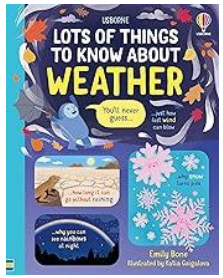
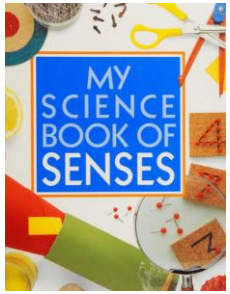
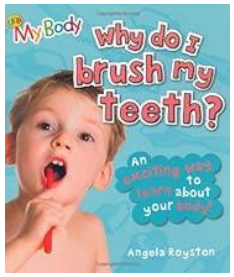
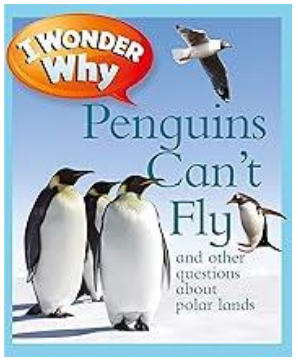
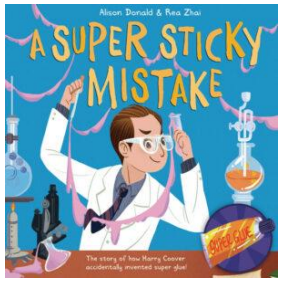
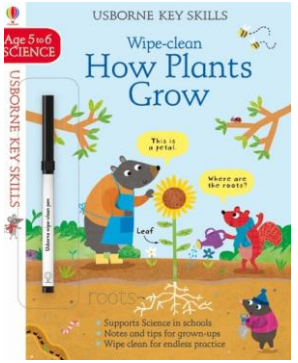
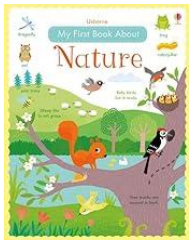
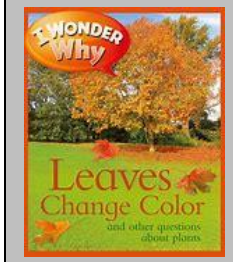
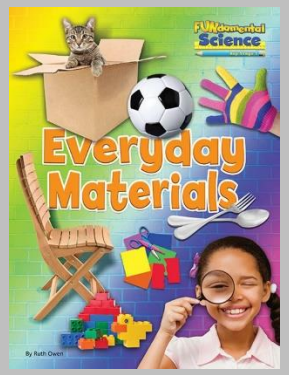
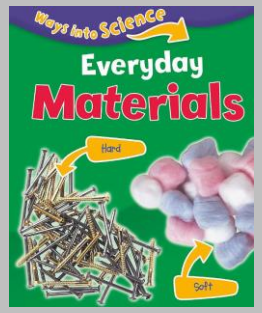
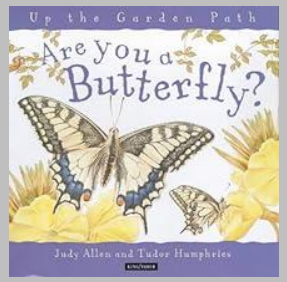
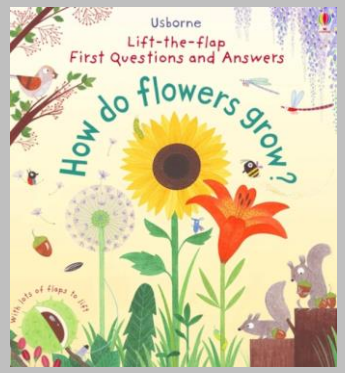
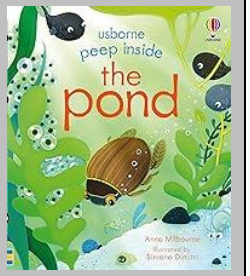
Crooksbarn Science
Medium Term Overview






Science Overview Year 1 & 2

Year Group	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 1 & 2 Rotation A 	Animals, including humans. (Human body & Senses) 	Animals, including humans. (Health & Hygiene) 	Animals, including humans. (Common Animals) 	Uses of Everyday Materials (Choosing Materials) 	Plants (How plants grow) 	Living Things & their habitats (Habitats) 
Year 1 & 2 Rotation B 	Plants (Trees) 	Everyday Materials (Material Properties) 	Uses of everyday Materials (Change) 	Animals, including humans. (Animal Offspring) 	Plants (Flowering plants) 	Living Things & their habitats / Animals, including humans) (Food chains) 

Year 1 & 2	Biology	Unit: Animals, including Humans (NC Year 1 – Split Unit)	Rotation A - Autumn 1

Knowledge Learning Objectives:

1. To identify, name the basic parts of the human body and say which part of the body is associated with each sense.
2. To label the basic parts of the human body and say which part of the body is associated with each sense.

Working Scientifically Learning Objectives:

a) To ask simple questions and recognise that they can be answered in different ways.
b) To observing closely, using simple equipment.
c) To performing simple tests.
d) To identify and classify.
e) To use their observations and ideas to suggest answers to questions.
f) To gather and record data to help answer questions.

Key Vocabulary:

Head, body, eyes, ears, mouth, teeth, leg,

Parts of the body including those linked to PSHE teaching.

Senses – touch, see, smell, taste, hear, fingers (skin), eyes, nose, ear, and tongue.

N.B. Although we often use our fingers and hands to feel objects, the children should understand that we can feel with many parts of our body.

Science Enquiry Questions:

Do people with long arms have long legs? (Pattern)

Does the tallest person have the biggest hands? (Pattern)

I can identify different smells/ tastes? (Comparative / Fair)

Key Learning:

Humans have key parts in common, but these vary from person to person.

Humans (and other animals) find out about the world using their senses. Humans have five senses – sight, touch, taste, hearing and smelling. These senses are linked to particular parts of the body.

Key Scientist:

Robert Winston - Professor of Human Science

Year 1 & 2	Biology	Unit: Animals, including humans (NC Year 2 - Split Unit)	Rotation A – Autumn 2

Knowledge Learning Objectives:

1. To find out about and describe the basic needs of animals, including humans, for survival (water, food, and air). The basic needs of feeding, drinking, and breathing that must be satisfied in order to survive.
2. To describe the importance for humans of exercise.
3. To describe the importance for humans of eating the right amounts of different types of food.
4. To describe the importance for humans of hygiene. Good hygiene is also important in preventing infections and illnesses.

Working Scientifically Learning Objectives:

a) To ask simple questions and recognise that they can be answered in different ways.
b) To observing closely, using simple equipment.
c) To performing simple tests.
d) To identify and classify.
e) To use their observations and ideas to suggest answers to questions.
f) To gather and record data to help answer questions.

Key Vocabulary:

Exercise, heartbeat, breathing, hygiene, germs, disease, food types (examples – meat, fish, vegetables, bread, rice, pasta)

Science Enquiry Questions:

Can you sort these food items based on...? (Classify)

Key Learning:

All animals, including humans, have the basic needs of feeding, drinking, and breathing that must be satisfied in order to survive.

To grow into healthy adults, they also need the right amounts and types of food and exercise.

Good hygiene is also important in preventing infections and illnesses.

Key Scientist

Florence Nightingale - Pioneer of modern nursing in Great Britain

Year 1 & 2	Biology	Unit: Animals, including Humans (NC Year 1 – Split Unit)	Rotation A – Spring 1

Knowledge Learning Objectives:

1. To identify and name a variety of common animals including fish, amphibians, reptiles, birds, and mammals.
2. To describe the structure of a variety of common animals (fish, amphibians, reptiles, birds, and mammals, including pets). ***(Head, body, eyes, ears, mouth, teeth, leg, tail, wing, claw, fin, scales, feathers, fur, beak, paws, hooves)***
3. To compare the structure of a variety of common animals (fish, amphibians, reptiles, birds, and mammals, including pets).

Working Scientifically Learning Objectives:

a) To ask simple questions and recognise that they can be answered in different ways.
b) To observing closely, using simple equipment.
c) To performing simple tests.
d) To identify and classify.
e) To use their observations and ideas to suggest answers to questions.
f) To gather and record data to help answer questions.

Key Vocabulary:

Head, body, eyes, ears, mouth, teeth, leg, tail, wing, claw, fin, scales, feathers, fur, beak, paws, hooves.

Names of animals experienced first-hand from each vertebrate group.

N.B. The children need to be able to name and identify a range of animals in each group e.g. name specific birds and fish. They do not need to use the terms mammal, reptiles etc. or know the key characteristics of each, although they will probably be able to identify birds and fish, based on their characteristics. The children also do not need to use the words carnivore, herbivore, and omnivore. If they do, ensure that they understand that carnivores eat other animals, not just meat.

Science Enquiry Questions:

How can we sort these animals? (Classify)

What do animals eat? (Research)

Key Learning:

Animals vary in many ways having different structures e.g. wings, tails, ears etc. They also have different skin coverings e.g. scales, feathers, hair. These key features can be used to identify them. Animals eat certain things - some eat other animals, some eat plants, some eat both plants and animals. Humans have key parts in common, but these vary from person to person.

Key Scientist:

Steve Backshall - Naturalist & Explorer

Year 1 & 2	Chemistry	Unit: Uses of Everyday Materials (NC Year 2 – Split Unit)	Rotation A – Spring 2

Knowledge Learning Objectives:

1. To identify a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper, and cardboard.
2. To compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper, and cardboard for particular uses.

Working Scientifically Learning Objectives:

a) To ask simple questions and recognise that they can be answered in different ways.
b) To observing closely, using simple equipment.
c) To performing simple tests.
d) To identify and classify.
e) To use their observations and ideas to suggest answers to questions.
f) To gather and record data to help answer questions.

Key Vocabulary:

Names of materials – wood, metal, plastic, glass, brick, rock, paper, cardboard
Properties of materials – as for Year 1 ***elastic, foil, card/cardboard, rubber, wool, clay, hard, soft, stretchy, stiff, bendy, floppy, waterproof, absorbent, breaks/tears, rough, smooth, shiny, dull, see-through, not see-through***

Plus: opaque, transparent, and translucent, reflective, non-reflective, flexible, rigid
Shape, push/pushing, pull/pulling, twist/twisting, squash/squashing, bend/bending, stretch/stretching.

