

EYFS

Characteristics of effective learning (working scientifically)

Playing and exploring: Finding out and exploring, playing with what they know and being willing to have a go.

Active learning: Being involved and concentrating, keeping trying and enjoying achieving what they set out to do.

Creating and thinking critically: Having their own ideas, making links and choosing ways to do things.

<u>Understanding the world (knowledge)</u>

People and communities: Children know about similarities and differences between themselves and others, and among families, communities and traditions.

The world: children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur, and talk about changes.

Physical development (knowledge)

Health and self-care: children know the importance for good health of physical exercise, and a healthy diet, and talk about ways to keep healthy and safe. They manage their own basic hygiene and personal needs successfully, including dressing and going to the toilet independently.

Communication and language (knowledge)

Understanding: children follow instructions involving several ideas or actions. They answer 'how' and 'why' questions about their experiences and in response to stories or events.

Working Scientifically:

- Think of questions to ask
- Perform a simple test
- Make observations, talking about what they can see, touch, smell, hear and taste
- Organise things into groups
- Use simple equipment to help make observations
- Put some information in a chart or table
- Explain what has been found out using basic language
- Show their work using pictures, labels or captions

Seasonal changes (physics)

- Observe changes across the four seasons
- Observe and describe weather associated with the seasons and how day length varies

Animals including humans (biology)

- Describe, compare and classify common animals (birds, fish, amphibians, reptiles, mammals- including pets).
- Identify, compare and classify animals by what they eat (carnivore, herbivore, omnivore).
- Identify, name, draw and label the parts of the human body that they can see (associate with the senses).

Plants (biology)

- Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees
- Identify and describe the basic structure of a variety of common flowering plants, including trees (stem, leaf, flower and root)

Everyday materials (chemistry)

- Distinguish between the name of an object and the material it is made from.
- Using the senses, describe and identify a range of everyday materials, including wood, plastic, glass, metal, water and rock.
- Using the senses, classify and compare a range of everyday materials, including wood, plastic, glass, metal, water and rock.
- Explain why a material might be useful for a specific job.

- Ask questions and suggest ways to find out the answer to their question
- Explain what they have found out using more scientific language
- Classify animals according to a number of their own criteria
- Point out the difference between living things and non-living things
- Say why certain animals have certain characteristics
- Independently sort some plants by those that can be eaten and those that cannot
- Independently sort some animals on a simple branching diagram with features such as meat eaters and non-meat eaters; swim and cannot swim
- Explain what happens to certain materials when they are heated or cooled, for example, bread, ice, chocolate, jelly, etc

Working Scientifically:

- Ask questions and use secondary sources to find answers
- Suggest ways, and use prompts, to find things out
- Perform simple tests
- Observe closely, using simple equipment
- Say whether things happened as they expected
- Find simple patterns and relationships
- Identify and classify things they have observed/ measured
- Use (text, diagrams, pictures, charts and tables) to record their observations and measures
- Use some scientific words to describe what they have seen and measured
- Identify animals and plants by a specific criteria (for example: lay eggs or not)

Seasonal changes (physics):

- Observe changes across the four seasons
- Observe and describe weather associated with the seasons and how day length varies

Living things and their habitats (biology):

- Explore and compare the difference between things which are alive, which are dead, and which 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 micro-habitats
- Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain

Animals including Humans (biology):

- 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)
- Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene

Plants (biology):

- 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

Uses of everyday materials (chemistry)

- Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses
- Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching

- Say why they think things did or did not happen how they expected
- Take measures using standards units of measure
- Use accurate scientific language to describe what they have seen and measured
- Use information from books and online information to find things out
- Suggest more than one way of grouping animals and plants and their reasons
- Describe what plants need to survive and link it to where they are found
- Describe the properties of different materials using words like transparent or opaque, flexible etc.
- Tell which materials cannot be changed back after being heated and cooled.

