Electricity

What should I already know?

- Electricity is a form of energy that can be carried by wires and is used for heating and lighting, and to provide power for devices.
- Sources of light and sound may need electricity to work.

What will I know by the end of the unit?

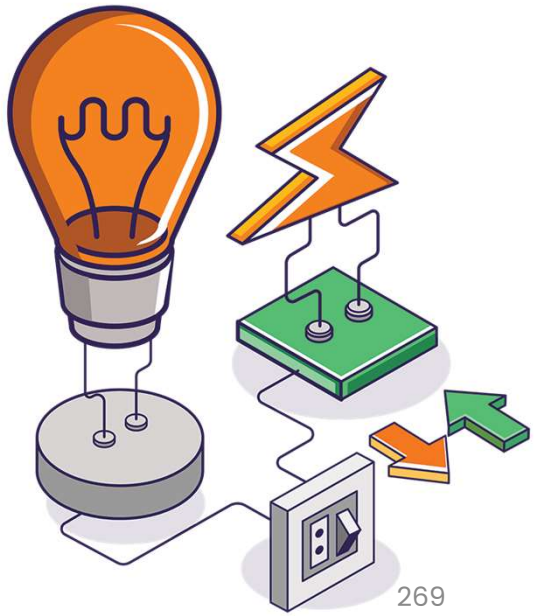
- Common appliances run on electricity either from the mains or from batteries.
- Electricity is generated using energy from natural sources such as the Sun, oil, water and wind. These can also be called fuel sources.
- A complete circuit is a loop that allows electrical current to flow through wires.
- A circuit contains a battery (cell), wires and an appliance that requires electricity to work (such as a bulb, motor or buzzer).
- A switch can break or reconnect a circuit.
- A switch controls the flow of the electrical current around the circuit. When the switch is off, the current cannot flow. This is not the same as an incomplete circuit
- Objects that are made from materials that allow electricity to pass through a create a complete circuit are called electrical conductors.
- Objects that are made from materials that do not allow electricity to pass through and do not complete a circuit are called electrical insulators.
- Metals are good conductors.

Scientific investigation (TAPS)

Review: Report on findings from enquires, including oral and written explanations, displays or presentations of results and conclusions.	• Can you explain results and your conclusions? • Can you recognise common conductors and insulators, and associate metals with being good conductors?

Key vocabulary

appliances	a device or machine in your home that you use to do a job such as cleaning or cooking.	**fuel**	a substance such as coal, oil, or petrol that is burned to provide heat or power.
battery	small devices that provide the power for electrical items such as torches.	**generate**	cause it to begin and develop.
bulb	the glass part of an electric lamp, which gives out light when electricity passes through it.	**insulator**	a non-conductor of electricity or heat mains where the supply of water, electricity, or gas enters a building.
buzzer	an electrical device that is used to make a buzzing sound.	**motor**	a device that uses electricity or fuel to produce movement
cell	a synonym for battery	**switch**	a small control for an electrical device which you use to turn the device on or off.
circuit	a complete route which an electric current can flow around.	**wires**	wires a long thin piece of metal that is us.
component	the parts that something is made of .		
conductor	a substance that heat or electricity can pass through or along .		
current	a flow of electricity through a wire or circuit.		
device	an object that has been invented for a particular purpose.		
electricity	a form of energy that can be carried by wires and in used for heating and lighting, and to provide power for devices.		
energy	the power from sources such as electricity that makes machines work or provides heat.		



Science | Knowledge Organiser: Year 4 - Sound

What should I already know?

- Hearing is one of my five senses.
- Sounds can be combined using musical instruments.

What will I know by the end of the unit?

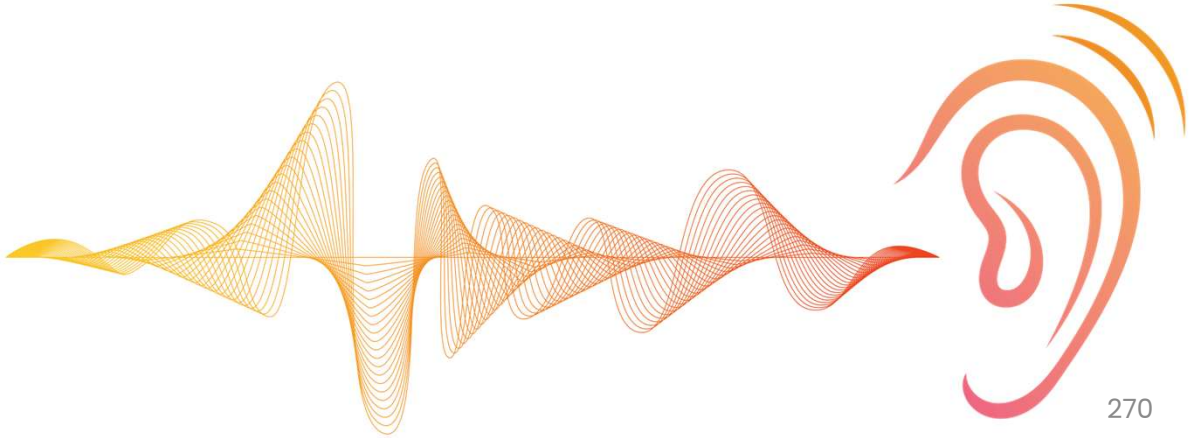
Sound can be reflected & absorbed and enable us to hear.	• Sounds are made by something vibrating. • The object that makes the sound is called the source. Vibrations from sounds travel through a medium (such as air, water, glass, stone, and brick) to the ear. These are called sound waves. • The sound waves travel to the ear and make the eardrums vibrate. • Messages are sent to the brain which recognises the vibrations as sounds. • A vibration with lots of energy makes a powerful sound wave and therefore a loud sound. • High pitch sounds are created by short sound waves and Low pitched by long sound waves.