Science Enquiry Questions:

How can you sort the different materials (Classify)

Which material would you use to make a …? (Comparative)

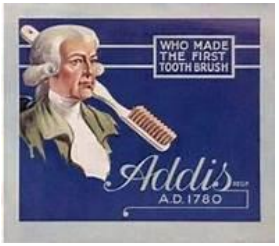
Key Learning:

All objects are made of one or more materials that are chosen specifically because they have suitable properties for the task. For example, a water bottle is made of plastic because it is transparent allowing you to see the drink inside and waterproof so that it holds the water.

When choosing what to make an object from, the properties needed are compared with the properties of the possible materials, identified through simple tests and classifying activities.

A material can be suitable for different purposes and an object can be made of different materials.

Key Scientist:



William Addis - Toothbrush Inventor

Year 1 & 2	Biology	Unit: Plants (NC Year 2)	Rotation A – Summer 1

Knowledge Learning Objectives:

1. To observe and describe some of the main changes in seeds and bulbs as they grow into mature plants - Observe Germination, Seedling, Mature Plant, Flower, Seeds, Bulbs
2. To find out and describe how plants need water, light, and a suitable temperature to grow.
3. To find out and describe how plants need water, light, and a suitable temperature to stay healthy.

Working Scientifically Learning Objectives:

a) To ask simple questions and recognise that they can be answered in different ways.
b) To observing closely, using simple equipment.
c) To performing simple tests.
d) To identify and classify.
e) To use their observations and ideas to suggest answers to questions.
f) To gather and record data to help answer questions.

Key Vocabulary:

As for Year 1 ***Leaf, flower, blossom, petal, fruit, berry, root, seed, trunk, branch, stem, bark, stalk, bud***

Names of trees in the local area

plus, light, shade, sun, warm, cool, water, grow, healthy.

Science Enquiry Questions:

Can you much the seed/bulb to the flower? (Classify)

How tall will this plant grow? (Observe)

What will this seed grow into? (Observe)

Do big seeds grow quicker? Taller? (Pattern)

Where should I plant this seed (sun/shade)? (Research)

How much should I water my plant? (Research)

Key Learning:

Plants may grow from either seeds or bulbs. These then germinate and grow into seedlings which then continue to grow into mature plants. These mature plants may have flowers which then develop into seeds, berries, fruits etc. Seeds and bulbs need to be planted outside at particular times of year and they will germinate and grow at different rates. Plants also need different amounts of water and space to grow well and stay healthy.

Key Scientist:

Marie Clark Taylor - Botanist

Year 1 & 2	Biology	Unit: Living things and their habitat (NC Year 2 - Split Unit)	Rotation A – Summer 2

Knowledge Learning Objectives:

1. To explore and compare the differences between things that are living, dead, and things that have never been alive.
2. To identify that most living things live in habitats to which they are suited.
3. To describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other.
4. To identify and name a variety of plants and animals in their habitats, including micro-habitats.

Working Scientifically Learning Objectives:

a) To ask simple questions and recognise that they can be answered in different ways.
b) To observing closely, using simple equipment.
c) To performing simple tests.
d) To identify and classify.
e) To use their observations and ideas to suggest answers to questions.
f) To gather and record data to help answer questions.

Key Vocabulary:

Living, dead, never been alive, suited, suitable, basic needs, food, shelter, move, feed

Names of local habitats e.g. pond, woodland etc.

Names of micro-habitats e.g. under logs, in bushes etc

Science Enquiry Questions:

Is it alive or dead or never been alive? (Classify)

Can you sort objects found in our environment? (Classify)

Can you sort the minibeasts (Classify)

Can you sort these plants? (Classify)

Which animals can you find? (Observe)

Which plants can you find? (Observe)

Are there more daisies on the field or in the meadow? (Pattern)

Where can we find more butterflies? (Pattern)

Key Learning:

The habitat provides the basic needs of the animals and plants – shelter, food, and water. Within a habitat there are different micro-habitats e.g. in a woodland – in the leaf litter, on the bark of trees, on the leaves. These micro-habitats have different conditions e.g. light or dark, damp, or dry. These conditions affect which plants and animals live there.

Key Scientist:

Prem Singh Gill - Polar Scientist

Year 1 & 2	Physics	Unit: Seasonal Changes (NC Year 1)	Rotation A – Throughout the Year

Knowledge Learning Objectives:

1. Observe changes across the four seasons.

Working Scientifically Learning Objectives:

a) To ask simple questions and recognise that they can be answered in different ways.
b) To observing closely, using simple equipment.
c) To performing simple tests.
d) To identify and classify.
e) To use their observations and ideas to suggest answers to questions.
f) To gather and record data to help answer questions.

Key Vocabulary:

Weather (sunny, rainy, windy, snowy etc.)

Seasons (winter, summer, spring, autumn)

Sun, sunrise, sunset, day length

Science Enquiry Questions:

Can you sort these objects (Classify)

Do all trees lose their leaves in the Autumn? (Observe)

Do trees have more leaves in Winter or Summer? (Pattern)

Key Learning:

In the UK, the day length is longest at mid-summer (about 16 hours) and gets shorter each day until mid-winter (about 8 hours) before getting longer again. The weather also changes with the seasons. In the UK, it is usually colder and rainier in winter, and hotter and dryer in the summer. The change in weather causes many other changes. Some examples are numbers of minibeasts found outside; seed and plant growth; leaves on trees; and type of clothes worn by people.

Key Scientist:

Dr Angie Burnett - Plant Biologist

Year: 1/2	(Biology	Unit: Plants (NC Year 1 – Split Unit)	Rotation B - Autumn 1

Knowledge Learning Objectives:

1. To identify and name some deciduous trees - *Names of trees in the local area – Oak, Horse chestnut, Sycamore, Birch*
2. To identify and name some evergreen trees - *Names of trees in the local area Holly, Pine, Yew – Monkey Puzzle Tree on Crooksbarn Estate*
3. To identify and describe the basic structure of trees - *Leaf, root, trunk, branch, bark, bud.*

Working Scientifically Learning Objectives:

a) To ask simple questions and recognise that they can be answered in different ways.
b) To observing closely, using simple equipment.
c) To performing simple tests.
d) To identify and classify.
e) To use their observations and ideas to suggest answers to questions.
f) To gather and record data to help answer questions.

Key Vocabulary:

Leaf, flower, blossom, petal, fruit, berry, root, seed, trunk, branch, stem, bark, stalk, bud

Names of trees in the local area Names of garden and wild flowering plants in the local area

Science Enquiry Questions:

How can we sort these leaves? (Classify)

Do bigger plants have bigger leaves? (Pattern Seeking)

Key Learning:

Growing locally, there will be a vast array of plants which all have specific names. These can be identified by looking at the key characteristics of the plant. Plants have common parts, but they vary between the different types of plants. Some trees keep their leaves all year while other trees drop their leaves during autumn and grow them again during spring.

Key Scientist:

Emma Williams - Botanist

Year: 1/2	Chemistry	Unit: Everyday Materials (NC Year 1)	Rotation B - Autumn 2

Knowledge Learning Objectives:

1. To distinguish between an object and the material from which it is made.
2. To identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock.
3. To describe the simple physical properties of a variety of everyday materials.
4. To compare a variety of everyday materials on the basis of their simple physical properties.
5. To group together a variety of everyday materials on the basis of their simple physical properties

Working Scientifically Learning Objectives:

a) To ask simple questions and recognise that they can be answered in different ways.
b) To observing closely, using simple equipment.
c) To performing simple tests.
d) To identify and classify.
e) To use their observations and ideas to suggest answers to questions.
f) To gather and record data to help answer questions.

Key Vocabulary:

Object, material, wood, plastic, glass, metal, water, rock/stone, brick, paper, fabric, elastic, foil, card/cardboard, rubber, wool, clay, hard, soft, stretchy, stiff, bendy, floppy, waterproof, absorbent, breaks/tears, rough, smooth, shiny, dull, see-through, not see-through

Science Enquiry Questions:

What is this object made from? (Classify)

Can you sort these materials based on their properties? (Classify)

Which material is best for…? (Comparative)

Key Learning:

All objects are made of one or more materials. Some objects can be made from different materials e.g. plastic, metal, or wooden spoons. Materials can be described by their properties e.g. shiny, stretchy, rough etc. Some materials e.g. plastic can be in different forms with very different properties.

Key Scientist

Charles Macintosh - Raincoat and waterproof materials

Year: 1/2	Chemistry	Unit: Uses of Everyday Materials (NC Year 2 – Split Unit)	Rotation B - Spring 1

Knowledge Learning Objectives:

1. To identify a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper, and cardboard.

2. To find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting, and stretching.

Working Scientifically Learning Objectives:

a) To ask simple questions and recognise that they can be answered in different ways.
b) To observing closely, using simple equipment.
c) To performing simple tests.
d) To identify and classify.
e) To use their observations and ideas to suggest answers to questions.
f) To gather and record data to help answer questions.

Key Vocabulary:

Names of materials – wood, metal, plastic, glass, brick, rock, paper, cardboard

Properties of materials – as for Year 1

elastic, foil, card/cardboard, rubber, wool, clay, hard, soft, stretchy, stiff, bendy, floppy, waterproof, absorbent, breaks/tears, rough, smooth, shiny, dull, see-through, not see-through

plus, opaque, transparent, and translucent, reflective, non-reflective, flexible, rigid
Shape, push/pushing, pull/pulling, twist/twisting, squash/squashing, bend/bending, stretch/stretching

Science Enquiry Questions:

Can you sort the materials which can be bent, twisted, stretched etc? (Classify)

How can you change this material? (Classify)

Key Learning:

Objects made of some materials can be changed in shape by bending, stretching, squashing, and twisting. For example, clay can be shaped by squashing, stretching, rolling, pressing etc. This can be a property of the material or depend on how the material has been processed e.g. thickness.

Key Scientist


Dr Pearl Agyakwa - Materials scientist

Year: 1/2	Biology	Unit: Animals, including humans (NC Year 2 – Split Unit)	Rotation B - Spring 2

Knowledge Learning Objectives:

1. To notice that animals, including humans, have offspring which grow into adults.

Working Scientifically Learning Objectives:

a) To ask simple questions and recognise that they can be answered in different ways.
b) To observing closely, using simple equipment.
c) To performing simple tests.
d) To identify and classify.
e) To use their observations and ideas to suggest answers to questions.
f) To gather and record data to help answer questions.

Key Vocabulary:

Offspring, reproduction, growth, child, young/old stages (examples - chick/hen, baby/child/adult, caterpillar/butterfly)

Science Enquiry Questions:

Can you sort these animals (Classify)

How do caterpillars grow? (Observe)

How do chicks grow? (Observe)

Can you match animals to their young (Research)

Key Learning:

Animals, including humans, have offspring which grow into adults. In humans and some animals, these offspring will be young, such as babies or kittens, which grow into adults.

