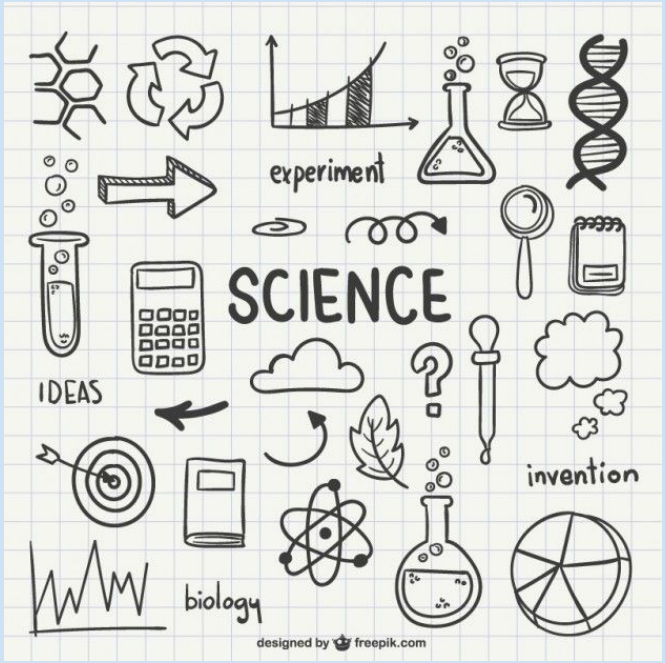


Willow Tree Academy

Scheme of Work and Progression Document

Table of contents:

National Curriculum Content:

EYFS	KS1	Y3/4	Y5/6
Understanding of the World: The World **Birth to three years:** . Repeat actions that have an effect . Explore natural materials, indoors and outdoors. . Explore and respond to different natural phenomena. .Make connections between features and their family and other families. . Notice differences between people . **30 - 50 months** ● Use senses to explore ● Explore collections of materials ● Talk about what they see using a wide vocabulary. ● Begin to make sense of their own story and family history. ● Show interest in different occupations ● Explore how things work ● Plant seeds and care for growing plants. ● Talk about different forces ● Knows that there are different countries and discuss experiences. **40-60 months** ● Looks closely at similarities, differences, patterns and change. ● Name and describe people in the family ● Compare and contrast , characters from stories ● Draw information from a simple map. ● Explore the natural world . ● Recognise some similarities and differences ● Understand the effect of changing seasons **Early Learning Goal** Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur, and talk about changes.	● Ask questions about what they notice ● Develop their understanding of scientific ideas by using different types of scientific enquiry to answer their own questions ● Observe changes over a period of time ● Notice patterns, grouping and classifying things ● Carry out simple comparative tests ● Find things out using secondary sources of information. ● Begin to use simple scientific language ● Talk about what they have found out ● Communicate their ideas to a range of audiences in a variety of ways. ● Science should be done through the use of first-hand practical experiences, but there should also be some use of appropriate secondary sources, such as books, photographs and videos.	● Explore by talking about, testing and developing ideas about everyday phenomena and the relationships between living things and familiar environments ● Begin to develop their ideas about functions, relationships and interactions ● Ask their own questions about what they observe ● Make some decisions about which types of scientific enquiry is likely to be the best way ● Observe changes over time ● Notice patterns ● Begin to group and classify things, ● Carry out simple comparative and fair tests ● Find things out using secondary sources of information ● Draw simple conclusions and use some scientific language to write about what they have found out.	● Develop a deeper understanding of a wide range of scientific ideas ● Explore by talking about their ideas ● Ask their own questions about scientific phenomena ● Analysing functions, relationships and interactions more systematically ● Encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates ● Begin to recognise that scientific ideas change and develop over time ● Select the most appropriate ways to answer science questions using different types of scientific enquiry ● Observe changes over different periods of time ● Notice patterns ● Begin to group and classify things, ● Carry out simple comparative and fair tests ● Find things out using secondary sources of information ● Draw conclusions based on their data and observations ● Use evidence to justify their ideas ● Use their scientific knowledge and understanding to explain their findings.

Year group coverage

Substantive knowledge

	Plants	Rocks	Animals inc humans	Forces and magnets	Materials and their properties	States of matter	Seasonal changes	Electricity	Light	Earth and space	Living things and their habitat	Evolution and inheritance	Sound
EYS													
Y1													
Y2													
Y3													
Y4													
Y5													
Y6													

Disciplinary knowledge

Comparative/fair testing	Research	Observation over time	Pattern-seeking	Identifying, grouping and classifying
Changing one variable to see its effect on another, whilst keeping all the other the same. **Link for support:** https://www.ogdentrust.com/assets/general/WS-fair-tests_February-2020.pdf	Using secondary sources of information to answer scientific questions. **Link for support:** https://www.ogdentrust.com/assets/general/WS-research.pdf	Observing changes that occur a period of time ranging from minutes to months. **Link for support:** https://www.ogdentrust.com/assets/general/WS-observing-over-time.pdf	Identifying patterns and looking for relationships in enquiries where variables are difficult to control. **Link for support:** https://www.ogdentrust.com/assets/general/WS-pattern-seeking.pdf	Making observations to name, sort and organise items. **Link for support:** https://www.ogdentrust.com/assets/general/WS-identifying-and-classifying.pdf

Working scientifically is to be planned across all topic areas with coverage of disciplinary knowledge planned for throughout the year.

Knowledge Progression

EYFS - Y6

Supporting documentation

https://docs.google.com/presentation/d/1bfRwQttgzHY5jFn_Er6_3ODk7gUW_klddY1CtCkcl-s/edit#slide=id.g1626bf6edb9_0_70

Animals including humans

EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Understanding of the World: The World Birth to three years: . Repeat actions that have an effect . Explore natural materials, indoors and outdoors. . Explore and respond to different natural phenomena. .Make connections between features and their family and other families. . Notice differences between people . 30 - 50 months • Use senses to explore • Explore collections of materials • Talk about what they see using a wide vocabulary. • Begin to make sense of their own story and family history. • Show interest in different occupations • Explore how things work • Plant seeds and care for growing plants. • Talk about different forces • Knows that there are different countries and discuss experiences. 40-60 months • Looks closely at similarities, differences, patterns and change. • Name and describe people in the family • Compare and contrast , characters from stories • Draw information from a simple map. • Explore the natural world . • Recognise some similarities and differences • Understand the effect of changing seasons Early Learning Goal Children know about similarities and differences in relation to and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals ts and explain why some things occur, and talk about changes.	• identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals • identify and name a variety of common animals that are carnivores, herbivores and omnivores • describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets) • identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense	• notice that animals, including humans, have offspring which grow into adults • find out about and describe the basic needs of animals, including humans, for survival (water, food and air) • describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.	• identify that animals, including humans, need the right types and amount of nutrition • Identify that they cannot make their own food; they get nutrition from what they eat. • identify that humans and some other animals have skeletons and muscles for support, protection and movement.	• describe the simple functions of the basic parts of the digestive system in humans • identify the different types of teeth in humans and their simple functions • construct and interpret a variety of food chains, identifying producers, predators and prey.	• describe the changes as humans develop to old age.	• identify and name the main parts of the human circulatory system • Describe the functions of the heart, blood vessels and blood • Describe the ways in which nutrients and water are transported within animals, including humans. • Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function

Living things and their habitat

EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
30 - 50 months • Comments and asks questions about aspects of their familiar world or the natural world. • Can talk about some of the things they have observed such as plants, animals, natural and found objects. • Developing an understanding of growth, decay and changes over time. • Shows care and concern for living things and the environment. Early Learning Goal Children know about similarities and differences in relation living things. They talk about the features of their own immediate environment and how environments might vary. They make observations of animals and plants and explain why some things occur, and talk about changes.		Explore and compare the differences between things that are living, dead, and things that have never been alive identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other identify and name a variety of plants and animals in their habitats, including micro-habitats Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food.		Recognise that living things can be grouped in a variety of ways Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment Recognise that environments can change and that this can sometimes pose dangers to living things.	Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird Describe the life process of reproduction in some plants and animals.	Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals Give reasons for classifying plants and animals based on specific characteristics.