Scientific investigation (TAPS)

Plan: Ask relevant questions and use different types of scientific enquiries to answer them.	• Can you suggest how to alter the pitch? • Can you carry out tests of these ideas?
Review: Identify differences, similarities or changes related to simple scientific ideas and processes.	• Can you explain how to make the best possible string telephone and suggest reasons for the improvements?

Key vocabulary

amplitude	a measure of the strength of a sound wave.	**power**	power is energy, especially electricity, that is obtained in large quantities from a fuel source and used to operate lights, heating, and machinery.
decibel	a measure of how loud a sound is.	**sound waves**	invisible waves that travel through air, water, and solid objects as vibrations
electricity	a form of energy that can be carried by wires and in used for heating and lighting, and to provide power for devices.	**source**	where something comes from.
energy	the power from sources such as electricity that makes machines work or provides heat.	**transmit**	to pass from one place or person to another.
frequency	a measure of how many times per second the sound wave cycles.	**travel**	how something moves around.
medium	something that makes possible the transfer of energy from one location to another.	**vibrations**	invisible waves that move quickly.
pitch	how high or low a sound is.	**volume**	how loud or quiet a sound is.



Our Curriculum: STEM Faculty

Science I Knowledge Organiser: Year 4 - Living Things and Habitats

What should I already know?

- Animals can be grouped into vertebrates (and then further into fish, reptiles, amphibians, birds and mammals) and invertebrates.
- Animals can be grouped into carnivores, herbivores and omnivores.
- The differences between the teeth of carnivores and herbivores.
- The names of some common wild and garden plants and deciduous and evergreen trees.
- Examples of habitats (including microhabitats) and the animals and plants that can be found there.
- Living things depend on each other to survive.
- How food chains and food webs work.
- How land use has changed over time and the effects this has on the environment (e.g. urban development).

What will I know by the end of the unit?

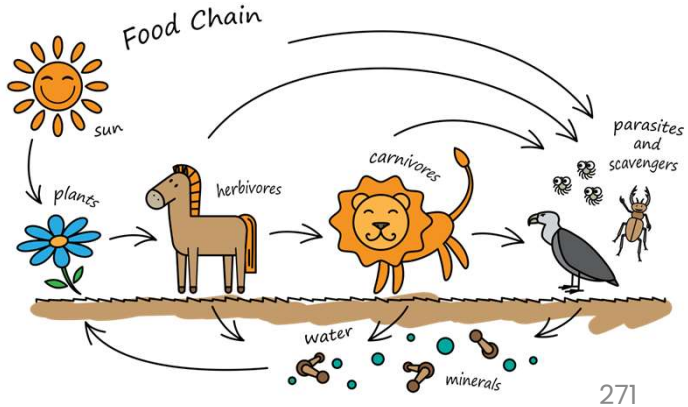
- All living things, which can also be called organisms, have to do certain things to stay alive. These are the life processes: movement, respiration, sensitivity, growth, reproduction, excretion and nutrition.
- Living things can be grouped in a variety of ways (where they live, what type of organism they are, what features they have).
- Classification keys (a tool that is used to group living things) can be used to help group, identify and name a variety of living things in their local and wider environment .
- Environments can change and that this can sometimes pose dangers to living things.
- Habitats can change throughout the year and this can have an effect on the plants and animals that live there.
- Humans can have positive and negative effects on the environment:
- Positive effects: nature reserves, ecological parks.
- Negative effects: litter, urban development .

Key vocabulary

biomes	a natural area of vegetation and animals.	**microhabitat**	a small part of the environment that supports a habitat, such as a fallen log in a forest .
carnivore	an animal that eats meat .	**nutrition**	the process of taking food into the body and absorbing the nutrients in those foods.
classification	a key a system which divides things into groups or types.	**omnivore**	person or animal eats all kinds of food, including both meat and plants.
deciduous	trees that lose leaves in the autumn every year.	**organism**	a living thing.
environment	all the circumstances, people, things, and events around them that influence their life.	**reproduction**	when an animal or plant produces one or more individuals similar to itself.
evergreen	a tree or bush which has green leaves all the year round.	**respiration**	process of respiring; breathing ; inhaling and exhaling air.
excretion	the process of eliminating waste from the body.	**sensitivity**	responding to the external environment.
food chain	a series of living things which are linked to each other because each thing feeds on the one next to it in the series.	**vertebrate**	a creature which has a spine.
habitat	the natural environment in which an animal or plant normally lives or grows.		
herbivore	an animal that only eats plants.		
invertebrate	a creature that does not have a spine, for example an insect, a worm, or an octopus.		

Scientific investigation (TAPS)

Do: Gather, record and classify data.	Can you group living things in different ways?



Science | Knowledge Organiser: Year 4 - Animals including Humans

What should I already know?