In other animals, such as chickens or insects, there may be eggs laid that hatch to young or other stages which then grow to adults.

The young of some animals do not look like their parents e.g. tadpoles.

Key Scientist

Chris Packham-Animal Conservationist & Naturalist

Year: 1/2	Biology	Unit: Plants (NC Year 1 – Split Unit)	Rotation B - Summer 1

Knowledge Learning Objectives:

1. To identify and name a variety of wild plants - ***Names of wild flowering plants in the local area – dandelion, daisy, buttercup, nettles, ivy, clover, brambles.***
2. To identify and name a variety of garden plants ***- Names of garden flowering plants in the local area – fuchsia, pansy, sunflower, rose, lavender.***
3. To identify and describe the basic structure of flowering plants ***- Leaf, petal, root, stem, stalk, berry.***

Working Scientifically Learning Objectives:

a) To ask simple questions and recognise that they can be answered in different ways.
b) To observing closely, using simple equipment.
c) To performing simple tests.
d) To identify and classify.
e) To use their observations and ideas to suggest answers to questions.
f) To gather and record data to help answer questions.

Key Vocabulary:

Leaf, flower, blossom, petal, fruit, berry, root, seed, trunk, branch, stem, bark, stalk, bud

Names of garden and wild flowering plants in the local area

Science Enquiry Questions:

How can you sort the flowers? (Classify)

Which flowers grow in the local environment? (Observe)

Which plants have the biggest flowers? (Pattern)

Key Learning:

Growing locally, there will be a vast array of plants which all have specific names. These can be identified by looking at the key characteristics of the plant. Plants have common parts, but they vary between the different types of plants. Some trees keep their leaves all year while other trees drop their leaves during autumn and grow them again during spring.

Key Scientist

Beatrix Potter - Author & Botanist

Year: 1/2	Biology	Unit: Animals, including Humans (NC Year 1 – Split Unit) / Living things and their habitat (NC Year 2 – Split Unit)	Rotation B - Summer 2

Knowledge Learning Objectives:

1. Identify and name a variety of common animals that are carnivores, herbivores, and omnivores (Animals, including Humans).
2. To describe how animals obtain their food from plants and other animals (Living things and their habitat).
3. To use the idea of a simple food chain and identify and name different sources of food (Living things and their habitat).

Working Scientifically Learning Objectives:

a) To ask simple questions and recognise that they can be answered in different ways.
b) To observing closely, using simple equipment.
c) To performing simple tests.
d) To identify and classify.
e) To use their observations and ideas to suggest answers to questions.
f) To gather and record data to help answer questions.

Key Vocabulary:

Names of animals experienced first-hand from each vertebrate group.
Names of local habitats e.g. pond, woodland etc.
Names of micro-habitats e.g. under logs, in bushes etc basic needs, food, food chain, shelter, move, feed

N.B. The children also do not need to use the words carnivore, herbivore, and omnivore. If they do, ensure that they understand that carnivores eat other animals, not just meat.

Science Enquiry Questions:

How can we sort these animals based on what they eat? (Classify)

Which animals can we find? (Observe over time)

Key Learning:
Animals eat certain things - some eat other animals, some eat plants, some eat both plants and animals. Animals and plants live in a habitat to which they are suited. The habitat provides the basic needs of the animals and plants – shelter, food, and water. The plants and animals in a habitat depend on each other for food and shelter etc. The way that animals obtain their food from plants and other animals can be shown in a food chain.

Key Scientist

Dawood Quresh - Marine Biologist

Year: 1/2	Physics	Unit: Seasonal Changes (NC Year 1)	Rotation B - Through the Year Weather and Length of Day

Knowledge Learning Objectives:

1. Observe and describe weather associated with the seasons and how day length varies.

Working Scientifically Learning Objectives:

a) To ask simple questions and recognise that they can be answered in different ways.
b) To observing closely, using simple equipment.
c) To performing simple tests.
d) To identify and classify.
e) To use their observations and ideas to suggest answers to questions.
f) To gather and record data to help answer questions.

Key Vocabulary:

Weather (sunny, rainy, windy, snowy etc.)

Seasons (winter, summer, spring, autumn)

Sun, sunrise, sunset, day length

Science Enquiry Questions:

What is the weather like in...? (Observe)

What clothes do we wear in...? (Observe)

What time does it get dark? (Observe)

Does it rain more in spring? (Pattern seeking)

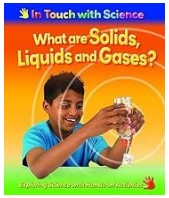
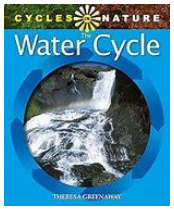
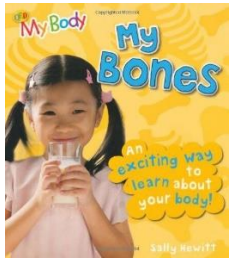
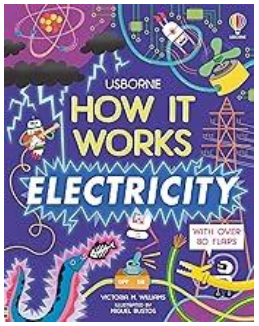
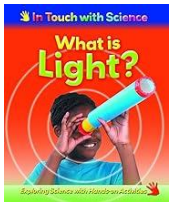
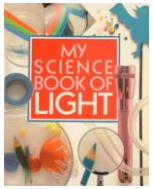
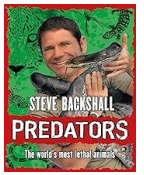
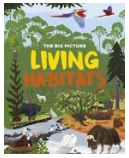
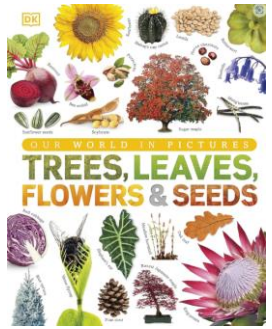
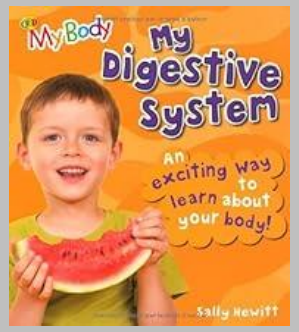
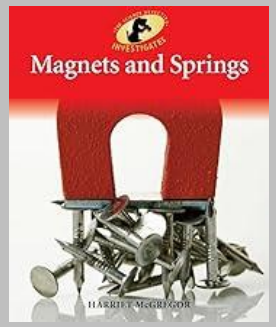
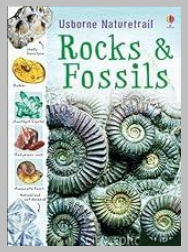
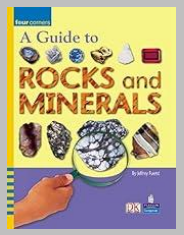
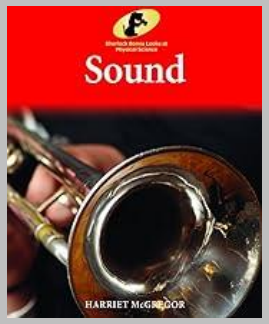
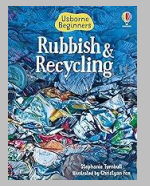
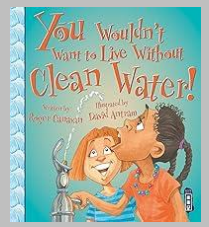
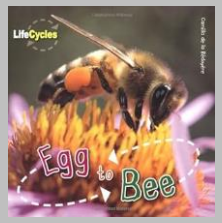
Key Learning:

In the UK, the day length is longest at mid-summer (about 16 hours) and gets shorter each day until mid-winter (about 8 hours) before getting longer again. The weather also changes with the seasons. In the UK, it is usually colder and rainier in winter, and hotter and dryer in the summer. The change in weather causes many other changes. Some examples are numbers of minibeasts found outside; seed and plant growth; leaves on trees; and type of clothes worn by people.

Key Scientist

Holly Green - Meteorologist

Science Overview Year 3 & 4

Year Group	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 3 & 4 Rotation A	States of Matter  	Animals, including humans. (Nutrition, Skeleton & Muscles) 	Electricity 	Light  	Living things and their habitats.  	Plants (Life & Growth) 
Year 3 & 4 Rotation B	Animals, including humans. (Digestion & Teeth) 	Forces & Magnets 	Rocks  	Sound 	Living things and their habitats (Environments Change)  	Plants (Lifecycle of a flowering plant) 

Year: 3/4	Chemistry	Unit: States of matter (NC Year 4)	Rotation A - Autumn 1

Knowledge Learning Objectives:

1. To compare and group materials together, according to whether they are solids, liquids, or gases.
2. To observe that some materials change state when they are heated.
3. To observe that some materials change state when they are cooled.
4. To measure or research the temperature at which this happens in degrees Celsius (°C).
5. To identify the part played by evaporation in the water cycle. Link to Geography
6. To associate the rate of evaporation with temperature. Link to Geography
7. To identify the part played by condensation in the water cycle. Link to Geography

Working Scientifically Learning Objectives:

a) To ask relevant questions and use different types of scientific enquiry to answer them.
b) To set up simple practical enquiries, comparative and fair tests.
c) To make systematic and careful observations.
d) To take accurate measurements using standard units.
e) To use a range of equipment, including thermometers and data loggers.
f) To gather, record, classify and present data in a variety of ways to help in answering questions.
g) To record findings using simple scientific language.
h) To record findings using simple drawings and labelled diagrams.
i) To record findings using simple keys, bar charts, and tables.
j) To report on findings from enquiries, including oral and written explanations and displays.
k) To report on findings from enquiries, including presentations of results and conclusions.
l) To use results to draw simple conclusions.
m) To use results to make predictions for new values.
n) To use results to suggest improvements and raise further questions.
o) To identifying differences, similarities or changes related to simple scientific ideas and processes.
p) To use straightforward scientific evidence to answer questions or to support their findings.

Key Vocabulary:

Solid, liquid, gas, state change, melting, freezing, melting point, boiling point, evaporation, temperature, water cycle

Key Scientist

Anders Celsius - Astronomer who invented the degrees Celsius temperature scale

Key Learning:

A solid keeps its shape and has a fixed volume. A liquid has a fixed volume but changes in shape to fit the container. A liquid can be poured and keeps a level, horizontal surface. A gas fills all available space; it has no fixed shape or volume.