Scientists

David Attenborough (Naturalist and Nature Documentary Broadcaster)

Plants

EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
30 - 50 months • Comments and asks questions about aspects of their familiar world such as the place where they live or the natural world. • Can talk about some of the things they have observed such as plants, animals, natural and found objects. • Developing an understanding of growth, decay and changes over time. • Shows care and concern for living things and the environment. Early Learning Goal Children know about similarities and differences in relation living things.They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur, and talk about changes.	• identify and name a variety of common wild and garden plants, including deciduous and evergreen trees • identify and describe the basic structure of a variety of common flowering plants, including trees.	• observe and describe how seeds and bulbs grow into mature plants • find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.	• identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers • explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant • investigate the way in which water is transported within plants • explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.	See living things and their habitats.	See living things and their habitats.	See living things and their habitats.

Scientists

Beatrix Potter (Author and Scientist)
Agnes Arber (Botanist)
Jan Ingenhousz (Photosynthesis)
Joseph Banks (Botanist)

Materials

EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
<u>Understanding of the World: The World</u> 30 - 50 months • Can talk about some of the things they have observed in natural and found objects. • Talks about why things happen and how things work. • Developing an understanding of changes over time. 40-60 months • Looks closely at similarities, differences, patterns and change. Early Learning Goal Children know about similarities and differences in relation to objects and materials.	• distinguish between an object and the material from which it is made • identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock • describe the simple physical properties of a variety of everyday materials • compare and group together a variety of everyday materials on the basis of their simple physical properties	• identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses • find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.	• compare and group together different kinds of rocks on the basis of their appearance and simple physical properties • describe in simple terms how fossils are formed when things that have lived are trapped within rock • recognise that soils are made from rocks and organic matter.	• compare and group materials together, according to whether they are solids, liquids or gases • observe that some materials change state when they are heated or cooled, and *measure or research the temperature at which this happens in degrees Celsius (°C)* • identify the part played by evaporation and condensation in the water cycle and *associate the rate of evaporation with temperature.*	• compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets • know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution • use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating • give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic • demonstrate that dissolving, mixing and changes of state are reversible changes • explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.	

Scientists

John Horner (Paleontologist)
Friedrich Mohs (Scientist)
Leonardo Da Vinci (Scientist/ geologist/ artist)

	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Light/ Sound				Recognise that they need light in order to see things and that dark is the absence of light Notice that light is reflected from surfaces Recognise that light from the sun can be dangerous and that there are ways to protect their eyes Recognise that shadows are formed when the light from a light source is blocked by an opaque object Find patterns in the way that the size of shadows change.	identify how sounds are made, associating some of them with something vibrating Recognise that vibrations from sounds travel through a medium to the ear Find patterns between the pitch of a sound and features of the object that produced it Find patterns between the volume of a sound and the strength of the vibrations that produced it Recognise that sounds get fainter as the distance from the sound source increases.	use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky. **(taken from space unit)**	Recognise that light appears to travel in straight lines Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.

Scientists

Gailileo Galilei (Frequency and Pitch of Sound Waves) **James Clerk Maxwell**(Visible and Invisible Waves of Light) (Y3) **Aristotle** (Sound Waves) **Alexander Graham Bell** (Invented the Telephone) **Thomas Young** (Wave Theory of Light)

	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Forces and magnets				Compare how things move on different surfaces Notice that some forces need contact between two objects, but magnetic forces can act at a distance Observe how magnets attract or repel each other and attract some materials and not others. Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials Describe magnets as having two poles Predict whether two magnets will attract or repel each other, depending on which poles are facing.		Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object Identify the effects of air resistance, water resistance and friction, that act between moving surfaces Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.	

Scientists

	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Electricity					• Identify common appliances that run on electricity. • Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers. • Identify whether a lamp will light in a simple series circuit, based on whether the lamp is part of a complete loop with a battery. • Recognise that a switch opens and closes the circuit and associate this with whether a lamp lights in a simple series circuit. • Recognise some common conductors and insulators, and associate metals with being good conductors. • Know the difference between a conductor and an insulator, giving examples of each. • Safety when using electricity	.	• Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. • Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches. • Use recognised symbols when representing a simple circuit in a diagram.

Scientists

Benjamin Franklin (scientist_ (scientist)

Thomas Edison (electric power -lightbulb)

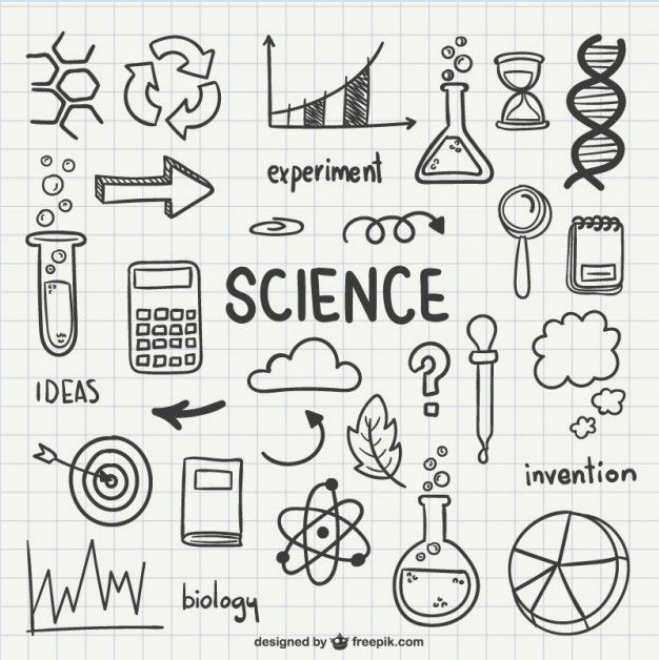
Alexander Graham Bell

Nikola Tesla (inventor)

	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Other		**Seasonal change** • observe changes across the four seasons • observe and describe weather associated with the seasons and how day length varies.				**Space** • describe the movement of the Earth, and other planets, relative to the Sun in the solar system • describe the movement of the Moon relative to the Earth • describe the Sun, Earth and Moon as approximately spherical bodies • use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.	**Evolution and Inheritance** • recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago • recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents • identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.
				Scientists		Galileo Galilei Sir Isaac Newton Katherine Johnson Edwin Hubble Stephen Hawking	Charles Darwin Mary Anning Alfred Wallace

Willow Tree Academy

Scheme of work



*Use this **scheme of work** to support planning on the sequential learning grid and your STP.*