- Animals including humans cannot make their own food; they get nutrition from what they eat.
- Animals and plants depend on each other to survive.
- All living things (or things that were once living) have a part to play in food chains. Without them, other animals and plants may not be able to survive.

What will I know by the end of the unit?

- Humans have three main types of teeth: a) Canines – used for tearing and ripping food b) Incisors – help you bite off and chew pieces of food. c) Molars – help you crush and grind food.
- Carnivores and herbivores have different types of teeth, to suit the type of food they eat.
- Our body needs food to provide it with energy, vitamins, and minerals.
- The digestive system breaks down food into substances that the various organs and cells in our body can use.
- The digestive system acts in stages to digest our food: 1) chewing 2) swallowing 3) stomach 4) large intestines 5) small intestines.
- Food chains and made up of producers, predators and prey.
- Producers use the sunlight to create their own food.
- A food chain shows the path of energy from one living thing to other.
- Decomposers, like bacteria, are necessary for all food chains.

Scientific investigation (TAPS)

Do: Gather, record and classify data	• Can you group living things in different ways?

Key vocabulary

digestion system	designed to extract the goodness from food and get rid of the leftovers	**molars**	twelve molars at the back of the mouth are big, flat teeth that also help to grind and chew.
nutrition	the substance that you take into your body as food and the way that they influence your health	**enamel**	yellowish-white hard material covering a tooth.
muscles	one of the many tissues in the body that can tighten and relax to produce movement	**tooth decay**	when bacteria in the mouth begin to eat away at teeth.
saliva	mostly made of water and it helps you to chew, taste and swallow food. it contains enzymes which start to break down food	**food chain**	shows how the lives of organisms are linked in natural communities made up of a series of organisms that eat each other. it shows how energy is transferred from one organism to another.
enzymes	special molecules in the body which act to create a chemical which breaks down food	**predators**	an animal that hunts, kills and eats other animals.
oesophagus	the tube in the body that takes food from the mouth to the stomach	**herbivores**	an animal that eats only plants.
stomach	an organ in the body where food is digested.	**omnivore**	an animal that eats both plants and animals.
intestine	a long tube through the body which food travels from the stomach and out the body while it is being digested.	**carnivores**	an animal that eats meat.
incisor	eight teeth at the front of the mouth which have a sharp, straight edge and help cut up the food.	**producer**	plants in a food chain.
canines	four teeth which are tall and pointed and are used to tear food.		
premolars	eight teeth behind the canines and are lower and bumpy and help to grind food.		

Science | Knowledge Organiser: Year 4 – States of Matter

What should I already know?

- How to compare and group together different kinds of materials on the basis of their appearance and simple physical properties.
- The suitability of a variety of everyday materials for different purposes.

What will I know by the end of the unit?

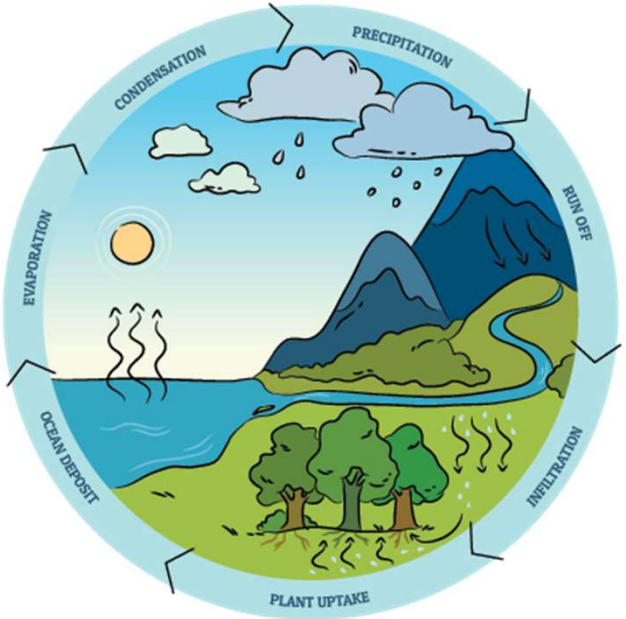
- Solids stay the same shape. They can be held in your hands and can be cut into a new shape. Examples – wood, metal, rock, ice.
- Liquids flow and can be poured. They change shape fill the container and their volume never changes. Examples – water, juice, oil
- Gases are often invisible. They always fill the container and their shape & volume change. Examples – oxygen, hydrogen, carbon dioxide
- All materials are made of particles.
- Some materials change state when they are heated or cooled.
- When heated, particles have more energy and when cooled they have less energy.
- Different materials have different temperatures at which they change state.
- Temperature is measured in degrees celsius (°c)
- Evaporation and condensation are processes in the water cycle.
- The rate of evaporation is affected by temperature

Scientific investigation (TAPS)

Plan: Set up a fair test	• Can you identify what to observe/measure to see if there is a difference?
Do: Take accurate measurements using standard units, using a range of equipment	• Can you use a thermometer to measure temperature accurately?