Melting is a state change from solid to liquid. Freezing is a state change from liquid to solid. The freezing point of water is 0oC.

Boiling is a change of state from liquid to gas that happens when a liquid is heated to a specific temperature and bubbles of the gas can be seen in the liquid. Water boils when it is heated to 100oC.

Evaporation is the same state change as boiling (liquid to gas), but it happens slowly at lower temperatures and only at the surface of the liquid. Evaporation happens more quickly if the temperature is higher, the liquid is spread out or it is windy.

Condensation is the change back from a gas to a liquid caused by cooling.

Water at the surface of seas, rivers etc. evaporates into water vapour (a gas). This rises, cools and condenses back into a liquid forming clouds. When too much water has condensed, the water droplets in the cloud get too heavy and fall back down as rain, snow, sleet etc. and drain back into rivers etc. This is known as precipitation. This is the water cycle.

Science Enquiry Questions:

Based on the children's own criteria:

Can you sort solids / liquids (Classify)

What happens when ice melts? (Observe)

What happens when frozen liquids melt? (Observe)

What affects the melting rate of chocolate (size of pieces, temperature of water, type of chocolate)? (Comparative)

What affects the rate an 'ice pole' melts? (Comparative) What affects the rate of evaporation? (Comparative)

What is the melting point of metals? (Research)

What is the water cycle? (Children present what they've learned in different ways: create a model, write a song, write a story, create a PPT, etc.) (Research)

Year: 3/4	Biology	Unit: Animals, including Humans (NC Year 3)	Rotation A - Autumn 2

Knowledge Learning Objectives:

1. To identify that animal, including humans, need the right types and amount of nutrition.
2. To identify that animals, including humans, cannot make their own food; they get nutrition from what they eat.
3. To identify that humans and some other animals have skeletons for support, protection, and movement.
4. To identify that humans and some other animals have muscles for support, protection, and movement.

Working Scientifically Learning Objectives:

a) To ask relevant questions and use different types of scientific enquiry to answer them.
b) To set up simple practical enquiries, comparative and fair tests.
c) To make systematic and careful observations.
d) To take accurate measurements using standard units.
e) To use a range of equipment, including thermometers and data loggers.
f) To gather, record, classify and present data in a variety of ways to help in answering questions.
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o) To identifying differences, similarities or changes related to simple scientific ideas and processes.
p) To use straightforward scientific evidence to answer questions or to support their findings.

Key Vocabulary:

Nutrition, nutrients, carbohydrates, sugars, protein, vitamins, minerals, fibre, fat, water, skeleton, bones, muscles, joints, support, protect, move, skull, ribs, spine

Key Scientist

Marie Curie - Physicist who invented the first mobile x-ray machine to treat soldiers wounded on the battlefield in WWI.

Key Learning:

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

Science Enquiry Questions:

Can you sort food based on nutrition? (Classify)

Do all animals have skeletons? (Classify)

Children generate questions for investigations:

Do 'healthy' drinks have less sugar? (Pattern)

Does brown bread have more fibre? (Pattern)

Do people with long arms throw further? (Pattern)

Can people with short legs jump higher? (Pattern)

Can people with longer legs run faster? (Pattern)

Which types of food contain which nutrients? (Research)

Year: 3/4	Physics	Unit: Electricity (NC Year 4)	Rotation A – Spring 1

Knowledge Learning Objectives:

1. To identify common appliances that run on electricity.
2. To construct a simple series electrical circuit.
3. To identify and name basic parts of an electric circuit, including cells, wires, bulbs, switches, and buzzers.
4. To 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.
5. To recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit.
6. To recognise some common conductors and insulators.
7. To associate metals with being good conductors.

Working Scientifically Learning Objectives:

a) To ask relevant questions and use different types of scientific enquiry to answer them.
b) To set up simple practical enquiries, comparative and fair tests.
c) To make systematic and careful observations.
d) To take accurate measurements using standard units.
e) To use a range of equipment, including thermometers and data loggers.
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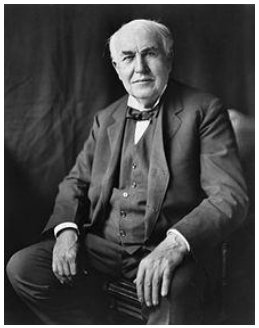
n) To use results to suggest improvements and raise further questions.
o) To identifying differences, similarities or changes related to simple scientific ideas and processes.
p) To use straightforward scientific evidence to answer questions or to support their findings.

Key Vocabulary:

Electricity, electrical appliance/device, mains, plug, electrical circuit, complete circuit, component, cell, battery, positive, negative, connect/connections, loose connection, short circuit, crocodile clip, bulb, switch, buzzer, motor, conductor, insulator, metal, non-metal, symbol.

N.B. Children in Year 4 do not need to use standard symbols for electrical components, as this is taught in Year 6

Key Scientist



Thomas Edison - Inventor including the light bulb

Key Learning:

Many household devices and appliances run on electricity. Some plug in to the mains and others run on batteries.

An electrical circuit consists of a cell or battery connected to a component using wires.

If there is a break in the circuit, a loose connection or a short circuit, the component will not work.

A switch can be added to the circuit to turn the component on and off. Metals are good conductors so they can be used as wires in a circuit. Non-metallic solids are insulators except for graphite (pencil lead). Water, if not completely pure, also conducts electricity.

Science Enquiry Questions:

Based on the children's own criteria:

Can you sort household appliances and/or toys (leading to electrical/not electrical, batteries/mains)? (Classify)

Can you sort materials into insulators and conductors? (Classify)

Year: 3/4	Physics	Unit: Light (NC Year 3)	Rotation A – Spring 2

Knowledge Learning Objectives:

1. To recognise that they need light in order to see things.
2. To recognise that dark is the absence of light.
3. To notice that light is reflected from surfaces.
4. To recognise that light from the sun can be dangerous.
5. To recognise that there are ways to protect their eyes from the sun.
6. To recognise that shadows are formed when the light from a light source is blocked by a solid object.
7. To find patterns in the way that the size of shadows change.

Working Scientifically Learning Objectives:

a) To ask relevant questions and use different types of scientific enquiry to answer them.
b) To set up simple practical enquiries, comparative and fair tests.
c) To make systematic and careful observations.
d) To take accurate measurements using standard units.
e) To use a range of equipment, including thermometers and data loggers.
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p) To use straightforward scientific evidence to answer questions or to support their findings.

Key Vocabulary:

Light, light source, dark, absence of light, transparent, translucent, opaque, shiny, matt, surface, shadow, reflect, mirror, sunlight, dangerous

Key Scientist

John Walker - Friction match inventor from Stockton.

Key Learning:

We see objects because our eyes can sense light. Dark is the absence of light. We cannot see anything in complete darkness. Some objects, for example, the sun, light bulbs, and candles are sources of light.

Objects are easier to see if there is more light. Some surfaces reflect light. Objects are easier to see when there is less light if they are reflective.

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

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

Science Enquiry Questions:

Can you sort the light sources (leading to man-made/natural)? (Classify)

Can you sort materials (leading to reflective/non-reflective, transparent/translucent/opaque)? (Classify)

Which material is most reflective? (Comparative)

Which material is most transparent? (Comparative)

How do you create different sizes and shapes of shadows? (Comparative)

Year: 3/4	Biology	Unit: Living things and their habitats (NC Year 4 – Split Unit)	Rotation A – Summer 1

Knowledge Learning Objectives:

1. To recognise that living things can be grouped in a variety of ways.
2. To explore and use classification keys to help identify and name a variety of living things in their local and wider environment.
3. To explore and use classification keys to help group a variety of living things in their local and wider environment.

Working Scientifically Learning Objectives:

a) To ask relevant questions and use different types of scientific enquiry to answer them.
b) To set up simple practical enquiries, comparative and fair tests.
c) To make systematic and careful observations.
d) To take accurate measurements using standard units.
e) To use a range of equipment, including thermometers and data loggers.
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p) To use straightforward scientific evidence to answer questions or to support their findings.

Key Vocabulary:

Classification, classification keys, environment, habitat, human impact, positive, negative, migrate, hibernate

Key Scientist

Dr Jane Goodall - Primatologist

Key Learning:

Living things can be grouped (classified) in different ways according to their features.

Classification keys can be used to identify and name living things. Living things live in a habitat which provides an environment to which they are suited (Year 2 learning).

These environments may change naturally e.g. through flooding, fire, earthquakes etc. Humans also cause the environment to change. This can be in a good way (i.e. positive human impact, such as setting up nature reserves) or in a bad way (i.e. negative human impact, such as littering).

These environments also change with the seasons; different living things can be found in a habitat at different times of the year.

Science Enquiry Questions:

Based on the children's own criteria:

Sort plants and animals that live in our local environment (Classify)

Can you sort animals and plants by using a branching databases/dichotomous key? (Classify)

Which living things are in our local environment at different times of the year? (Observe)

Do animals with …. have ….? (Pattern)

Do plants with …. have ….? (Pattern)

What plants and animals live in wider environments e.g. polar, desert, jungle, etc? (Research)

Year: 3/4	Biology	Unit: Plants (NC Year 3 – Split Unit)	Rotation A – Summer 2

Knowledge Learning Objectives:

1. To identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves, and flowers.
2. To explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow).
3. To explore the requirements of plants for life and growth vary from plant to plant.
4. To investigate the way in which water is transported within plants.

Working Scientifically Learning Objectives:

a) To ask relevant questions and use different types of scientific enquiry to answer them.
b) To set up simple practical enquiries, comparative and fair tests.
c) To make systematic and careful observations.
d) To take accurate measurements using standard units.
e) To use a range of equipment, including thermometers and data loggers.
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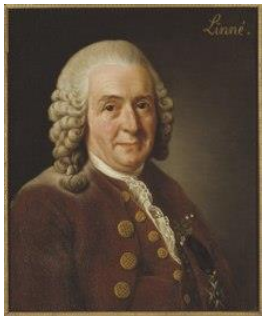
p) To use straightforward scientific evidence to answer questions or to support their findings.