Working Scientifically:

- Ask relevant questions and suggest how to find out the answer
- Make simple predictions
- Set up simple practical enquiries, comparatives and fair tests
- When planning a fair test, explain why it was fair
- Use a range of equipment, (including a thermometer and data-logger)
- Make systematic and careful observations
- Where appropriate, take measurements using standard units
- Record and present their observations/ measurements in different ways (e.g. labelled diagrams, tables, groupings, bar charts)
- Explain their results using scientific language, including oral and written explanations, displays and presentations
- Using results draw simple conclusions; explaining patterns or changes and identifying whether the results answer the research question

Plants (biology):

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

Animals including humans (biology):

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

Rocks (chemistry):

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

Light (physic):

- 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 a solid object
- Find patterns in the way that the size of shadows change

Forces and Magnets (physics):

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

- Decide which type of scientific enquiry to use to answer questions (fair test, classification, over time, pattern seeking)
- Make predictions based on scientific knowledge
- Record observations/ measurements in a wider range of ways (e.g simple scientific language, drawings, labelled diagrams, keys, bar graphs and tables)
- Explain, using scientific language, how the muscular and skeletal systems work together to create movement
- Classify living things and non-living things by a number of characteristics that they have thought of
- Begin to relate the properties of rocks with their uses
- Investigate the strengths of different magnets and find fair ways to compare them
- Explain why their shadow changes when the light source is moved closer or further from the object

Working Scientifically:

- Ask relevant questions and decide which type of scientific enquiry to use to answer them (fair test, classification, over time, pattern seeking)
- Set up simple practical enquiries, comparatives and fair tests, deciding which information needs to be collected
- Make predictions based on scientific knowledge
- Make systematic and careful observations/ measures
- Where appropriate, take accurate measurements using standard units
- Use a wide range of equipment, including a thermometer and data-logger
- Record observations/ measurements in a wider range of ways (e.g simple scientific language, drawings, labelled diagrams, keys, bar graphs and tables)
- Explain results using scientific language, including oral and written explanations, displays and presentations
- Using results draw simple conclusions; explaining patterns or changes, similarities or differences to simple scientific ideas and processes, and identifying whether the results answer the research question
- Within the conclusion, suggest improvements and raise further questions based on the results

Living things and their habitats (biology):

- Recognise that living things can be grouped in a variety of ways
- Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment
- · Recognise that environments can change and this can sometimes pose dangers to living things

Animals including animals (biology):

- Describe the simple functions of the organs of the human digestive system
- Identify the different types of human teeth and their simple functions
- Construct and interpret a variety of food chains, identifying producers, predators and prey

States of matter (chemistry):

- Compare and group materials together, according to whether they are solids, liquids or gases
- Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C)
- Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature

Sound (physics):

- Identify how sounds are made, associating some of them with something vibrating
- Recognise that vibrations from sounds travel through a medium to the ear
- Find patterns between the pitch of a sound and features of the object that produced it
- Find patterns between the volume of a sound and the strength of the vibrations that produced it
- Recognise that sounds get fainter as the distance from the sound source increases

Electricity (physics):

- 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.

- Use test results to make further predictions based on scientific knowledge and set up further comparative tests
- Recognise which variable may have an effect on results and control them accurately
- When appropriate, take repeated readings
- Group and classify a variety of materials according to the impact of temperature on them
- Explain how people, weather and the environment can affect living things
- Investigate which metals can be used to connect across a gap in a circuit
- Explain the difference between volume and pitch, referring to soundwaves

Working Scientifically:

- Raise different kinds of questions and plan the most appropriate type of scientific enquiry to use (fair test, classification, over time, pattern seeking)
- Recognise and control variables accurately, deciding what measures/ observations to use and how long to make them for
- Choose the most appropriate equipment to make measurements
- Support predictions with scientific knowledge
- Use a range of scientific equipment to take measurements, including standard measures, with increasing accuracy and precision
- When appropriate, take repeated readings
- Record data of increasing complexity using scientific diagrams and labels, classification key, tables, scatter graphs, bar and line graphs
- Using results draw conclusions; explaining casual relationships, patterns or changes, similarities or differences to scientific ideas and processes, identifying whether the results answer the research question and suggesting improvements
- Use test results to make further predictions based on scientific knowledge, setting up further comparative and fair tests
- Report findings from enquiries, including conclusions, in oral and written forms (such as displays and other presentations)
- Identify scientific evidence that has been used to support or refute ideas or arguments

Living things and their habitats (biology):

- 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.