Working Scientifically		
Year 1 and Year 2	**Year 3 and Year 4**	**Year 5 and Year 6**
• asking simple questions and recognising that they can be answered in different ways • observing closely, using simple equipment • performing simple tests • identifying and classifying • using their observations and ideas to suggest answers to questions • gathering and recording data to help in answering questions	• asking relevant questions and using different types of scientific enquiries to answer them • setting up simple practical enquiries, comparative and fair tests • making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers • gathering, recording, classifying and presenting data in a variety of ways to help in answering questions • recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables • reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions • using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions • identifying differences, similarities or changes related to simple scientific ideas and processes • using straightforward scientific evidence to answer questions or to support their findings.	• planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary • taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate • recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs • using test results to make predictions to set up further comparative and fair tests • reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations • identifying scientific evidence that has been used to support or refute ideas or arguments
Question, Questioning, Observe, Record, Identify, Group, Classify, Sort, Predict, Diagram, Chart, Bar chart, Table, Data	Relevant Questions, Predication, Plan, Observations, Record, Research, Enquiry, Comparative, Fair, Accurate, Measurements, Thermometer, Data Logger, Classify, Keys, Diagrams, Graphs, Charts, Tables, Conclusion, Explanation	Predication, Plan, Variables, Observations, Record, Repeat, Identify, Comparative, Fair, Accurate, Precise, Quantitative, Measurements, Scientific Diagrams, Classification keys, Present Systematic, Graphs (scatter, line, bar), Patterns, Interpret, Conclusion, Explanation, Relationships, Evidence, Refute, Degree of trust in results, Validity

Working scientifically is a core part of the science curriculum. It is the test not of children's knowledge but their science skills but their ability to think and act like a scientist. These are the vital tools we need to equip the next generation of scientists with. Evidence of working scientifically should be seen in all science lessons.

Year 1 - Plants

National Curriculum Objectives	Key learning	Vocabulary
• Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. • Identify and describe the basic structure of a variety of common flowering plants. • Identify and name the roots, trunk, branches and leaves of trees.	• Plants grow from seeds/bulbs • Plants need light and water to grow and survive • Plants are important • We can eat lots of plants	Leaves, trunk, branch, root, seed, bulb, flower, stem, wild, garden, deciduous, evergreen **Willow Tree Experiences** **Linked texts** Tree: Seasons Come, Seasons Go (Patricia Hegarty and Britta Teckentrup) A Little Guide to Wild Flowers (Charlotte Voake) The Things That I LOVE about TREES (Chris Butterworth) Harry's Hazelnut (Ruth Parsons)

Prior learning	Key questions	Future learning
In EYFS Children should: • Make observations of plants • Know some names of plants, trees and flowers • May be able to name and describe different plants, trees and flowers • Show some care for their world around them	How do Plants grow? • What do Plants need to grow? • Do all plants need water? • Are all plants green? • Why do seeds look different? • Can plants grow as big in the shade? • What is the biggest/smallest/smelliest (etc) tree/flower/plant on the planet?	In Year 2 Children will: • Observe and describe how seeds and bulbs grow into mature plants. • Find out and describe how plants need water, light and warmth to grow and stay healthy.

Enquiry ideas

Comparative/fair testing	Identifying, grouping and classifying	Observation over time	Pattern-seeking	Research	Big question (assessment opportunity)
Which type of compost grows the tallest sunflower?	How can we sort the leaves that we collected on our walk?	How does a daffodil bulb change over the year?	Do trees with bigger leaves lose their leaves first in autumn?	What are the most common British plants and where can we find them?	How many types of plant are there?

Year 2 - Plants

National Curriculum Objectives	Key learning	Vocabulary
• Observe and describe how seeds and bulbs grow into mature plants. • Find out and describe how plants need water, light and warmth to grow and stay healthy	• Plants grow from seeds/bulbs • Plants need light, water and warmth to grow and survive • Flowers make seeds to make more plants (reproduce) • Plants are important • We need plants to survive (to clean air, to eat) • We can eat different parts of the plants (leaves, stems, roots, seeds, fruit)	Leaves, trunk, branch, root, seed, bulb, flower, stem, wild, garden, deciduous, evergreen, observe, grow, compare, record, temperature, predict, measure, diagram, germinate, warmth, sunlight.

Willow Tree Experiences	Linked texts
	The Tin Forest (Helen Ward) Jack and the Beanstalk (Richard Walker) Ten Seeds (Ruth Brown) A Seed Is Sleepy (Dianna Aston)

Prior learning	Key questions	Future learning
In Year 1 Children should: • Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. • Identify and describe the basic structure of a variety of common flowering plants. • Identify and name the roots, trunk, branches and leaves of trees.	• Do cress produce seeds, how could we find out? • Do all plants produce flowers and seeds? • What is different between freshly cut and planted flowers? • Do plants flower all year round? • What are flowers for? • What happens to a plant after it has produced seeds?	In Year 3 Children will: • Identify and describe the functions of different parts of the flowering plant: roots, stem/trunk/leaves and flowers • Explore the part flowers play in a flowering plant's life cycle, including pollination, seed formation and seed dispersal • Explain the requirements of plants for life and growth (air, light, water, nutrients from soil, room to grow) and how they vary between plants • Know the way in which water is transported between plants

Enquiry ideas

Comparative/fair testing	Identifying, grouping and classifying	Observation over time	Pattern-seeking	Research	Big question (assessment opportunity)
Do cress seeds grow quicker inside or outside?	How can we identify the trees that we observed on our tree hunt?	What happens to my bean after I have planted it?	Do bigger seeds grow into bigger plants?	How does a cactus survive in a desert with no water?	What should I do to grow a healthy plant?

Year 3 - Plants

National Curriculum Objectives	Key learning	Vocabulary
• Identify and describe the functions of different parts of the flowering plant: roots, stem/trunk/leaves and flowers • Explore the part flowers play in a flowering plants life cycle, including pollination, seed formation and seed dispersal • Explain the requirements of plants for life and growth (air, light, water, nutrients from soil, room to grow) and how they vary between plants • Know the way in which water is transported between plants	Plants are producers, they make their own food. • Their leaves absorb sunlight and carbon dioxide • Plants have roots, which provide support and draw water from the soil • Flowering plants have specific adaptations which help it to carry out pollination, fertilisation and seed production • Seed dispersal improves a plants chances of successful reproduction • Seeds/bulbs require the right conditions to germinate and grow. • Seeds contain enough food for the plant's initial growth	Air, light, water, nutrients, soil, support, anchor, reproduction, pollination, dispersal, transportation, flower, energy, growth, seedling, carbon dioxide, oxygen, sugar, material, photosynthesis, chlorophyll **Willow Tree Experiences** **Linked texts** The Hidden Forest (Jeannie Baker) George and Flora's Secret Garden (Jo Elworthy)

Prior learning	Key questions	Future learning
In Year 2 Children should: • Observe and describe how seeds and bulbs grow into mature plants. • Find out and describe how plants need water, light and warmth to grow and stay healthy.	How do plants reproduce? • Do all flowers look the same? • How do insects know which flowers to pollinate? • Why do flowers smell? • What do seeds do? • Can a plant live without its leaves? • Do grass/trees make flowers? • What conditions are perfect for a seed to grow? • Where do weeds come from? • How does the space between seeds affect how well they grow? • Does seed size match plant size? • Do plants take in water through their roots? • How does water move through the plant? • How do plants make their food? • How does light affect plant growth? • How does a plant get carbon dioxide?	In Year 6 Children will: • Recognise that living things have changed over time and that fossils provide information about living things • Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents • Identify how animals and plants are adapted to suit their environment in different ways, and that adaptation can lead to evolution.

Enquiry ideas

Comparative/fair testing	Identifying, grouping and classifying	Observation over time	Pattern-seeking	Research	Big question (assessment opportunity)
How does the length of the carnation stem affect how long it takes for the food colouring to dye the petals?	How many ways can you group our seed collection?	What happens to celery when it is left in a glass of coloured water?	What colour flowers do pollinating insects prefer?	What are all the different ways that seeds disperse?	Why do plants have flowers?