Key Vocabulary:

Photosynthesis, pollen, insect/wind pollination, seed formation, seed dispersal (wind dispersal, animal dispersal, water dispersal)

Key Scientist



Carl Linnaeus - Biologist

Key Learning:

Many plants, but not all, have roots, stems/trunks, leaves, and flowers/blossom. The roots absorb water and nutrients from the soil and anchor the plant in place. The stem transports water and nutrients/minerals around the plant and holds the leaves and flowers up in the air to enhance photosynthesis, pollination, and seed dispersal. The leaves use sunlight and water to produce the plant's food. Some plants produce flowers which enable the plant to reproduce. Pollen, which is produced by the male part of the flower, is transferred to the female part of other flowers (pollination). This forms seeds, sometimes contained in berries or fruits which are then dispersed in different ways. Different plants require different conditions for germination and growth.

Science Enquiry Questions:

How is water transported in plants? (Observe)

How do flowers change over time? (Observe)

What affects how plants grow e.g. more/less light/water, change in temperature, nutrients? (Pattern Seeking)

What are the main functions of a plant? (Research)

Year: 3/4	Biology	Unit: Animals, including Humans (NC Year 4)	Rotation B- Autumn 1

Knowledge Learning Objectives:

1. To describe the simple functions of the basic parts of the digestive system in humans.
2. To identify the different types of teeth in humans.
3. To identify the simple functions of teeth in humans.
4. To construct and interpret a variety of food chains, identifying producers, predators, and prey.

Working Scientifically Learning Objectives:

a) To ask relevant questions and use different types of scientific enquiry to answer them.
b) To set up simple practical enquiries, comparative and fair tests.
c) To make systematic and careful observations.
d) To take accurate measurements using standard units.
e) To use a range of equipment, including thermometers and data loggers.
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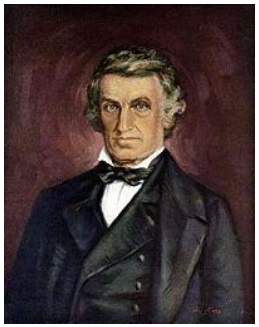
p) To use straightforward scientific evidence to answer questions or to support their findings.

Key Vocabulary:

Digestive system, digestion, mouth, teeth, saliva, oesophagus, stomach, small intestine, nutrients, large intestine, rectum, anus, teeth, incisor, canine, molar, premolars, herbivore, carnivore, omnivore, producer, predator, prey, food chain

Key Scientist



William Beaumont - Surgeon / Research on human digestion

Key Learning:

Food enters the body through the mouth. Digestion starts when the teeth start to break the food down. Saliva is added and the tongue rolls the food into a ball.

The food is swallowed and passes down the oesophagus to the stomach.

Here the food is broken down further by being churned around and other chemicals are added.

The food passes into the small intestine. Here nutrients are removed from the food and leave the digestive system to be used elsewhere in the body.

The rest of the food then passes into the large intestine. Here the water is removed for use elsewhere in the body.

What is left is then stored in the rectum until it leaves the body through the anus when you go to the toilet.

Humans have four types of teeth: incisors for cutting; canines for tearing; and molars and premolars for grinding (chewing).

Living things can be classified as producers, predators, and prey according to their place in the food chain.

Science Enquiry Questions:

Can you identify different types of teeth (linking to simple functions)? (Classify)

Can you recognise what eats plants and what eats animals by looking at their teeth? (Classify)

What are the different parts of the digestive system (Children present what they've learned in different ways: create a model, write a song, write a story, create a PPT, etc.)? (Research)

Can you construct a food chain to show what do different animals eat within a specific environment e.g. coral, polar, African grasslands? (Research)

Year: 3/4	Physics	Unit: Forces and Magnets (NC Year 3)	Rotation B - Autumn 2

Knowledge Learning Objectives:

1. To compare how things move on different surfaces.
2. To notice that some forces need contact between two objects.
3. To notice that magnetic forces can act at a distance.
4. To observe how magnets attract or repel each other.
5. To observe how magnets attract some materials and not others.
6. To compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet.
7. To identify some magnetic materials.
8. To describe magnets as having two poles.
9. To predict whether two magnets will attract or repel each other, depending on which poles are facing.

Working Scientifically Learning Objectives:

a) To ask relevant questions and use different types of scientific enquiry to answer them.
b) To set up simple practical enquiries, comparative and fair tests.
c) To make systematic and careful observations.
d) To take accurate measurements using standard units.
e) To use a range of equipment, including thermometers and data loggers.
f) To gather, record, classify and present data in a variety of ways to help in answering questions.
g) To record findings using simple scientific language.
h) To record findings using simple drawings and labelled diagrams.
i) To record findings using simple keys, bar charts, and tables.
j) To report on findings from enquiries, including oral and written explanations and displays.
k) To report on findings from enquiries, including presentations of results and conclusions.
l) To use results to draw simple conclusions.
m) To use results to make predictions for new values.
n) To use results to suggest improvements and raise further questions.
o) To identifying differences, similarities or changes related to simple scientific ideas and processes.
p) To use straightforward scientific evidence to answer questions or to support their findings.

Key Vocabulary:

Force, push, pull, twist, contact force, non-contact force, magnetic force, magnet, strength, bar magnet, ring magnet, button magnet, horseshoe magnet, attract, repel, magnetic material, metal, iron, steel, poles, north pole, south pole

Key Scientist

Sir Isaac Newton - Developed the theory of gravity.

Key Learning:

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

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

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

Science Enquiry Questions:

Based on the children's own criteria:

How can we sort materials (leading towards metal/non-metal and magnetic/not magnetic)? (Classify)

How can we sort toys (leading to what makes them move e.g. push/pull)? (Classify)

How do objects move on different surfaces e.g. cars, spinning tops, wind-up/clockwork toys? (Comparative)

How strong are magnets? (Comparative)

How are magnets used in everyday life? (Research)

Year: 3/4	Chemistry	Unit: Rocks (NC Year 3)	Rotation B - Spring 1

Knowledge Learning Objectives:

1. To compare and group together different kinds of rocks on the basis of their appearance.
2. To compare and group together different kinds of rocks on the basis on some simple physical properties.
3. To describe in simple terms how fossils are formed when things that have lived are trapped within rock.
4. To recognise that soils are made from rocks and organic matter.

Working Scientifically Learning Objectives:

a) To ask relevant questions and use different types of scientific enquiry to answer them.
b) To set up simple practical enquiries, comparative and fair tests.
c) To make systematic and careful observations.
d) To take accurate measurements using standard units.
e) To use a range of equipment, including thermometers and data loggers.
f) To gather, record, classify and present data in a variety of ways to help in answering questions.
g) To record findings using simple scientific language.
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n) To use results to suggest improvements and raise further questions.
o) To identifying differences, similarities or changes related to simple scientific ideas and processes.
p) To use straightforward scientific evidence to answer questions or to support their findings.

Key Vocabulary:

Rock, stone, pebble, boulder, grain, crystals, layers, hard, soft, texture, absorb water, soil, fossil, marble, chalk, granite, sandstone, slate, soil, peat, sandy/chalk/clay soil

Key Scientist

Mary Anning - Fossil Collector

Key Learning:

Rock is a naturally occurring material. There are different types of rock e.g. sandstone, limestone, slate etc. which have different properties. Rocks can be hard or soft. They have different sizes of grain or crystal. They may absorb water. Rocks can be different shapes and sizes (stones, pebbles, boulders). Soils are made up of pieces of ground down rock which may be mixed with plant and animal material (organic matter). The type of rock, size of rock pieces and the amount of organic matter affect the property of the soil. Some rocks contain fossils. Fossils were formed millions of years ago. When plants and animals died, they fell to the seabed. They became covered and squashed by other material. Over time the dissolving animal and plant matter is replaced by minerals from the water.

Science Enquiry Questions:

Based on the children's own criteria

How can we sort these flowers? (Classify)

How are soils similar / different? (Classify)

How do soils separate into different layers in water? (Observe)

Which is the hardest rock? (Comparative)

Which rock is most absorbent? (Comparative)

How quickly water runs through different types of soil? (Comparative)

How are fossils formed? (Research)

Year: 3/4	Physics	Unit: Sound (NC Year 4)	Rotation B - Spring 2

Knowledge Learning Objectives:

1. To identify how sounds are made, associating some of them with something vibrating.
2. To recognise that vibrations from sounds travel through a medium to the ear.
3. To find patterns between the pitch of a sound and features of the object that produced it.
4. To find patterns between the volume of a sound and the strength of the vibrations that produced it.
5. To recognise that sounds get fainter as the distance from the sound source increases.

Working Scientifically Learning Objectives:

a) To ask relevant questions and use different types of scientific enquiry to answer them.
b) To set up simple practical enquiries, comparative and fair tests.
c) To make systematic and careful observations.
d) To take accurate measurements using standard units.
e) To use a range of equipment, including thermometers and data loggers.
f) To gather, record, classify and present data in a variety of ways to help in answering questions.
g) To record findings using simple scientific language.
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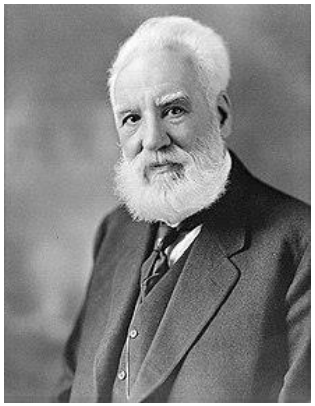
l) To use results to draw simple conclusions.
m) To use results to make predictions for new values.
n) To use results to suggest improvements and raise further questions.
o) To identifying differences, similarities or changes related to simple scientific ideas and processes.
p) To use straightforward scientific evidence to answer questions or to support their findings.

Key Vocabulary:

Sound, source, vibrate, vibration, travel, pitch (high, low), volume, faint, loud, insulation

Key Scientist



Alexander Graham Bell Scientist - Invented the telephone.

Key Learning:

A sound produces vibrations which travel through a medium from the source to our ears.

Different mediums such as solids, liquids and gases can carry sound, but sound cannot travel through a vacuum (an area empty of matter). The vibrations cause parts of our body inside our ears to vibrate, allowing us to hear (sense) the sound.

The loudness (volume) of the sound depends on the strength (size) of vibrations which decreases as they travel through the medium. Therefore, sounds decrease in volume as you move away from the source.

A sound insulator is a material which blocks sound effectively.

Pitch is the highness or lowness of a sound and is affected by features of objects producing the sounds. For example, smaller objects usually produce higher pitched sounds.