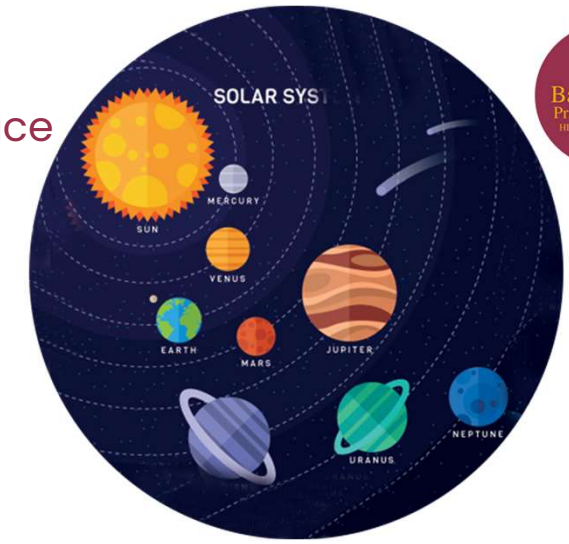
Key vocabulary

matter	objects that take up space and have mass. everything around you is made up of matter.	**reversible**	capable of being reversed so that the previous state is restored.
solid	a solid holds its shape and has a fixed volume.	**irreversible**	not able to be undone or altered – a chemical change has occurred.
liquid	a liquid fills up the shape of the bottom of a container. it forms a pool, not a pile and also has a fixed volume	**the water cycle**	the complete journey that water makes, from one place to the other, and from one state to the other.
gas	a gas can escape from an unsealed container. it fills up the space it is in, and does not have a fixed volume.	**precipitation**	when water or snow fall from a cloud.
evaporation	the process of a liquid heating and changing into a gas.		
condensation	the process of a gas cooling and changing into a liquid.		
melting	the process of a solid heating and changing into a liquid.		
freezing	the process of a liquid cooling and changing into a solid.		
temperature	the degree or intensity of heat present in a substance or object and shown by a thermometer or perceived by touch.		
celsius	a scale of temperature on which water freezes at 0° (and boils at 100°)under standard conditions.		
particle	a tiny amount of something. you can't see them with your eyes!		



Our Curriculum: STEM Faculty

Science I Knowledge Organiser: Year 5 – Earth and Space



What should I already know?

- We have four seasons (autumn, winter, spring and summer)
- The sun is a source of light but the moon is not
- The a shadow is caused when an object blocks light from passing through it
- The properties of a sphere

Scientific investigation (TAPS)	
Gather and record data using tables and graphs	• Can children design simple tables to record results? • Can children present results as a bar chart or line graph?

Key vocabulary

asteroid	a rock that orbits the sun in a belt between mars and jupiter
axis	an imaginary line through the middle of something
comet	a bright object with a long, tail that travels around the sun
galaxy	an extremely large group of stars and planets. our galaxy is called the milky way
gravity	the force which causes things to drop to the ground
meteorite	a rock from outer space that has landed on earth
orbit	the curved path in space that is followed by an object going around and round a planet, moon or star
planet	a large round object in space that moves around a star
solar system	the sun and all the planets that go around it
star	a large ball of burning gas in space
time zones	one of the areas into which the world is divided where the time is calculated as being a particular number of hours behind or ahead of gmt (greenwich mean time)
universe	the whole of space and all the start, planets and other forms of matter and energy in it.

What will I know by the end of the unit?

What causes day and night?	• The Earth rotates on it's axis anti-clockwise and makes a complete rotation over 24 hours (a day) • This makes it appear as the sun moves through the sky but the earths rotation causes day and night • Different parts of the earth experience daylight at different times– the means that morning and night are in different places. This is also the reason we have time zones • As the earth rotates, shadows that are formed change in size and orientations.
Year length and the seasons	• The earth takes 365 and a quarter days to orbit the sun • Because of the extra quarter of a day it take to orbit the sun, every four years the Earth is a leap year! • It is the Earth tilt that causes seasons
The moon	• The moon orbits the Earth anticlockwise and takes approximately 28 days • The Moon spins once on its axis every time it orbits Earth. This means that we only see one side of the moon • The moon has different phases depending on where it is in orbit • The moons gravity causes high and low tides.
What is a solar system?	• There are 8 planets in our solar system (Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune). Pluto is a dwarf planet • They all orbit the Sun, which is a star, and they all have moons • The first four planets are relatively small and rocky, while the four outer planets are gas giants (Jupiter and Saturn) or ice giants (Uranus and Neptune) • There are also asteroids, meteoroids and comets in the solar system • The solar system is in a galaxy called the Milky Way • The galaxy is in the universe.

Science I Knowledge Organiser: Year 5 – Forces

What should I already know?

- How things move on different surfaces
- That some forces need contact between two objects, but magnetic forces can act at a distance
- Magnets attract or repel each other and attract some materials and not others
- Group a variety of everyday materials on the basis of whether they attract to a magnet
- That magnets have two poles

What will I know by the end of the unit?