Year 1-Animals, including humans

National Curriculum Objectives

- Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals.
- Identify and name a variety of common animals that are carnivores, herbivores and omnivores
- describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets)
- identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense

Key learning

- There are many different animals with different characteristics.
- Animals have senses to help individuals survive. When animals sense things they are able to respond.
- Animals need food to survive.
- Animals need a variety of food to help them grow, repair their bodies, be active and stay healthy.

Vocabulary

Amphibians, birds, fish, mammals, reptiles, carnivores, herbivore, omnivore, sight, hearing, touch, taste, smell, head, neck, ear, mouth, shoulder, hand, fingers, leg, foot, thumb, eye, nose, knee, toes, teeth, elbow

Willow Tree Experiences

Linked texts
One Year with Kipper
Snail Trail
Superworm

Prior learning

In Early Years children should:
• be able to identify different parts of their body.
• Have some understanding of healthy food and the need for variety in their diets.
• Be able to show care and concern for living things.
• Know the effects exercise has on their bodies.
• Have some understanding of growth and change.
• Can talk about things they have observed including animals

Key questions

• What do animals eat?
• Do all animals eat the same food?
• Which of our senses is the most accurate at identifying food?
• Do all animals hunt?
• Why are animals different colours and patterns?

Future learning

In Year 2 children will:
• Know that animals, including humans, have offspring which grow into adults
• Know the basic stages in a life cycle for animals, including humans.
• Find out and describe the basic needs of animals, including humans, for survival (water, food and air).
• Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.

Enquiry ideas

Comparative/fair testing

Is our sense of smell better when we cannot see?

Identifying, grouping and classifying

How can we organise all the zoo animals?

Observation over time

How does my height change over the year?

Pattern-seeking

Do you get better at smelling as you get older?

Research

Do all animals have the same senses as humans?

Big question
(assessment opportunity)

What are animals like?

Year 2-Animals, including humans

National Curriculum Objectives

- notice that animals, including humans, have offspring which grow into adults
- find out about and describe the basic needs of animals, including humans, for survival (water, food and air)
- describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.

Key learning

- Animals move in order to survive.
- Different animals move in different ways to help them survive.
- Exercise keeps animal's bodies in good condition and increases survival chances.
- All animals eventually die.
- Animals reproduce new animals when they reach maturity.
- Animals grow until maturity and then do not grow any larger.

Vocabulary

Living, dead, never alive, habitats, micro-habitats, food, food chain, leaf litter, shelter, seashore, woodland, ocean, rainforest, conditions, desert, damp, shade

Willow Tree Experiences

Linked texts
The Gruffalo
Meerkat Mail
Tadpole's promise

Prior learning

Year 1 children should:
• Know that animals, including humans, have offspring which grow into adults
• Know the basic stages in a life cycle for animals, including humans.
• Find out and describe the basic needs of animals, including humans, for survival (water, food and air).
• Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.

Key questions

- How long do should my pets live for?
- Do all animals grow and live the same way?
- Do bigger animals live longer?
- Why are we all different heights?
- How and why do we grow and change?

Future learning

In Year 3 children will:
• Identify that animals, including humans, need the right types and amount of nutrition, and they cannot make their own food; they get their nutrition from what they eat.
• Know how nutrients, water and oxygen are transported within animals and humans.
• Know about the importance of a nutritious, balanced diet.
• Identify that humans and some other animals have skeletons and muscles for support, protection and movement:

Enquiry ideas

Comparative/fair testing	Identifying, grouping and classifying	Observation over time	Pattern-seeking	Research	Big question (assessment opportunity)
Do amphibians have more in common with reptiles or fish?	How would you group things to show which are living, dead, or have never been alive?	How does a tadpole change over time?	Which age group of children wash their hands the most in a day?	What food do you need in a healthy diet and why?	Do living things change or stay the same?

Year 3-Animals, including humans

National Curriculum Objectives

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

Key learning

• Different animals are adapted to eat different foods.
• Many animals have skeletons to support their bodies and protect vital organs.
• Muscles are connected to bones and move them when they contract.
• Movable joints connect bones.

Vocabulary

Nutrients, nutrition, carbohydrates, protein, fats, vitamins, minerals, water, fibre, skeleton, bones, joints, endoskeleton, exoskeleton, hydrostatic skeleton, vertebrates, invertebrates, muscles, contract, relax

Willow Tree Experiences

Linked texts
The Story of Frog Belly Rat
Bone Funnybones
Goldilocks and the Three Bears

Prior learning

In Year 2 children should:
• Know that animals, including humans, have offspring which grow into adults
• Know the basic stages in a life cycle for animals, including humans.
• Find out and describe the basic needs of animals, including humans, for survival (water, food and air).
• Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.

Key questions

• Why do we need a skeleton?
• What types of skeleton are there?
• Are all skeletons the same?
• Can something survive without a skeleton?
• What happens if we break a bone?
• How do we move?
• Why do we need joints?
• Why do muscles get tired?
• Can we 'break' muscles?

Future learning

In Year 4 children will:
• Describe the simple functions of the basic parts of the digestive system in humans.
• Identify the different types of teeth in humans and their simple functions.
• Construct and interpret a variety of food chains, identifying producers, predators and prey

Enquiry ideas

Comparative/fair testing

How does the angle that your elbow/knee is bent affect the circumference of your upper arm/thigh?

Identifying, grouping and classifying

How do the skeletons of different animals compare?

Observation over time

How does our skeleton change over time? (from birth to death)

Pattern-seeking

Do male humans have larger skulls that female humans?

Research

Why do different types of vitamins keep us healthy and which foods can we find them in?

Big question
(assessment opportunity)

Why do animals have skeletons?
What is a healthy diet and why is it important?

Year 4-Animals, including humans

National Curriculum Objectives

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

Key learning

- Animals have teeth to help them eat.
- Different types of teeth do different jobs.
- Food is broken down by the teeth and further in the stomach and intestines where nutrients go into the blood.
- The blood takes nutrients around the body.
- Nutrients produced by plants move to primary consumers then to secondary consumers through food chains.

Vocabulary

Herbivore, Carnivore, Digestive system, tongue, mouth, teeth, oesophagus, stomach, gallbladder, small intestine, pancreas, large intestine, liver, tooth, canine, incisor, molar, premolar, producer, consumer

Willow Tree Experiences

Linked texts
Human Body Odyssey
Crocodiles Don't Brush Their Teeth
Wolves

Prior learning

In Year 3 children should:
• Identify that animals, including humans, need the right types and amount of nutrition, and they cannot make their own food; they get their nutrition from what they eat.
• Know how nutrients, water and oxygen are transported within animals and humans.
• Know about the importance of a nutritious, balanced diet.
• Identify that humans and some other animals have skeletons and muscles for support, protection and movement

Key questions

• Why do we need a variety of different foods?
• Do all organisms eat the same things?
• Why do some people need different diets? (weightlifter vs marathon runner)
• Why are teeth important?
• What happens to our food?
• What is our digestive system?
• How does our food turn into poo and wee?

Future learning

In Year 5 children will:
• Know the life cycle of different living things, e.g. Mammal, amphibian, insect bird.
• Know the differences between different life cycles.
• Know the process of reproduction in plants.
• Know the process of reproduction in animals

Enquiry ideas

Comparative/fair testing	Identifying, grouping and classifying	Observation over time	Pattern-seeking	Research	Big question (assessment opportunity)
In our class, are omnivores taller than vegetarians?	How can we organise teeth into groups?	How does an eggshell change when it is left in cola?	Are foods that are high in energy always high in sugar?	How do dentists fix broken teeth?	What do our bodies do with the food we eat?