Science Enquiry Questions:

Based on the children's own criteria:

How can we sort musical instruments? (Classify)

Which is the loudest musical instrument? (Comparative)

Does volume change as distance away from a source increases? (Comparative)

How do string telephones work? (Comparative)

How does pitch change? (Using milk bottles, straw pipes, rulers, elastic band guitars) (Comparative)

Year: 3/4	Biology	Unit: Living things and their habitats (NC Year 4 – Spilt Unit)	Rotation B – Summer 1

Knowledge Learning Objectives:

1. To recognise that environments can change and that this can sometimes pose dangers to living things.

Working Scientifically Learning Objectives:

a) To ask relevant questions and use different types of scientific enquiry to answer them.
b) To set up simple practical enquiries, comparative and fair tests.
c) To make systematic and careful observations.
d) To take accurate measurements using standard units.
e) To use a range of equipment, including thermometers and data loggers.
f) To gather, record, classify and present data in a variety of ways to help in answering questions.
g) To record findings using simple scientific language.
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i) To record findings using simple keys, bar charts, and tables.
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m) To use results to make predictions for new values.
n) To use results to suggest improvements and raise further questions.
o) To identifying differences, similarities or changes related to simple scientific ideas and processes.
p) To use straightforward scientific evidence to answer questions or to support their findings.

Key Vocabulary:

Classification, classification keys, environment, habitat, human impact, positive, negative, migrate, hibernate

Key Scientist

Dr Juliette Jackson - Coastal Researcher

Key Learning:

Living things can be grouped (classified) in different ways according to their features.

Classification keys can be used to identify and name living things. Living things live in a habitat which provides an environment to which they are suited (Year 2 learning).

These environments may change naturally e.g. through flooding, fire, earthquakes etc. Humans also cause the environment to change. This can be in a good way (i.e. positive human impact, such as setting up nature reserves) or in a bad way (i.e. negative human impact, such as littering).

These environments also change with the seasons; different living things can be found in a habitat at different times of the year.

Science Enquiry Questions:

What impact do global environmental issues have on living things? (Research)

Year: 3/4	Biology	Unit: Plants (NC Year 3 – Split Unit)	Rotation B – Summer 2
Knowledge Learning Objectives: 1. To identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves, and flowers. 2. To explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow). 3. To explore the requirements of plants for life and growth vary from plant to plant. 4. To investigate the way in which water is transported within plants.			**Working Scientifically Learning Objectives:** a) To ask relevant questions and use different types of scientific enquiry to answer them. b) To set up simple practical enquiries, comparative and fair tests. c) To make systematic and careful observations. d) To take accurate measurements using standard units. e) To use a range of equipment, including thermometers and data loggers. f) To gather, record, classify and present data in a variety of ways to help in answering questions. g) To record findings using simple scientific language. h) To record findings using simple drawings and labelled diagrams. i) To record findings using simple keys, bar charts, and tables. j) To report on findings from enquiries, including oral and written explanations and displays. k) To report on findings from enquiries, including presentations of results and conclusions. l) To use results to draw simple conclusions. m) To use results to make predictions for new values. n) To use results to suggest improvements and raise further questions. o) To identifying differences, similarities or changes related to simple scientific ideas and processes. p) To use straightforward scientific evidence to answer questions or to support their findings.

Key Vocabulary:

Photosynthesis, pollen, insect/wind pollination, seed formation, seed dispersal (wind dispersal, animal dispersal, water dispersal)

Key Scientist

Dr Kelsey Byers Evolutionary Biologist

Key Learning:

Many plants, but not all, have roots, stems/trunks, leaves, and flowers/blossom. The roots absorb water and nutrients from the soil and anchor the plant in place. The stem transports water and nutrients/minerals around the plant and holds the leaves and flowers up in the air to enhance photosynthesis, pollination, and seed dispersal. The leaves use sunlight and water to produce the plant's food. Some plants produce flowers which enable the plant to reproduce. Pollen, which is produced by the male part of the flower, is transferred to the female part of other flowers (pollination). This forms seeds, sometimes contained in berries or fruits which are then dispersed in different ways. Different plants require different conditions for germination and growth.

Science Enquiry Questions:

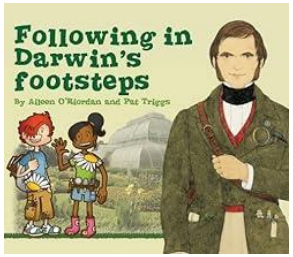
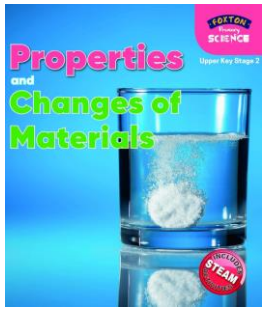
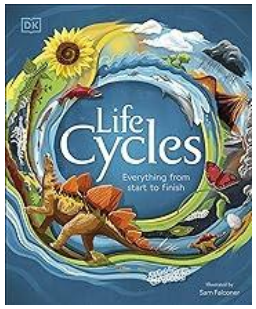
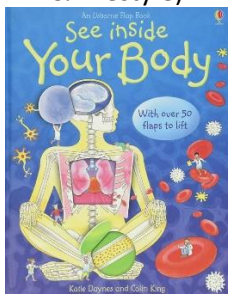
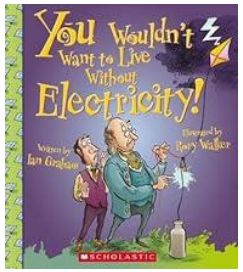
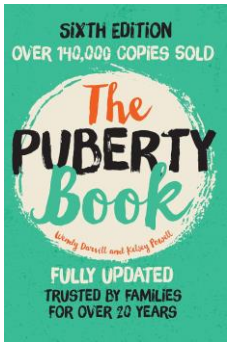
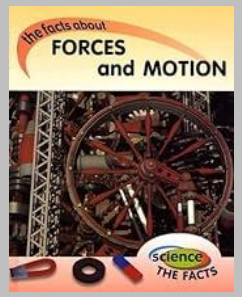
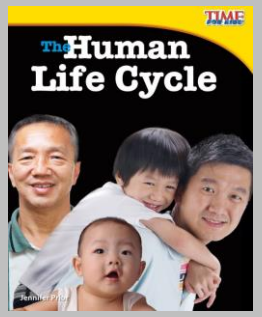
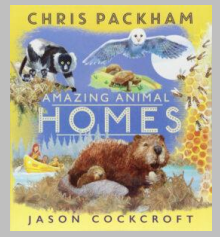
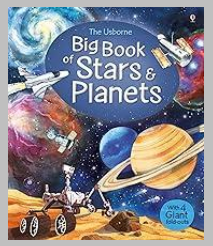
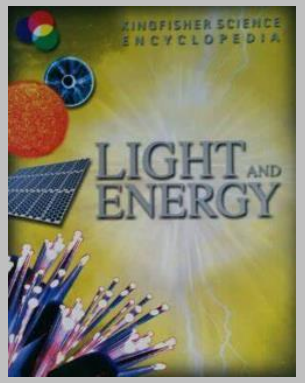
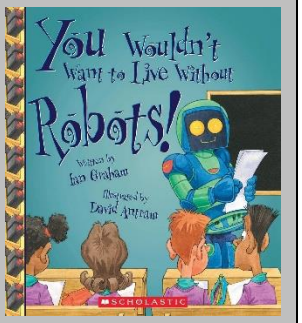
Based on children's own criteria:

How could we sort flowers (Classify)

How do plants disperse their seeds? (Research)

How are different plants pollenated? (Research)

Science Overview Year 5 & 6

Year Group	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 5 & 6 Rotation A	Evolution & Inheritance 	Properties & Change of Materials 	Living things & their habitats (Lifecycles) 	Animals, including humans. (Circulatory System & Lifestyle) 	Electricity 	Puberty / KS3 Ready Investigations 
Year 5 & 6 Rotation B	Forces 	Animals, including humans. (Birth to Old Age) 	Living things and their habitats 	Earth & Space  	Light 	Puberty / KS3 Ready Investigations 

Year: 5/6	Biology	Unit: Evolution and inheritance (NC Year 6)	Rotation A – Autumn 1

Knowledge Learning Objectives:

1. To recognise that living things have changed over time.
2. To recognise that fossils provide information about living things that inhabited the Earth millions of years ago.
3. To recognise that living things produce offspring of the same kind.
4. To recognise that normally offspring vary and are not identical to their parents.
5. To identify how animals are adapted to suit their environment in different ways.
6. To identify how plants are adapted to suit their environment in different ways.
7. To identify that adaptation may lead to evolution.

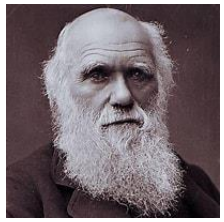
Working Scientifically Learning Objectives:

a) To plan different types of scientific enquiries to answer questions.
b) To plan different types of scientific enquiries, including recognising and controlling variables where necessary.
c) To take measurements, using a range of scientific equipment, with increasing accuracy and precision.
d) To take measurements, using a range of scientific equipment, taking repeat readings when appropriate.
e) To record data and results of increasing complexity using scientific diagrams and labels.
f) To record data and results of increasing complexity using classification keys.
g) To recording data and results of increasing complexity using tables.
h) To record data and results of increasing complexity using scatter graphs.
i) To record data and results of increasing complexity using bar graphs.
j) To record data and results of increasing complexity using line graphs.
k) To use test results to make predictions.
l) To use test results to set up further comparative and fair tests.
m) To report and present findings from enquiries, including conclusions, in oral and written forms such as displays and other presentations.
n) To report and present findings from enquiries, including causal relationships, in oral and written forms (displays /presentations).
o) To report and present findings from enquiries, including explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.
p) To identify scientific evidence that has been used to support or refute ideas or arguments.

Key Vocabulary:

Offspring, sexual reproduction, vary, characteristics, suited, adapted, environment, inherited, species, fossils

Key Scientist



Charles Darwin - Biologist / Theory of Evolution

Key Learning:

All living things have offspring of the same kind, as features in the offspring are inherited from the parents.

Due to sexual reproduction, the offspring are not identical to their parents and vary from each other.

Plants and animals have characteristics that make them suited (adapted) to their environment. If the environment changes rapidly, some variations of a species may not suit the new environment and will die.

If the environment changes slowly, animals and plants with variations that are best suited survive in greater numbers to reproduce and pass their characteristics on to their young.

Over time, these inherited characteristics become more dominant within the population.

Over a very long period of time, these characteristics may be so different to how they were originally that a new species is created. This is evolution.

Fossils give us evidence of what lived on the Earth millions of years ago and provide evidence to support the theory of evolution.