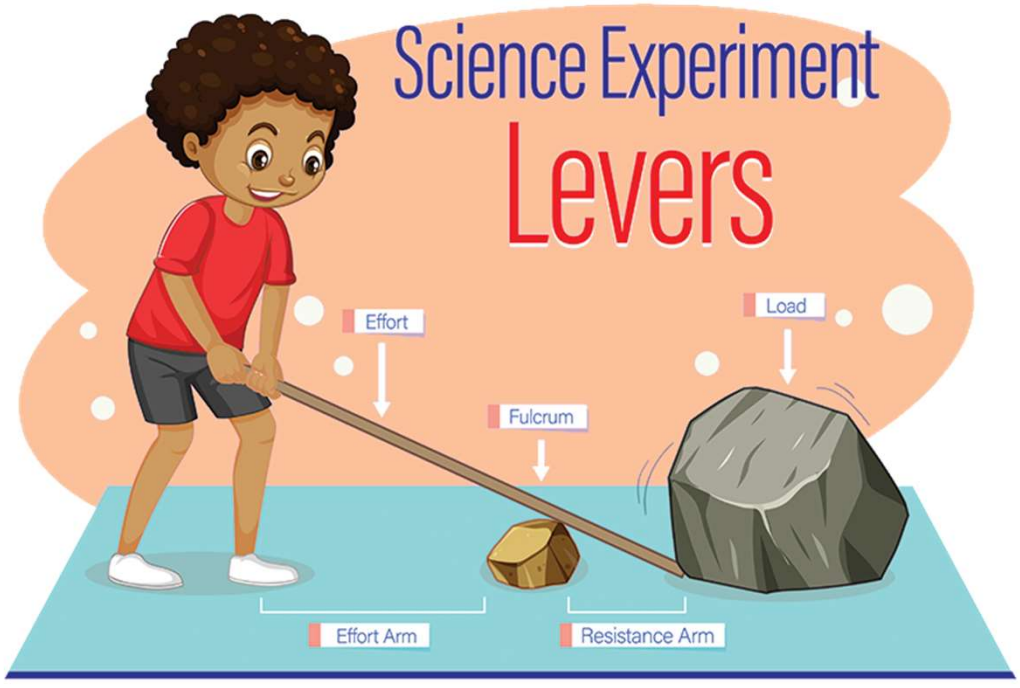
What is Gravity?	• Objects fall towards the Earth because of the force of gravity acting between the earth and the falling object • Gravity is the force which draws objects and planets towards its center • Gravity keeps all of the planets in orbit around the sun
What is air resistance?	• Air resistance (or drag) acts against gravity on falling objects and this is how a parachute works.
What affects the motion of objects?	• Some mechanisms including levers, pulleys and gears, allow a smaller force to have a greater effect.

Scientific investigation (TAPS)

Identify the effect of water resistance.	
Explain the degree of trust in the results.	• Can children use test results to make predications relating water resistance to surface area? • Can children identify variables which may affect the results?
Identify the effect of air resistance that acts between moving surfaces	
Measure, take repeat readings.	• Can children improve accuracy by repeating measurements? • Can children identify patterns in results?

Key vocabulary

air resistance	a force that is caused by air with the force acting in the opposite direction to an object moving through the air	**levers**	a rigid bar resting on a pivot that is used to move a heavy object
force	a push or pull upon an object resulting from its interaction with another object	**pull force**	to draw something towards you.
friction	the resistance that one surface or object encounters when moving over another	**push force**	to move something by using force
gravity	the force that attracts a body towards the center of the earth	**water resistance**	a force that is caused by water with the force acting in the opposite direction to an object moving through the water



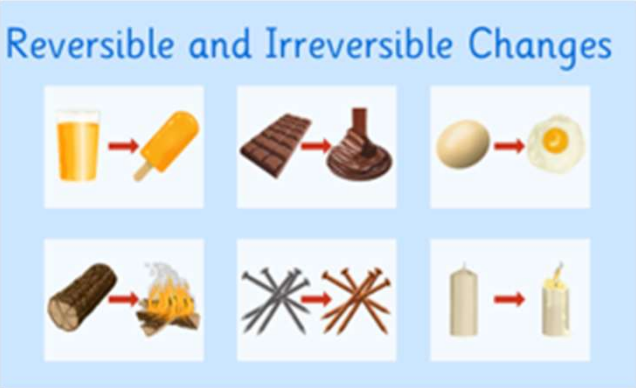
Science I Knowledge Organiser: Year 5 – Materials and their Properties

What should I already know?

- Identify and compare the suitability of a variety of everyday materials including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses.
- The shape of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.
- Know the different between an object and the material from which it is made.
- Know the names of different everyday materials including woods, plastic, glass, metal, rock and water.
- Group everyday materials based on their simple physical properties.

What will I know by the end of the unit?

- Compare and group together everyday materialson the basis of their properties, including their hardness, transparency, conductivity, and response to magnets
- Decide how mixtures might be separated, including through filtering, sieving and evaporating
- Compare the use of different everyday materials such as metals, wood, plastic .



Scientific investigation (TAPS)	
Gather and record data of increasing complexity using tables	• Can children record data clearly and accurately? • Can children record repeat readings?
Plan different types of scientific enquiry including recognising and controlling variables	• Can children plan and carry out a fair test to compare the absorbency of different brand nappies? • Can children explain why the test is/is not fair?
Use test results to make predication to set up further comparative and fair tests	• Can children carry out an investigation to test a hypothesis?
Plan scientific enquiry to answer question and recognise and control variable where necessary	• Can children plan a fair test to investigate factors affecting the speed which solids dissolve in water?