Animals, including humans (biology):

• Describe the changes as humans develop to old age

Properties and changes of materials (chemistry):

- Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets
- Know that some materials will dissolve in liquid to form a solution
- Describe how to recover a substance from a solution
- Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating
- Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic
- Demonstrate that dissolving, mixing and changes of state are reversible changes
- Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.

Earth and space (physics):

- Describe the movement of the Earth, and other planets, relative to the Sun in the solar system
- Describe the movement of the Moon relative to the Earth
- Describe the Sun, Earth and Moon as approximately spherical bodies
- Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.

Forces (physics):

- Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object
- Identify the effects of air resistance, water resistance and friction, that act between moving surfaces
- Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.

- Explore different ways to test an idea, choose the best way and give reasons
- Explain (in simple terms) a scientific idea and what evidence supports it
- Link conclusions to other scientific knowledge or findings
- Describe methods, using scientific language, for separating mixtures e.g. filtration, distillation
- Compare the time of day at different places on the earth
- Observe the local environment and draw conclusions about life-cycles, e.g. the vegetable garden or plants in a shrubbery
- Explain how water causes resistance to floating objects

Working Scientifically:

- Raise different kinds of questions and plan the most appropriate type of scientific enquiry to use (fair test, classification, over time, pattern seeking)
- Recognise and control variables accurately and effectively, deciding what measures/ observations to use and how long to make them for
- Choose the most appropriate equipment to make measurements
- Support predictions with scientific knowledge
- Use a range of scientific equipment to take measurements, including standard measures, with increasing accuracy and precision
- When appropriate, take repeated readings
- Record data of increasing complexity using scientific diagrams and labels, classification key, tables, scatter graphs, bar and line graphs
- Using results draw conclusions; explaining casual relationships, patterns or changes, similarities or differences to scientific ideas and processes, identifying whether the results answer the research question, how accurate the enquiry was and suggesting improvements
- Use test results to make further predictions based on scientific knowledge, setting up further comparative and fair tests
- Report findings from enquiries, including conclusions, in oral and written forms (such as displays and other presentations)
- Identify scientific evidence that has been used to support or refute ideas or arguments

Living things and their habitats (biology):

- 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.

Animals including humans (biology):

- 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

Evolution and inheritance (biology):

- 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.

Light (physics):

- 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.

Electricity (physics):

- 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.

- Use information from different sources to answer a question and plan a scientific enquiry
- Plan in advance which equipment they will need for an enquiry and use it effectively
- Explain how scientific ideas have developed over time
- Analyse the advantages and disadvantages of specific adaptations, such as being on two rather than four feet
- Begin to understand what is meant by DNA
- Compare the organ systems of humans to other animals
- Explain the danger of short circuits and what a fuse is
- Make a diagram of the human body and explain how different parts work and depend on one another

SCIENCE The order of topics is subject to change to meet the needs of each year group					
Year	Autumn	Spring	Summer		
EYFS	Foundation stage teache	rs plan topics based around jectives are arranged in thos	the children's interest. The		
	Distinguish between an object and the material from which it is made. Identify and name a variety of everyday materials. 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. Seasonal changes Observe changes across the four seasons	Animals, including humans Identify and name a variety of common animals. Identify and name a variety of common animals that are carnivores, herbivores and omnivores. Describe and compare the structure of a variety of common animals. Identify name, draw and label the basic parts of the human body. Seasonal changes Observe changes across the four seasons Observe and describe weather associated with the seasons and how day length varies.	Plants Identify and name a variety of common wild and garden plants. Identify and describe the basic structure of a variety of common flowering plants, including trees. Seasonal changes Observe changes across the four seasons Observe and describe weather associated with the seasons and how day length varies.		
	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). Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. Living things and their habitats	Identify and name a variety of plants and animals in their habitats, including micro-habitats. Simple food chains. Investigation skills focus Plants Find out and describe how plants need water, light and a suitable temperature to grow and stay	Plants Observe and describe how seeds and bulbs grow into mature plants. Use of everyday materials Identify and compare the uses of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.		