More recently, scientists such as Darwin and Wallace observed how living things adapt to different environments to become distinct varieties with their own characteristics.

Science Enquiry Questions:

Can you classify a species of animals / plants? (Classify)

Can you use different pieces of equipment, e.g. chopsticks, toothpicks, cutlery, to look for patterns linking the suitability of bird beaks for the available food e.g. rice, grapes, raisins? (Pattern)

Year: 5/6	Chemistry	Unit: Properties and changes of materials (NC Year 5)	Rotation A – Autumn 2

Knowledge Learning Objectives:

1. To compare and group together everyday materials on the basis of their properties, including their hardness, solubility, and transparency.
2. To compare and group together everyday materials on the basis of their properties, including their conductivity (electrical and thermal).
3. To compare and group together everyday materials on the basis of their properties, including their response to magnets.
4. To know that some materials will dissolve in liquid to form a solution.
5. To describe how to recover a substance from a solution.
6. To use knowledge of solids, liquids, and gases to decide how mixtures might be separated through filtering and sieving.
7. To use knowledge of solids, liquids, and gases to decide how mixtures might be separated through evaporating.
8. To give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood, and plastic.
9. To demonstrate that dissolving, mixing and changes of state are reversible changes.
10. To explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible.
11. To explain that some changes result in the formation of new materials, including changes associated with burning.
12. To explain that some changes result in the formation of new materials, including the action of acid on bicarbonate of soda.

Working Scientifically Learning Objectives:

a) To plan different types of scientific enquiries to answer questions.
b) To plan different types of scientific enquiries, including recognising and controlling variables where necessary.
c) To take measurements, using a range of scientific equipment, with increasing accuracy and precision.
d) To take measurements, using a range of scientific equipment, taking repeat readings when appropriate.
e) To record data and results of increasing complexity using scientific diagrams and labels.
f) To record data and results of increasing complexity using classification keys.
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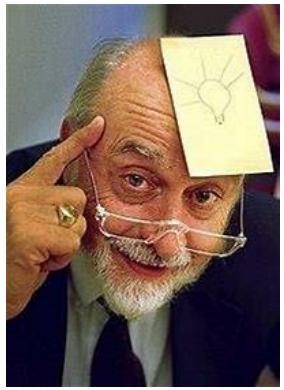
l) To use test results to set up further comparative and fair tests.
m) To report and present findings from enquiries, including conclusions, in oral and written forms such as displays and other presentations.
n) To report and present findings from enquiries, including causal relationships, in oral and written forms (displays /presentations).
o) To report and present findings from enquiries, including explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.
p) To identify scientific evidence that has been used to support or refute ideas or arguments.

Key Vocabulary:

Thermal/electrical insulator/conductor, change of state, mixture, dissolve, solution, soluble, insoluble, filter, sieve, reversible/non-reversible change, burning, rusting, new material

Key Scientist



Arthur Fry - Inventor of Post it Note

Key Learning:

Materials have different uses depending on their properties and state (liquid, solid, gas).

Properties include hardness, transparency, electrical and thermal conductivity, and attraction to magnets. Some materials will dissolve in a liquid and form a solution while others are insoluble and form sediment.

Mixtures can be separated by filtering, sieving and evaporation. Some changes to materials such as dissolving, mixing and changes of state are reversible, but some changes such as burning wood, rusting and mixing vinegar with bicarbonate of soda result in the formation of new materials and these are not reversible.

Science Enquiry Questions:

Based on the children's own criteria:

Sort materials samples of wood, metal, plastic, etc? (Classify)

What happens when solids are added to liquids (classify materials based on the outcomes)? (Classify)

What happens to metals in different liquids (Rusting)? (Observe)

Which materials keep things warm/cold? (Comparative)

Which material would be good for a bag for different purposes? (Comparative)

Which material dissolves the quickest? (Comparative)

Year: 5/6	Biology	Unit: Living things and their habitats (NC Year 5)	Rotation A – Spring 1

Knowledge Learning Objectives:

1. To describe the differences in the life cycles of a mammal, an amphibian, an insect, and a bird
2. To describe the life process of reproduction in some plants.
3. To describe the life process of reproduction in some animals.

Working Scientifically Learning Objectives:

a) To plan different types of scientific enquiries to answer questions.
b) To plan different types of scientific enquiries, including recognising and controlling variables where necessary.
c) To take measurements, using a range of scientific equipment, with increasing accuracy and precision.
d) To take measurements, using a range of scientific equipment, taking repeat readings when appropriate.
e) To record data and results of increasing complexity using scientific diagrams and labels.
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p) To identify scientific evidence that has been used to support or refute ideas or arguments.

Key Vocabulary:

Life cycle, reproduce, sexual, sperm, fertilises, egg, live young, metamorphosis, asexual, plantlets, runners, bulbs, cuttings

Key Scientist

David Attenborough - Naturalist & TV Presenter

Key Learning:

As part of their life cycle, plants and animals reproduce. Most animals reproduce sexually. This involves two parents where the sperm from the male fertilises the female egg. Animals, including humans, have offspring which grow into adults.

In humans and some animals, these offspring will be born live, such as babies or kittens, and then grow into adults. In other animals, such as chickens or snakes, there may be eggs laid that hatch to young which then grow to adults. Some young undergo a further change before becoming adults e.g. caterpillars to butterflies. This is called a metamorphosis. Plants reproduce both sexually and asexually.

Bulbs, tubers, runners, and plantlets are examples of asexual plant reproduction which involves only one parent.

Gardeners may force plants to reproduce asexually by taking cuttings. Sexual reproduction occurs through pollination, usually involving wind or insects.

Science Enquiry Questions:

Which animal has the longest lifecycle? (Classify)

What grows first (roots/stem/ leaf/flower)? (Observe)

How do bulbs grow? (Observe)

Can we harvest bulbs? (Observe)

How do strawberry/spider plants change through the year? (Observe)

Children generate questions such as:

Do larger mammals have longer gestation periods? (Pattern)

Do smaller animals lay more eggs? (Pattern)

How do gardeners asexually reproduce plants? (Research)

Year: 5/6	Biology	Unit: Animals, including humans (NC Year 6)	Rotation A – Spring 2

Knowledge Learning Objectives:

1. To identify and name the main parts of the human circulatory system,
2. To describe the functions of the heart, blood vessels and blood.
3. To recognise the impact of diet and exercise on the way their bodies function. Link to PHSE
4. To recognise the impact of drugs and lifestyle on the way their bodies function. Link to PHSE
5. To describe the ways in which nutrients are transported within animals, including humans.
6. To describe the ways in which water is transported within animals, including humans.

Working Scientifically Learning Objectives:

a) To plan different types of scientific enquiries to answer questions.
b) To plan different types of scientific enquiries, including recognising and controlling variables where necessary.
c) To take measurements, using a range of scientific equipment, with increasing accuracy and precision.
d) To take measurements, using a range of scientific equipment, taking repeat readings when appropriate.
e) To record data and results of increasing complexity using scientific diagrams and labels.
f) To record data and results of increasing complexity using classification keys.
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l) To use test results to set up further comparative and fair tests.
m) To report and present findings from enquiries, including conclusions, in oral and written forms such as displays and other presentations.
n) To report and present findings from enquiries, including causal relationships, in oral and written forms (displays /presentations).
o) To report and present findings from enquiries, including explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.
p) To identify scientific evidence that has been used to support or refute ideas or arguments.

Key Vocabulary:

Heart, pulse, rate, pumps, blood, blood vessels, transported, lungs, oxygen, carbon dioxide, nutrients, water, muscles, cycle, circulatory system, diet, exercise, drugs, lifestyle

Key Scientist

William Harvey - Doctor who discovered the function of the heart as a pump

Key Learning:

The heart pumps blood in the blood vessels around to the lungs. Oxygen goes into the blood and carbon dioxide is removed.

The blood goes back to the heart and is then pumped around the body. Nutrients, water, and oxygen are transported in the blood to the muscles and other parts of the body where they are needed.

As they are used, they produce carbon dioxide and other waste products. Carbon dioxide is carried by the blood back to the heart and then the cycle starts again as it is transported back to the lungs to be removed from the body. This is the human circulatory system.

Diet, exercise, drugs and lifestyle have an impact on the way the body functions. They can affect how well out heart and lungs work, how likely we are to suffer from conditions such as diabetes, how clearly, we think, and generally how fit and well we feel.

Some conditions are caused by deficiencies in our diet e.g. lack of vitamins.

This content is also included in PSHE. The new statutory requirements for relationships and health education can be found below:

*Statutory guidance on Physical health and mental wellbeing (primary and secondary).

Science Enquiry Questions:

Do pulse rates change before, during and after exercise? (Observe)

Do older people have lower pulse rates? (Pattern)

Do boys have higher pulse rates? (Pattern)

Do different activities affect heart rate? (Comparative)

What do you know about the circulatory system? (Research)

Year: 5/6	Physics	Unit: Electricity (NC Year 6)	Rotation A – Summer 1

Knowledge Learning Objectives:

1. To associate the brightness of a lamp with the number and voltage of cells used in the circuit.
2. To associate the volume of a buzzer with the number and voltage of cells used in the circuit.
3. To compare and give reasons for variations in how components function, including the brightness of bulbs.
4. To compare and give reasons for variations in how components function, including the loudness of buzzers.
5. To compare and give reasons for variations in how components function, including the on/off position of switches.
6. To use recognised symbols when representing a simple circuit in a diagram.

Working Scientifically Learning Objectives:

a) To plan different types of scientific enquiries to answer questions.
b) To plan different types of scientific enquiries, including recognising and controlling variables where necessary.
c) To take measurements, using a range of scientific equipment, with increasing accuracy and precision.
d) To take measurements, using a range of scientific equipment, taking repeat readings when appropriate.
e) To record data and results of increasing complexity using scientific diagrams and labels.
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p) To identify scientific evidence that has been used to support or refute ideas or arguments.

Key Vocabulary:

Circuit, complete circuit, circuit diagram, circuit symbol, cell, battery, bulb, buzzer, motor, switch, voltage

N.B. Children do not need to understand what voltage is but will use volts and voltage to describe different batteries. The words "cells" and "batteries" are now used interchangeably.

Key Scientist

Nikola Tesla - Electrical Engineer

Key Learning:

Adding more cells to a complete circuit will make a bulb brighter, a motor spin faster or a buzzer make a louder sound.

If you use a battery with a higher voltage, the same thing happens. Adding more bulbs to a circuit will make each bulb less bright.