Key vocabulary			
conductor	a material or device which allows heat or electricity to carry through	**magnetic**	capable of being magnetized or attracted by a magnet
dissolve	when something solid mixes with a liquid and becomes part of the liquid	**material**	the matter from which a thing is or can be made from
evaporation	the process of turning from liquid to vapour	**opaque**	not able to see through, not transparent
flexible	capable of bending easily without breaking	**reversible**	able to be reversed back to its original state
gas	an air-like fluid substance which expands freely to fill any space available	**solid**	firm and stable in shape, not a liquid or fluid
insulator	something which keeps in heat	**soluble**	able to dissolved, especially in water
irreversible	cannot be reversed back to its original state	**thermal**	relating to heat
liquid	a substance that flows freely but can be measured by volume e.g water	**transparent**	allow light to pass through so that objects behind can be seen

Science I Knowledge Organiser: Year 5 – Living Things and Habitats

What should I already know?

- Recognise that living things can be grouped in a variety of different ways
- Group and identify some living things in our local and wider environment
- Recognise that environments change and the dangers these have to living things.

What will I know by the end of the unit?

What is reproduction?	• Sexual reproduction requires two parents with female and male gametes (cells) • Asexual reproduction will produce offspring that is identical to them and it requires only one parent.
How do plants reproduce?	• Male Gametes can be found in the pollen • Female Gametes can be found in the Ovary • Pollination occurs when pollen from another anther is transferred to the stigma by the bees and other insects • The pollen then travels down and meets the Ovule which causes seeds to form • Seeds are then dispersed which causes germination to occur again
What are examples of lifecycles?	• The lifecycles of mammals, birds and amphibians and insects have differences and similarities.

Scientific investigation (TAPS)

Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird

Report and present findings from enquiries, in oral and written forms such as displays and other presentations, using appropriate scientific language.	• Can children present their research clearly? • Can children present using scientific language?

Key vocabulary

anther	the part of a stamen that releases the pollen	**life cycle**	the series of changes that an animal or plant passes through from the beginning of it's like, to it's death
bulb	a root shaped like an onion which grows into a plant	**metamorphosis**	a person or a thing that develops or changes into something completely different.
cell	the smallest part of a plant that allows it to function independently	**pollination**	to pollinate a plant or tree means to fertilize other flowers of the same species so that they produce seeds
dispersed	scattered, spread, or separated through a large area	**pollen**	a fine powder produced by flowers. it fertilizes other flowers of the same species so that they produce seeds.
fertilization	male and female gametes meet to form a seed or an embryo	**reproduction**	when an animal or plan produces one or more individual similar to itself
germination	if a seed germinates or is germinated, it is growing	**stigma**	the top of the center of a flower which takes in pollen

Our Curriculum: STEM Faculty

Science I Knowledge Organiser: Year 5 – Animals including Humans

What should I already know?

- The simple functions of the basic parts of the digestive system in humans
- The different types of teeth in humans and their simple functions
- Understand a variety of food chains and know what a producer, predator and prey is.

What will I know by the end of the unit?

Describe the changes as humans develop to old age.	• Describe the difference in the life cycles of mammals, animals, an amphibian, an insect and a bird • Life cycles develop in cycles. • Understand that the lifecycles of different mammals and animals are different to each other.

Scientific investigation (TAPS)

Describe the changes as humans develop to old age	
Take measurements using a range of different materials	• Can children record and present results clearly?

Key vocabulary

adolescent	the process of developing from a child into an adult	**life expectancy**	the average period that you may expect to live
adult	a person who is fully grown or developed	**mammal**	a warm blooded vertebrate animal, distinguishable by the possession of hair or fur, females secreting milk for young and typically giving birth to live young
asexual reproduction	offspring get genes from one parent so are clones of their parents	**offspring**	a persons child or children/ an animals young
child	a young human being below the age of puberty or below the legal age of majority	**puberty**	the period during which adolescents reach sexual maturity and become capable of reproduction
foetus/ fetus	an unborn or unhatched offspring of a mammal, in particular an unborn human more than eight weeks after conception	**reproduction**	the production of offspring by a sexual or asexual process
gestation	the time of developing inside the womb between conception and birth	**sexual reproduction**	offspring get genes from both mum and dad, inheriting a mix of features from both

Science I Knowledge Organiser: Year 6 – Classifications

What should I already know?

- 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.

What will I know by the end of the unit?

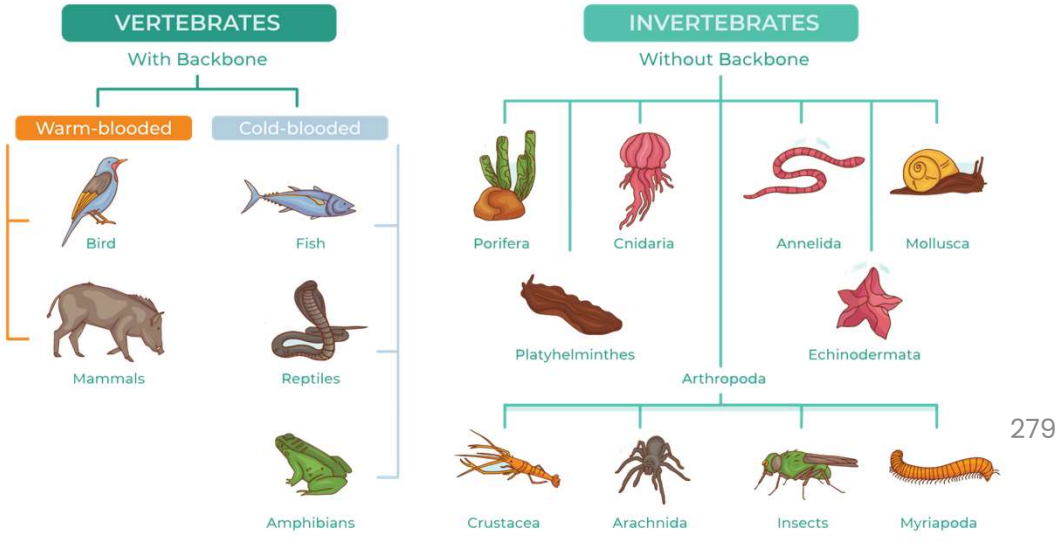
- Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals
- Give reasons for classifying plants and animals based on specific characteristics