Year 5-Animals, including humans

National Curriculum Objectives

- describe the changes as humans develop to old age.

Key learning

• Different animals mature at different rates and live to different ages.
• Puberty is something we all go through, a process which prepares our bodies for being adults, and reproduction
• Hormones control these changes, which can be physical and/or emotional

Vocabulary

Foetus, Embryo, Womb, Gestation, Baby, Toddler, Teenager, Elderly, Growth, Development, Puberty, Hormone, Physical, Emotional,

Willow Tree Experiences

Linked texts
Hair in Funny Places
Giant
You're Only Old Once!

Prior learning

In Year 4 children should:
• Describe the simple functions of the basic parts of the digestive system in humans.
• Identify the different types of teeth in humans and their simple functions.

Key questions

• What do humans look like?
• Do all animal embryos look the same?
• How do humans change?
• Why do humans change?
• What causes puberty?
• What changes do we go through during puberty?
• Are there any patterns between vertebrate animals and their gestation periods?

Future learning

In Year 6:
• Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.
• Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function.
• Describe the ways in which nutrients and water are transported within animals, including humans.

Enquiry ideas

Comparative/fair testing	Identifying, grouping and classifying	Observation over time	Pattern-seeking	Research	Big question (assessment opportunity)
How does age affect a human's reaction time?	Can you identify all the stages in the human life cycle?	How do different animal embryos change?	Is there a relationship between a mammal's size and its gestation period?	Why do people get grey/white hair when they get older?	Why and how does the human body change over time?

Year 6-Animals, including humans

National Curriculum Objectives

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

Key learning

• The heart pumps blood around the body.
• Oxygen is breathed into the lungs where it is absorbed by the blood.
• Muscles need oxygen to release energy from food to do work. (Oxygen is taken into the blood in the lungs; the heart pumps the blood through blood vessels to the muscles; the muscles take oxygen and nutrients from the blood.)

Vocabulary

Oxygenated, Deoxygenated, Valve, Exercise, Respiration Circulatory system, heart, lungs, blood vessels, blood, artery, vein, pulmonary, alveoli, capillary, digestive, transport, gas exchange, villi, nutrients, water, oxygen, alcohol, drugs, tobacco.

Willow Tree Experiences

Linked texts
Pig-Heart Boy
Skellig
A Heart Pumping Adventure

Prior learning

In Year 5 children should:
• Describe the changes as humans develop to old age

Key questions

• Why do we need oxygen?
• Do fish and plants breathe?
• How does the size of a person's lungs affect their lung capacity? • Are there ways to increase/decrease our lung capacity? Is lung capacity fixed?
• Why do we have blood?
• How does our heart work?
• How does exercise effect our pulse rate?
• Is the air you breathe out, the same as that you breathe in?

Future learning

In Key Stage 3 children will learn about:
• the hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms.
• the tissues and organs of the human digestive system, including adaptations to function and how the digestive system digests food (enzymes simply as biological catalysts)
• the consequences of imbalances in the diet, including obesity, starvation and deficiency diseases
• the structure and functions of the gas exchange system in humans, including adaptations to function

Enquiry ideas

Comparative/fair testing

How does the length of time we exercise for affect our heart rate?

Identifying, grouping and classifying

Which organs of the body make up the circulation system, and where are they found?

Observation over time

How does my heart rate change over the day?

Pattern-seeking

Is there a pattern between what we eat for breakfast and how fast we can run?

Research

How have our ideas about disease and medicine changed over time?

Big question

(assessment opportunity)

How do our choices affect how our bodies work? Why does my heart beat?

Year 6-Evolution and inheritance

National Curriculum Objectives	Key learning	Vocabulary
• Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago • Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents • Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.	• Life cycles have evolved to help organisms survive to adulthood. • Over time the characteristics that are most suited to the environment become increasingly common. *NB: The following could be duplicated in Year 6 Living things and their habitats.* • Organisms best suited to their environment are more likely to survive long enough to reproduce. Organisms are best adapted to reproduce are more likely to do so. • Organisms reproduce and offspring have similar characteristic patterns. • Variation exists within a population (and between offspring of some plants) • Competition exists for resources and mates	Fossils, Adaptation, Evolution, Characteristics, Reproduction, Genetics, Variation, Inherited, Environmental, Mutation, Competition, Survival of the Fittest, Evidence. **Willow Tree Experience** Skype a scientist Mr Men and Little Miss diagram Darwin's finches-beak challenge Use family photos *Ask SL for further support* **Linked texts** One Smart Fish (Christopher Wormell) The Molliebird (Jules Pottle) Our Family Tree (Lisa Westberg Peters)

Prior learning	Key questions	Future learning
From Key Stages 1 & 2, children should: • Understand there is a variety of life on Earth • Know that some animal's differences are important to their survival • Know how animals and plants reproduce • Know how fossils form over time	• Why are we all different? • What is variation, and why is it important? • How did life begin on Earth? • How do we change? • What is evolution? • What evidence is there for evolution? • How does evolution happen? • What reasons do animals become extinct? • What possible futures do animals face, and can we predict which is most likely? • How did Darwin come up with the theory?	In Key Stage 3 children will learn about: • heredity as the process by which genetic information is transmitted from one generation to the next • the variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation • the variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection • changes in the environment may lead to extinction

Enquiry ideas

Comparative/fair testing	Identifying, grouping and classifying	Observation over time	Pattern-seeking	Research	Big question (assessment opportunity)
What is the most common eye colour in our class?	Compare the skeletons of apes, humans, and Neanderthals	How has the skeleton of the horse changed over time?	Is there a pattern between the size and shape of a bird's beak and the food it will eat?	What happened when Charles Darwin visited the Galapagos islands?	*What is evolution, how does it happen and how do scientists know?*

Year 2 - Living things and their habitats

National Curriculum Objectives

• Explore and compare the difference between things that are living, dead and things that have never been alive.
• Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other.
• Identify and name a variety of plants and animals in their habitats, including micro habitats.
• Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name the different sources of food.

Key learning

• Some things are living, some were once living but now dead and some things never lived.
• There is variation between living things.
• Different animals and plants live in different places. Living things are adapted to survive in different habitats.
• Environmental change can affect plants and animals that live there

Vocabulary

Living, dead, never alive, habitats, micro-habitats, food, food chain, leaf litter, shelter, seashore, woodland, ocean, rainforest, conditions, desert, damp, shade.

Willow Tree Experiences

Linked texts

The Gruffalo (Julia Donaldson)
Meerkat Mail (Emily Gravett)
No Place Like Home (Jonathon Emmett)

Prior learning

In Early Years children should:
• Comments and questions about the place they live or the natural world.
• Shows care and concern for living things and the environment.
• Can talk about things they have observed such as plants and animals.
• Notices features of objects in their environment.
• Comments and asks questions about their familiar world.

Key questions

• How to animals eat?
• Do all animals eat the same thing?
• Which animals hunt, and which animals are hunted? Why?
• What animals live in our school environment? • How are animals and plants 'adapted' to live in their habitats
• Why do animals and plants like to live in different places?
• How do seasons affect our animals and plants?
• Which animals hibernate and why?
• Why do snails hibernate, but slugs do not?
• How to habitats change over our school year?

Future learning

In Year 4 children will:
• Recognise that living things can be grouped in a variety of ways.
• Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment.
• Know and label the features of a river.
• Recognise that environments can change and that this can sometimes pose danger to living things.

Enquiry ideas

Comparative/fair testing

Which pets are the easiest to look after?

Identifying, grouping and classifying

How would you group these plants and animals based on what habitat you would find them in?