Using more motors or buzzers, each motor will spin more slowly and each buzzer will be quieter.

Turning a switch off (open) breaks a circuit so the circuit is not complete, and electricity cannot flow. Any bulbs, motors or buzzers will then turn off as well.

You can use recognised circuit symbols to draw simple circuit diagrams.

Science Enquiry Questions:

What is the effect of adding more bulbs, cells, buzzers, motors to a circuit? (Comparative)

Year: 5/6	Physics	Unit: Forces (NC Year 5)	Rotation B – Autumn 1

Knowledge Learning Objectives:

1. To explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.
2. To identify the effects of air resistance, that act between moving surfaces.
3. To identify the effects of water resistance, that act between moving surfaces.
4. To identify the effects of friction, that act between moving surfaces.
5. To recognise that some mechanisms, including levers, pulleys, and gears, allow a smaller force to have a greater effect.

Working Scientifically Learning Objectives:

a) To plan different types of scientific enquiries to answer questions.
b) To plan different types of scientific enquiries, including recognising and controlling variables where necessary.
c) To take measurements, using a range of scientific equipment, with increasing accuracy and precision.
d) To take measurements, using a range of scientific equipment, taking repeat readings when appropriate.
e) To record data and results of increasing complexity using scientific diagrams and labels.
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p) To identify scientific evidence that has been used to support or refute ideas or arguments.

Key Vocabulary:

Force, gravity, Earth, air resistance, water resistance, friction, mechanisms, simple machines, levers, pulleys, gears

Key Scientist

Danial Azahan - Mechanical Engineer

Key Learning:

A force causes an object to start moving, stop moving, speed up, slow down or change direction.

Gravity is a force that acts at a distance. Everything is pulled to the Earth by gravity. This causes unsupported objects to fall.

Air resistance, water resistance and friction are contact forces that act between moving surfaces. The object may be moving through the air or water, or the air and water may be moving over a stationary object. A mechanism is a device that allows a small force to be increased to a larger force. The pay back is that it requires a greater movement.

The small force moves a long distance, and the resulting large force moves a small distance, e.g. a crowbar or bottle top remover.

Pulleys, levers, and gears are all mechanisms, also known as simple machines.

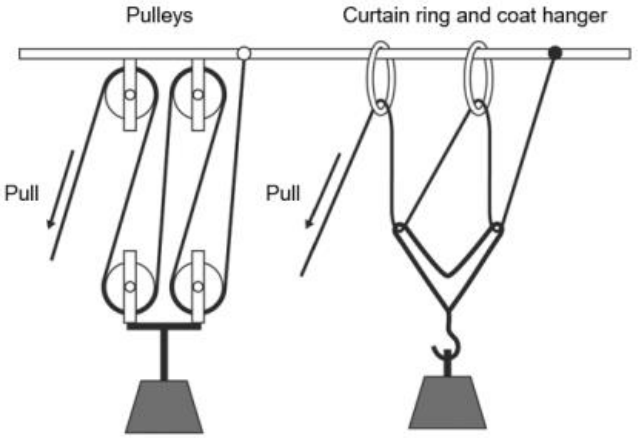
Science Enquiry Questions:

Which shoes are best for running? (Comparative)

Which boat move quicker across the water? (Comparative)

What shape makes the best parachute? (Comparative)

What are Heath Robinson and Rube Goldberg machines? (Research)



Year: 5/6	Biology	Unit: Animals, including animals (NC Year 5)	Rotation B – Autumn 2

Knowledge Learning Objectives:

1. To describe the changes as humans develop into old age (Childhood, Puberty, Young Adult / Middle Age, Old Age) Links to PHSE

Working Scientifically Learning Objectives:

a) To plan different types of scientific enquiries to answer questions.
b) To plan different types of scientific enquiries, including recognising and controlling variables where necessary.
c) To take measurements, using a range of scientific equipment, with increasing accuracy and precision.
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Key Vocabulary:

Puberty – the vocabulary to describe sexual characteristics

Key Scientist

Jack Sharkey - Sports Scientist

Key Learning:

When babies are young, they grow rapidly. They are very dependent on their parents. As they develop, they learn many skills. At puberty, a child's body changes and develops primary and secondary sexual characteristics. This enables the adult to reproduce. This needs to be taught alongside PSHE.

The new statutory requirements for relationships and health education can be found below:

- statutory guidance on Physical health and mental wellbeing (primary and secondary).

Other useful guidance includes:

- Joint briefing on teaching about puberty in KS2 from PHSE Association and Association for Science Education

Briefing on humans development and reproduction in the Primary Curriculum from PHSE Association and Association for Science Education.

(Puberty will be focused on in Summer 2)

Science Enquiry Questions:

What questions do we have about…? (Research)

Year: 5/6	Biology	Unit: Living things and their habitats (NC Year 6)	Rotation B – Spring 1

Knowledge Learning Objectives:

1. To describe how living things are classified into broad groups according to common observable characteristics, including micro-organisms, plants and animals.
2. To describe how living things are classified into broad groups based on similarities and differences, including micro-organisms, plants and animals.
3. To give reasons for classifying animals based on specific characteristics.
4. To give reasons for classifying plants based on specific characteristics.

Working Scientifically Learning Objectives:

a) To plan different types of scientific enquiries to answer questions.
b) To plan different types of scientific enquiries, including recognising and controlling variables where necessary.
c) To take measurements, using a range of scientific equipment, with increasing accuracy and precision.
d) To take measurements, using a range of scientific equipment, taking repeat readings when appropriate.
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p) To identify scientific evidence that has been used to support or refute ideas or arguments.

Key Vocabulary:

Vertebrates, fish, amphibians, reptiles, birds, mammals, invertebrates, insects, spiders, snails, worms, flowering, non-flowering

Key Scientist

Carl Linnaeus - Biologist

Key Learning:

Living things can be formally grouped according to characteristics. Plants and animals are two main groups but there are other livings things that do not fit into these groups e.g. micro-organisms such as bacteria and yeast, and toadstools and mushrooms.

Plants can make their own food whereas animals cannot. Animals can be divided into two main groups: those that have backbones (vertebrates); and those that do not (invertebrates).

Vertebrates can be divided into five small groups: fish; amphibians; reptiles; birds; and mammals.

Each group has common characteristics. Invertebrates can be divided into a number of groups, including insects, spiders, snails, and worms. Plants can be divided broadly into two main groups: flowering plants; and non-flowering plants.

Science Enquiry Questions:

Can you use the Carl Linnaeus' system to classify animals? (Classify)

Can you classify plants into flowering, mosses, ferns and conifers, based on specific characteristics (Classify)

Can you create a branching database/dichotomous key to classify a set of living things? (Classify)

Whate are the characteristics of a vertebrate/invertebrate group? (Research)

What are the characteristics of flowering plants, mosses, ferns and conifers? (Research)

What is the difference between bacteria, virus and fungi? (Research)

Are micro-organisms helpful or harmful? (Research)

Year: 5/6	Physics	Unit: Earth and space (NC Year 5)	Rotation B – Spring 2

Knowledge Learning Objectives:

1. To describe the movement of the Earth, and other planets, relative to the Sun in the solar system.
2. To describe the movement of the Moon relative to the Earth.
3. To describe the Sun, Earth, and Moon as approximately spherical bodies.
4. To use the idea of the Earth's rotation to explain day and night.
5. To use the idea of the Earth's rotation to explain the apparent movement of the sun across the sky.

Working Scientifically Learning Objectives:

a) To plan different types of scientific enquiries to answer questions.
b) To plan different types of scientific enquiries, including recognising and controlling variables where necessary.
c) To take measurements, using a range of scientific equipment, with increasing accuracy and precision.
d) To take measurements, using a range of scientific equipment, taking repeat readings when appropriate.
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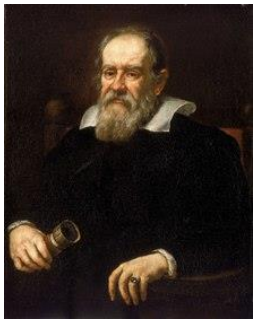
Key Vocabulary:

Earth, Sun, Moon, (Mercury, Jupiter, Saturn, Venus, Mars, Uranus, Neptune), spherical, solar system, rotates, star, orbit, planets

Key Scientist



Galileo Galilei – Astronomer

Key Learning:

The Sun is a star. It is at the centre of our solar system. There are 8 planets (can choose to name them, but not essential).

These travel around the Sun in fixed orbits. Earth takes 365¼ days to complete its orbit around the Sun.

The Earth rotates (spins) on its axis every 24 hours.

As Earth rotates half faces the Sun (day) and half is facing away from the Sun (night).

As the Earth rotates, the Sun appears to move across the sky.

The Moon orbits the Earth. It takes about 28 days to complete its orbit. The Sun, Earth and Moon are approximately spherical.

Science Enquiry Questions:

Do shadows change over the course of a day? (Observe)

What questions do we have about Earth and Space? (Research)

Year: 5/6	Physics	Unit: Light (NC Year 6)	Rotation B – Summer 1

Knowledge Learning Objectives:

1. To recognise that light appears to travel in straight lines.
2. To 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.
3. To explain that we see things because light travels from light sources to our eyes.
4. To explain that we see things because light travels from light sources to objects and then to our eyes.
5. To use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.

Working Scientifically Learning Objectives:

a) To plan different types of scientific enquiries to answer questions.
b) To plan different types of scientific enquiries, including recognising and controlling variables where necessary.
c) To take measurements, using a range of scientific equipment, with increasing accuracy and precision.
d) To take measurements, using a range of scientific equipment, taking repeat readings when appropriate.
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p) To identify scientific evidence that has been used to support or refute ideas or arguments.

Key Vocabulary:

Light, light source, dark, absence of light, transparent, translucent, opaque, shiny, matt, surface, shadow, reflect, mirror, sunlight, dangerous.

As for Year 3 - Light, plus straight lines, light rays

Key Scientist

Alhazen - Discoveries in optics and knowing light affect our eyes.

Key Learning:

Light appears to travel in straight lines, and we see objects when light from them goes into our eyes.

The light may come directly from light sources, but for other objects some light must be reflected from the object into our eyes for the object to be seen.

Objects that block light (are not fully transparent) will cause shadows. Because light travels in straight lines the shape of the shadow will be the same as the outline shape of the object.

Science Enquiry Questions:

Can you investigate the shape of shadows and link this to light travelling in straight lines? (Comparative)