Scientific investigation (TAPS)

Give reasons why a particular invertebrate belongs to a certain group	
Report and present findings from enquiries using appropriate scientific language	Can children report and present information about an invertebrate classification group
Give reasons for classifying plants and animals based on specific characteristics	
Record the results of a survey using a classification key	• Can children create questions which separate animal groups? • Can children use a classification key? • Can children record their research clearly, using scientific language?

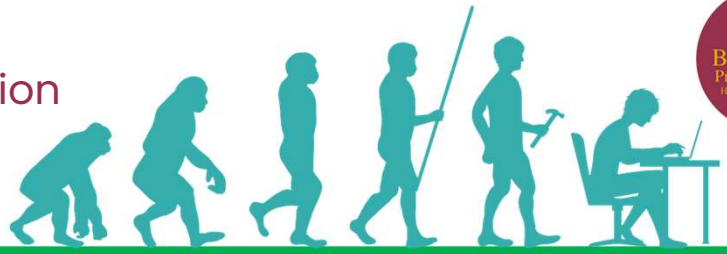
Key vocabulary

amphibian	a cold-blooded vertebrate animal that compromises frogs, toads, newts, salamanders and caecilians	**insect**	a small animal that has six legs and generally one or two pairs of wings
annelid	a segmented worm	**invertebrate**	an animal lacking a backbone
arachnid	an animal that has eight legs and a body formed of two parts	**mammal**	a warm-blooded vertebrate animal, distinguishable by the possession of hair or fur, females secreting milk for young and typically giving birth to live young
bird	a warm-blooded egg-laying vertebrate animal distinguished by the possession of feathers, wings, a beak and typically able to fly	**microorganism**	a microscopic organism, especially a bacteria, virus or fungus
crustaceans	mostly live in water with a hard shell and segmented body	**reptile**	a vertebrate animal that has dry scaly skin and typically lay soft-shelled eggs on land
habitat	the natural home or environment of an animal, plant or other organism	**vertebrate**	an animal with possession of a backbone/ spinal column



Our Curriculum: STEM Faculty

Science I Knowledge Organiser: Year 6 – Evolution



What should I already know?

- Which things are living and which are not.
- Identifying animals (e.g. amphibians, reptiles, birds, fish, mammals, invertebrates) and plants using classification keys
- Animals that are carnivores, herbivores and omnivores.
- Animals have offspring which grow into adults.
- Some animals have skeletons for support, protection and movement.
- Food chains, food webs and the role of predators and prey.
- Sometimes environments can change and this has an effect on the plants and animals that exist there
- Living things breed to produce offspring which grow into adults. This is called reproduction.
- The role of Mary Anning in paleontology The features of some rocks and the role they play in the formation of fossils.

What will I know by the end of the unit?

- recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago
- recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents
- identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution

Scientific investigation (TAPS)

- Can the children explain how they are testing the strength of the eggs?
- Can the children consider the trustworthiness of their method/results?
- Can children use evidence (from fossils or research) to develop ideas?
- Can children discuss whether evidence supports ideas?

Key vocabulary

adaptation	a change in structure or function that improves the chance of survival for an animal or plant within a given environment	**generation**	the act or process of bringing into being; through reproduction, especially of offspring
ancestor	an early type of animal or plant from which a later, usually dissimilar, type has evolved	**inherit**	If you inherit a characteristic you are born with it, because your parents or ancestors also had it
biodiversity	a wide variety of plant and animal species living in their natural environment	**natural selection**	a process by which species of animals and plants that are best adapted to their environment survive and reproduce, while those that are less well adapted die out
evolution	a process of change that takes place over many generations, during which species of animals, plants, or insects slowly change some of their physical characteristics	**offspring**	a person's children or an animal's young
extinct	no longer has any living members, either in the world or in a particular place	**paleontology**	the study of fossils as a guide to the history of life on Earth
fossil	the hard remains of a prehistoric animal or plant that are found inside a rock	**species**	a class of plants or animals whose members have the same main characteristics and are able to breed with each other

Science I Knowledge Organiser: Year 6 – Light

What should I already know?

- 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.

What will I know by the end of the unit?

- recognise that light appears to travel in straight lines
- 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
- 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
- use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them

Scientific investigation (TAPS)

Use the idea that light appears to travel in straight lines to explain why shadows have the same shape as their objects	
Take accurate measure ments and record data on a graph	• Can children make accurate measurements? • Can children choose the appropriate type of graph to present their results?