Observation over time

How does the school pond change over the year?

Pattern-seeking

What conditions do woodlice prefer to live in?

Research

How are the animals in Australia different to the ones that we find in Britain?

Big question
(assessment opportunity)

Why do different animals live in different places?

Year 4 - Living things and their habitats

National Curriculum Objectives

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

Key learning

- Living things can be divided into groups based upon their characteristics
- Environmental change affects different habitats differently
- Different organisms are affected differently by environmental change
- Different food chains occur in different habitats
- Human activity significantly affects the environment

Vocabulary

Environment, flowering, nonflowering, plants, animals, vertebrates, fish, amphibians, reptiles, mammals, invertebrate, human impact, nature reserves, deforestation.

Willow Tree Experiences

Linked texts

The Vanishing Rainforest (Richard Platt)
The Morning I Met a Whale (Michael Morpurgo)
Journey to the River Sea (Eva Ibbotson)

Prior learning

In Year 2, children should:
- Explore and compare the difference between things that are living, dead and things that have never been alive.
- Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other.
- Identify and name a variety of plants and animals in their habitats, including micro habitats.
- Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name the different sources of food.

Key questions

- What food chains and webs are there in our local habitat?
- How does energy move through the food chain?
- How does removal of one species from an environment, affect others? (keystone species)
- How does environmental change affect different organisms?
- What are the most important things we could do to improve our outside area? (big hotels, pond, compost, wildflowers)
- How does human activity affect our environment (ferries on the Solent? Sandown Airport? KFC?)

Future learning

In Year 5:
- Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird.
- Describe the life process of reproduction in some plants and animals.

Enquiry ideas

Comparative/fair testing

Does the amount of light affect how many woodlice move around?

Identifying, grouping and classifying

Can we use the classification keys to identify all the animals that we caught pond dipping?

Observation over time

How does the variety of invertebrates on the school field change over the year?

Pattern-seeking

How has the use of insecticides affected bee population?

Research

Why are people cutting down the rainforests and what effect does that have?

Big question
(assessment opportunity)

Are living things in danger?

Year 5 - Living things and their habitats

National Curriculum Objectives	Key learning	Vocabulary
• Know the life cycle of different living things, e.g. Mammal, amphibian, insect bird. • Know the process of reproduction in plants. • Know the process of reproduction in animals.	Different animals mature at different rates and live to different ages. • Some organisms reproduce sexually where offspring inherit information from both parents. • Some organisms reproduce asexually by making a copy of a single parent. • Environmental change can affect how well an organism is suited to its environment. • Different types of organisms have different life cycles.	Reproduction, Sexual, Asexual, Pollination, Dispersal, reproduction, cell, fertilisation, pollination, male, female, pregnancy, young, mammal, metamorphosis, amphibian, insect, egg, embryo, bird, plant

Willow Tree Experiences	Linked texts
	The Land of Neverbelieve (Norman Messenger) Mummy Laid an Egg (Babette Cole)

Prior learning	Key questions	Future learning
In Year 4 children should: • Construct and interpret a variety of food chains, identifying producers, predators and prey • Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other. • Identify and name a variety of plants and animals in their habitats, including micro habitats.	• What is a life cycle? • What types of life cycles are there? • Are life cycles the same? • Do plants reproduce in the same ways as us? • How do plants spread their seeds?	In Year 6: • Classify living things into broad groups according to observable characteristics and based on similarities and differences. • Give reasons for classifying plants and animals based on specific characteristics.

Enquiry ideas

Comparative/fair testing	Identifying, grouping and classifying	Observation over time	Pattern-seeking	Research	Big question (assessment opportunity)
How does the level of salt affect how quickly brine shrimp hatch?	Compare this collection of animals based on similarities and differences in their lifecycle.	How does a bean change as it germinates?	Is there are relationship between number of petals and number of stamens?	What are the differences between the life cycle of an insect and a mammal?	Do all plants and animals reproduce in the same way?

Year 6 - Living things and their habitats

National Curriculum Objectives

• Classify living things into broad groups according to observable characteristics and based on similarities and differences.
• Give reasons for classifying plants and animals based on specific characteristics.

Key learning

• Variation exists within a population (and between offspring of some plants) – NB: this Key Idea is duplicated in Year 6 Evolution and Inheritance.
• Organisms best suited to their environment are more likely to survive long enough to reproduce.
• Organisms are best adapted to reproduce are more likely to do so.
• Organisms reproduce and offspring have similar characteristic patterns.
• Competition exists for resources and mates.

Vocabulary

Variation Organisms Populations. Classification Characteristics Environment, flowering, nonflowering, plants, animals, vertebrates, fish, amphibians, reptiles, mammals, invertebrate, human impact, nature reserves, deforestation. Classify, compare, bacteria, microorganism, organism, invertebrates, vertebrates, Linnaean.

Willow Tree Experiences

Linked texts

Beetle Boy (M G Leonard) Insect Soup (Barry Louis Polisar)
Fur and Feathers (Janet Halfmann)

Prior learning

In Year 5, children should:
• Recognise that living things can be grouped in a variety of ways.
• Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment.
Recognise that environments can change and that this can sometimes pose danger to living things.

Key questions

• Why do we need to classify living things?
• How do we classify?
• What are the difficulties with classification? (penguins, whales, platypus)
• How do animals change over time?
• Why does variation exist?
• What happens if animals of different species breed? (hybrids)
• What happens to house plants outside?
• What are microorganisms?
• How can we prevent the spread of disease?
• Why do animals and plants compete – and what for?

Future learning

In Key Stage 3 children will learn about:
• the dependence of almost all life on Earth on the ability of photosynthetic organisms, such as plants and algae, to use sunlight in photosynthesis to build organic molecules that are an essential energy store and to maintain levels of oxygen and carbon dioxide in the atmosphere
• the adaptations of leaves for photosynthesis. • the interdependence of organisms in an ecosystem, including food webs and insect pollinated crops
• the importance of plant reproduction through insect pollination in human food security
• how organisms affect, and are affected by, their environment, including the accumulation of toxic materials

Enquiry ideas

Comparative/fair testing

Which is the most common invertebrate on our school playing field?

Identifying, grouping and classifying

How would you make a classification key for vertebrates/invertebrates or microorganisms?

Observation over time

What happens to a piece of bread if you leave it on the windowsill for two weeks?

Pattern-seeking

Do all flowers have the same number of petals?

Research

What do different types of microorganisms do? Are they always harmful?

Big question
(assessment opportunity)

In what ways can we sort living things?

Year 4 Electricity

National Curriculum Objectives

- Identify common appliances that run on electricity.
- Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers.
- Identify whether a lamp will light in a simple series circuit, based on whether the lamp is part of a complete loop with a battery.
- Recognise that a switch opens and closes the circuit and associate this with whether a lamp lights in a simple series circuit.
- Recognise some common conductors and insulators, and associate metals with being good conductors.
- Know the difference between a conductor and an insulator, giving examples of each.
- Safety when using electricity

Key learning

- A source of electricity (mains of battery) is needed for electrical devices to work.
- Electricity sources push electricity round a circuit.
- More batteries will push the electricity round the circuit faster.
- Devices work harder when more electricity goes through them.
- A complete circuit is needed for electricity to flow and device to work.
- Some materials allow electricity to flow easily and these are called conductors. Materials that don't allow electricity to flow easily are called insulators.