SCIENCE The order of topics is subject to change to meet the needs of each year group					
Year	Autumn	Spring	Summer		
3	Rocks Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. Describe in simple terms how fossils are formed when things that have lived are trapped within rock. Recognise that soils are made from rocks and organic matter. Investigation skills focus	Animals including humans Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat. Identify that humans and some animals have skeletons and muscles for support, protection and movement. Forces and magnets Compare how things move on different surfaces. Notice that some forces need contact between two objects, but magnetic forces can act at a distance. Observe how magnets attract or repel each other and attract some materials and not others. Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials. Describe magnets as having two poles. Predict whether two magnets will attract or repel each other,	Plants Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers. Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant. Investigate the way in which water is transported within plants. Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.		
4	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. States of matter Compare solids, liquids or gases. Observe that some materials change state when they are heated or cooled. The water cycle.	depending on which poles are facing. Electricity	Living things and their habitats Recognise that living things can be grouped in a variety of ways. Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. Recognise that environments can change and that this can sometimes pose dangers to living things. Sound Identify how sounds are made, associating some of them with something vibrating. Recognise that vibrations from sounds travel through a medium to the ear. Find patterns between the pitch of a sound and features of the object that produced it. Find patterns between the volume of a sound and the strength of the vibrations that produced it. Recognise that sounds get fainter as the distance from the sound increases.		

<u>SCIENCE</u>					
The order of topics is subject to change to meet the needs of each year group					
Year	Autumn	Spring	Summer		
	cycles of a mammal, an amphibian,	Properties and changes of materials Compare and group together everyday material on the basis of their properties.	Animals including humans Describe the changes as humans develop to old age.		
	Describe the life processes of reproduction in some plants and animals.	Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution.	Investigation skills focus		
		Use knowledge of solids, liquids and gases to decide how mixtures might be separated. Give reasons for the particular uses			
	Describe the movement of the Moon relative to the Earth.	of everyday materials, including metals, wood and plastic.			
	as approximately sprictical bodies.	Demonstrate that dissolving, mixing and change of state are reversible changes.			
	to explain day and night and the apparent movement of the sun across the sky.	Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda. Forces			
		Explain that unsupported objects fall towards the earth because of the gravity acting between the Earth and the falling object.			
		Identify the effects of air resistance, water resistance and friction that act between moving surfaces.			
		Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.			
6	Evolution and inheritance	Light	Living things and their habitats		
	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.	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 emit or reflect light into the eye. Explain that we see things because light travels from light sources to our	Describe how living things are classified into broad groups according to common observable characteristics and base on similarities and differences, including micro-organisms, plants and animals. Give reasons for classifying plants		
	Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.	Use the idea that light travels in	and animals based on specific characteristics. Investigation skills focus		
	Electricity Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit.	Animals, including humans Identify and name the main parts of the human circulatory system, and			
	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.	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.			
	Use recognised symbols when representing a simple circuit in a diagram	Describe the ways in which nutrients and water are transported within animals, including humans.			

<u>SCIENCE</u>						
The order of topics is subject to change to meet the needs of each year group						
Year	Autumn	Spring	Summer			
Working Scientifically	All year groups teach the working scientifically skills throughout all knowledge topics. The working scientifically skills are woven throughout the year and taught according to the classes' needs and ability.					

Science links to SMSC:

Subject: Science

Spiritual

 Science supports spiritual development by providing many opportunities for children to think and spend time reflecting on the amazing wonders which occur in our natural world.

Moral

Science supports moral development by showing children that different opinions need to be
respected and valued. There are many moral and ethical issues that we cover in science including
discussions about environmental and human issues.

Social

 Science supports social development by exposing children to the power of collaborative working in the science community which has led to some amazing and life changing breakthroughs in medicine. When undertaking experiments and research children work collaboratively.

Cultural

 Science supports cultural development by looking at how scientists from a range of cultures have had a significant impact globally. It also helps children to understand how important science is to the economy and culture of the UK.