Key vocabulary

absorption	an object which takes in light, opposite to reflection (bouncing back)	**Spectrum**	A band of colours, as seen in rainbows, produced by separation of the components of light by their different degrees of refraction
Filter	Pass through a device to remove unwanted material (liquid, gas, light or sound)	**translucent**	light may pass through but images on the other side are not clearly visible.
lens	piece of glass or other see-through material that is curved on one or both sides.	**transparent**	light passes through and images are clearly visible on the other side
Light source	Something that provides light, whether it be a natural or artifical source of light (e.g. the sun, a torch)		
opaque	not capable of having light pass through it. (e.g. black sheet of card)		
Periscope	An apparatus consisting of a tube of attached to a set of mirrors or prisms through which an observer can see things that are otherwise out of sight		
Reflection	The throwing back by a body or surface of light, heat or sound without absorbing it		
refraction	bending of light as it passes through one substance to another.		
Shadow	A dark area or shape produced by a body coming between rays of light and a surface		

Science | Knowledge Organiser: Year 6 – Animals including Humans

What should I already know?

- Describe the changes as humans develop to old age.
- Describe the simple functions of the basic parts of the digestive system in humans.
- Identify the different types of teeth in humans and their simple functions.
- Construct and interpret a variety of food chains, identifying producers, predators and prey.

What will I know by the end of the unit?

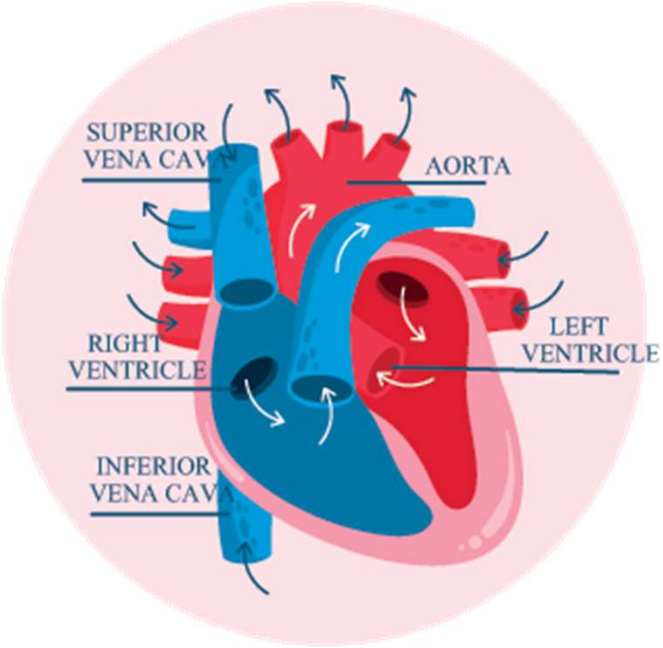
- identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood
- recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function
- describe the ways in which nutrients and water are transported within animals, including humans

Scientific investigation (TAPS)

Use test result to make predictions to set up further comparative and fair tests	• Can children plan a scientific enquiry to answer their question? • Can children explain their findings and consider the degree of trust in their results? • ·an children make predictions based on their results?

Key vocabulary

aorta	the main artery through which blood leaves your heart before it flows through the rest of your body	**oxygenated**	blood that contains oxygen
arteries	a tube in your body that carries oxygenated blood from your heart to the rest of your body	**pulse**	the regular beating of blood through your body. How fast or slow your pulse is depends on the activity you are doing
atrium	one of the chambers in the heart	**respiration**	process of respiring; breathing ; inhaling and exhaling air
blood vessels	the narrow tubes through which your blood flows. Arteries, veins and capillaries are blood vessels.	**veins**	a tube in your body that carries deoxygenated blood to your heart from the rest of your body
capillaries	tiny blood vessels in your body	**ventricle**	one of the chambers in the heart
carbon dioxide	a gas produced by animals and people breathing out		
circulatory system	the system responsible for circulating blood through the body		
deoxygenated	blood that does not contain oxygen		
heart	the organ in your chest that pumps the blood around your body		
lungs	two organs inside your chest which fill with air when you breathe in. They oxygenate the blood and remove carbon dioxide from it		
nutrients	substances that help plants and animals to grow		
organ	a part of your body that has a particular purpose		
oxygen	a colourless gas that plants and animals need to survive		



Our Curriculum: STEM Faculty

Science I Knowledge Organiser: Year 6 – Electricity

What should I already know?

- 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, and associate metals with being good conductors.

What will I know by the end of the unit?

- 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

Scientific investigation (TAPS)

Compare variations in how components function.	
Plan a scientific enquiry to answer a question, recognising and controlling variables.	• Can children raise a question relating to simple circuits and the brightness of the bulb? • Can children decide what evidence to collect in order to answer the question?

Key vocabulary

battery	a container consisting of one or more cells where chemical energy is converted into electricity and used as a source of power	**current**	a flow of electricity which results from the ordered directional movement of electrically charged particles
bulb	a glass bulb which provides light by passing an electrical current through a filament	**electricity**	a form of energy resulting from the existence of charged particles
buzzer	an electrical device that makes a buzzing noise and is used for signalling	**filament**	a conducting wire or thread with a high melting point that forms part of an electric bulb
cell	a device containing electrodes that is used for generating current	**motor**	a machine powered by electricity that supplies motive power for a vehicle or other moveable device
circuit	a complete and closed path around which a circulating electric current can flow	**switch**	a device for making and breaking the connection in an electric circuit
conductor	a material or device which allows heat or electricity to carry through	**voltage**	an electrical force that makes electricity move through a wire, measured in volts