Vocabulary

Appliances ,Electricity, Electrical circuit, Cell, Wire, Bulb, Buzzer, Danger, Electrical safety, Sign, Insulators, Wood, Rubber, Plastic, Glass, Conductors, Metal, Water, Switch, Open, Closed

Willow Tree Experiences

Early Years-Switches

Linked texts

Until I Met Dudley (Roger McGough)
Oscar and the Bird: A Book about Electricity (Geoff Waring)
Electrical Wizard: How Nikola Tesla Lit Up the World (Elizabeth Rusch)

Prior learning

In Early Years children:
• May have some understanding that objects need electricity to work.
• May understand that a switch will turn something on or off.

Key questions

• What would life be like without electricity?
• What sorts of things use/need electricity?
• What electricity do I use?
• In which ways can we 'get' electricity? (mains/plugs/batteries/wireless)
• How do we make electricity?
• How do batteries work?
• How quickly can batteries run out? Does this make a difference depending on number of components?
• How does the number of batteries added to the circuit affect a device?
• What materials can carry electricity? (conductors/insulators)

Future learning

In Year 6 children will:
• Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit.
• Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches.
• Use recognised symbols when representing a simple circuit in a diagram.

Enquiry ideas

Comparative/fair testing

How does the thickness of a conducting material affect how bright the lamp is?
Which metal is the best conductor of electricity?

Identifying, grouping and classifying

How would you group these electrical devices based on where the electricity comes from?

Observation over time

How long does a battery light a torch for?

Pattern-seeking

Which room has the most electrical sockets in a house?

Research

How has electricity changed the way we live? How does a light bulb work?

Big question (assessment opportunity)

What can we do with electricity?

Year 6 Electricity

National Curriculum Objectives

- Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit.
- Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches.
- Use recognised symbols when representing a simple circuit in a diagram.

Key learning

- Batteries are a store of energy. This energy pushes electricity round the circuit. When the battery's energy is gone it stops pushing. Voltage measures the 'push.'
- The greater the current flowing through a device the harder it works.
- Current is how much electricity is flowing round a circuit.
- When current flows through wires heat is released. The greater the current, the more heat is released.

Vocabulary

Bulb, Bright, Dim, Buzzer, Brightness, Electrical appliances, Electrical circuit, Cells, Voltage, Volts, Components, Switches, Simple circuit, Series circuit, Motors, Short circuit, Resistance, Wire, Conductor, Current

Willow Tree Experiences

DT Project - circuit games

Linked texts

Goodnight Mister Tom (Michelle Magorian)
Blackout (John Rocco)
Hitler's Canary (Sandi Toksvig)

Prior learning

In Year 4, children should:
• Identify common appliances that run on electricity.
• Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers.
• Identify whether a lamp will light in a simple series circuit, based on whether the lamp is part of a complete loop with a battery.
• Recognise that a switch opens and closes the circuit and associate this with whether a lamp lights in a simple series circuit. Recognise some common conductors and insulators, and associate metals with being good conductors.
• Know the difference between a conductor and an
insulator, giving examples of each

Key questions

• Do all batteries push as hard as each other?
• What is electricity?
• How does the voltage of a battery affect how much current is pushed?
• How does the length of time I leave the current flowing for affect
• How does number of bulbs affect the brightness of a bulb?
• Are all types of wires as good as conducting electricity?
• Why are wires insulated in plastic? Does type of material make a difference?
• Does length of wire make a difference?
• Does the type of circuit affect how the components work/long the battery lasts?
• What renewable ways can we generate electricity?
• How does current affect heat?
• What are the dangers of a short circuit?

Future learning

In Key Stage Three children will learn:
• Electric current, measured in amperes, in circuits, series and parallel circuits, currents
add where branches meet and current as flow of charge
• Potential difference measured in volts, battery and bulb ratings, resistance measured
in ohms, as the ratio of potential difference (p.d.) to current
• Differences in resistance between conducting and insulating components (quantitative).
• Separation of positive or negative charges when objects are rubbed together: transfer
of electrons, forces between charged objects
• The idea of electric field, forces acting across the space between objects not in contact.

Enquiry ideas

Comparative/fair testing

How does the voltage of the batteries in a circuit affect the brightness of the lamp?

How does the voltage of the batteries in a circuit affect the volume of the buzzer?

Identifying, grouping and classifying

How would you group electrical components and appliances based on what electricity makes them do?

Observation over time

How does brightness of bulb change as the battery runs out?
How can we measure how quickly a battery is used up?

Pattern-seeking

Does the temperature of a light bulb go up the longer it is on?

Research

How has our understanding of electricity changed over time?

Big question

(assessment opportunity)

Can we vary the effects of electricity?

Year 3 Forces

National Curriculum Objectives

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

Key learning

- Magnets exert attractive and repulsive forces on each other.
- Magnets exert non-contact forces, which work through some materials. •
- Magnets exert attractive forces on some materials.
- Magnet forces are affected by magnet strength, object mass, distance from object and object material.

Vocabulary

Surfaces , Strength , Forces , Materials, Friction, Magnet, , Attract Push/Pushing Contact , Non-Contact, Force, Magnetic, Material Pull/Pulling, Magnetic, Poles, Direct Contact

Willow Tree Experiences

Linked texts

The Iron Man (Ted Hughes) Mrs Armitage: Queen of the Road (Quentin Blake) Mr Archimedes' Bath (Pamela Allen)

Prior learning

In Year 2 children:
• May have an awareness of how to make things stop and start, using simple pushes and pulls.

In Early Years children should:
• Know about similarities and differences in relation to places, objects, materials and living things.
• Talk about the features of their own immediate environment and how environments might vary from one another.
• Make observations of animals and plants, explain why some things occur, and talk about changes.
• They may know about floating and sinking

Key questions

• What are magnetic materials? How can we find out?
• Can I make a magnetic material non-magnetic?
• How far away does a magnet have to be before it attracts a magnetic material?
• How far away can the magnetic attraction between two magnets be experiences?
• Is the repulsive force the same size?
• How is the magnetic attraction of repulsion force affected by putting materials between the magnets?
• Are bigger magnets stronger? • How could you use magnets to measure the number of pages in a book?

Future learning

In Year 5 children will:

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

Enquiry ideas

Comparative/fair testing

How does the mass of an object affect how much force is needed to make it move? Which magnet is strongest? Which surface is best to stop you slipping?

Identifying, grouping and classifying

Which materials are magnetic?

Observation over time

If we magnetise a pin, how long does it stay magnetised for?

Pattern-seeking

Do magnetic materials always conduct electricity? Does the size and shape of a magnet affect how strong it is?

Research

How have our ideas about forces changed over time? How does a compass work?

Big question
(assessment opportunity)

How can we move magnets?

Year 5 Forces

National Curriculum Objectives

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

Key learning

- Air resistance and water resistance are forces against motion caused by objects having to move air and water out of their way.
- Friction is a force against motion caused by two surfaces rubbing against each other.
- Some objects require large forces to make them move; gears, pulley and levers can reduce the force needed to make things move

Vocabulary

Force , Gravity, Air Resistance, Moving, Surfaces, Pulleys , Gears, Water Resistance, Surfaces, Leavers, Speed, Movement , Fall, Earth, Mechanisms , Friction

Willow Tree Experiences
Bikeability training
Cycle 1 - Visit to National Space Centre
Cycle 2- Visit to Gulliver's

Linked texts
The Enormous Turnip (Katie Daynes)
Leonardo's Dream (Hans de Beer)
The Aerodynamics of Biscuits (Clare Helen Welsh)

Prior learning

In Year 3 children:

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

Key questions

• What is a force?
• How can a force act on an object?
• How can we see forces?
• How can we measure forces?
• How does the saltiness (salinity) of water affect the water resistance? • How does the length of a piece of a paper helicopter's wings affect the time it takes to fall?
• How does the changing the shape of a piece of plasticine affect water resistance?
• How does adding holes to a parachute affect the time it takes to fall? • How does the amount/depth of tread affect the friction between a shoe and a surface?
• How can we use levers to lift heavy objects?
• What is the most effective way to move an object?
• Can you create a pulley system to life a given load?

Future learning

In KS3 children will learn about:
• Opposing forces and equilibrium: weight held by stretched spring or supported on a compressed surface
• Forces being needed to cause objects to stop or start moving, or to change their speed or direction of motion (qualitative only)
• Change depending on direction of force and its size.

Enquiry ideas

Comparative/fair testing
How does the angle of launch affect how far a paper rocket will go?
How does the surface area of an object affect the time it takes to sink?

Identifying, grouping and classifying
Can you label and name all the forces acting on the objects in each of these situations?

Observation over time
How long does a pendulum swing for before it stops?

Pattern-seeking
Do all objects fall through water in the same way?
How does surface area of parachute affect the time it takes to fall?

Research
How do submarines sink if they are full of air?

Big question
(assessment opportunity)
How and why do objects move?

Year 5-Earth and Space

National Curriculum Objectives	Key learning	Vocabulary
• Describe the movement of the Earth, and other planets, relative to the Sun in the solar system • Describe the movement of the Moon relative to the Earth • Describe the Sun, Earth and Moon as approximately spherical bodies • Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.	• Objects with larger masses exert bigger gravitational forces. • Objects like planets, moons and stars spin. • Smaller mass objects like planets orbit large mass objects like stars. • Stars produce vast amounts of heat and light. • All other objects are lumps of rock, metal or ice and can be seen because they reflect the light of stars.	Earth, Sun, Moon, Axis, Rotation, Day, Night, Phases of the Moon, star, constellation, waxing, waning, crescent, gibbous. Mercury, Venus, Mars, Jupiter, Saturn, Uranus, Neptune, planets, solar system, day, night, rotate, orbit, axis, spherical, geocentric, heliocentric.

Willow Tree Experiences	Linked texts
Cycle 1 - Visit to National Space Centre	The Skies Above My Eyes (Charlotte Guillain & Yuval Zommer) George's Secret Key to the Universe (Lucy and Stephen Hawking with Christophe Galfard)

Prior learning	Key questions	Future learning
In Key Stage 1 and in Year 3 children should: • Understand changes in weather patterns and seasons. • Compare how things move on different surfaces. • Notice that some forces need contact between two objects, but magnetic forces can act at a distance. • Describe magnets as having two poles. Predict whether two magnets with attract or repel each other, depending on which poles are facing	How does temperature/size/day length/year length change as you get closer/further to the sun? How does distance from a light source affect how much light hits an object? Does having more moons result in more light hitting a planet? How could you test this? Why do we have day/night/months/years/seasons? Why does day length change? Why does shadow size change over the course of a day?	In KS3 children will learn about: • Gravity force, weight = mass x gravitational field strength (g), on Earth g=10 N/kg, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and Sun (qualitative only) • Our Sun as a star, other stars in our galaxy, other galaxies • The seasons and the Earth's tilt, day length at different times of year, in different hemispheres the light year as a unit of astronomical distance

Enquiry ideas

Comparative/fair testing	Identifying, grouping and classifying	Observation over time	Pattern-seeking	Research	Big question (assessment opportunity)
How does the length of daylight hours change in each season?	How could you organise all the objects in the solar system into groups?	Can you observe and identify all the phases in the cycle of the Moon?	Is there a pattern between the size of a planet and the time it takes to travel around the Sun?	How have our ideas about the solar system changed over time?	*Sun, Earth & Moon: What is moving and how do we know?*

Year 3 - Light

National Curriculum Objectives	Key learning	Vocabulary
• Recognise that they need light in order to see things and that dark is the absence of light • Notice that light is reflected from surfaces • Recognise that light from the sun can be dangerous and that there are ways to protect their eyes • Recognise that shadows are formed when the light from a light source is blocked by an opaque object • Find patterns in the way that the size of shadows change.	• We need light to be able to see • Light is reflected from surfaces into our eyes • Light from the sun can be dangerous • Shadows are formed when the light from a light source is blocked by an opaque object **Note: pupils should be warned that it is not safe to look directly at the sun, even when wearing dark glasses.**	Light source, energy, reflection, shadow, opaque, transparent, translucent, straight lines,
		Willow Tree Experiences Victorian topic links, invention of electric light bulb
		Linked texts

Prior learning	Key questions	Future learning
	• How do we see? • Which light sources are man-made? Which are natural? • Is the moon a light source? (no) • How are shadows formed? • What is reflection?	In Year 6, children will be taught to: • Recognise that light appears to travel in straight lines • Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye • Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes • Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.

Enquiry ideas

Comparative/fair testing	Identifying, grouping and classifying	Observation over time	Pattern-seeking	Research	Big question (assessment opportunity)
Pupils should explore what happens when light reflects off a mirror or other reflective surfaces, including playing mirror games to help them to answer questions about how light behaves.	Pupils might work scientifically by: looking for patterns in what happens to shadows when the light source moves or the distance between the light source and the object changes.	Children should look for, and measure, shadows, and find out how they are formed and what might cause the shadows to change.	Children should think about why it is important to protect their eyes from bright lights.	Find natural and man-made light sources and compare.	What is dark?

Year 6 - Light

National Curriculum Objectives

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

Key learning

- Light appears to travel in straight lines
- Objects are seen either because they give out light or reflect light into the eye
- Light travels from a light source into our eyes
- We see objects that are not light sources because light travels from a light source, to the object and then to our eyes
- Shadows have the same shape as the opaque object which blocks the light because light travels in straight lines

Vocabulary

Light source, energy, reflection, shadow, opaque, transparent, translucent, straight lines,

Willow Tree Experiences

WWII link, making periscopes, Eden Camp

Linked texts

Prior learning

In Year 3, pupils were taught to:

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

Key questions

- How does light travel?
- How do we see?
- How can I see a lit candle? (or any light source)
- How can I see an apple? (or any object which is not a light source)

Future learning

At KS3, children will learn about **Light waves**

- the similarities and differences between light waves and waves in matter
- light waves travelling through a vacuum; speed of light
- the transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface
- use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eye
- light transferring energy from source to absorber, leading to chemical and electrical effects; photosensitive material in the retina and in cameras
- colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection

Enquiry ideas

Comparative/fair testing

Pupils might work scientifically by: deciding where to place rear-view mirrors on cars; designing and making a periscope and using the idea that light appears to travel in straight lines to explain how it works.

Identifying, grouping and classifying

Grouping objects which cast similar sized/shaped shadows and using this to explain why shadows have the same shape as the objects that cast them.

Observation over time

Children might investigate the relationship between light sources, objects and shadows by using shadow puppets.

Pattern-seeking

Pupils should build on the work on light in year 3, exploring the way that light behaves, including light sources, reflection and shadows. They should talk about what happens and make predictions.

Research

Children could extend their experience of light by looking a range of phenomena including rainbows, colours on soap bubbles, objects looking bent in water, and coloured filters (they do not need to explain why these phenomena occur).

Big question

(assessment opportunity)

Are all shadows equal?

Year 4 - Sound

National Curriculum Objectives	Key learning	Vocabulary
• Identify how sounds are made, associating some of them with something vibrating • Recognise that vibrations from sounds travel through a medium to the ear • Find patterns between the pitch of a sound and features of the object that produced it • Find patterns between the volume of a sound and the strength of the vibrations that produced it • Recognise that sounds get fainter as the distance from the sound source increases.	• Sounds are made by vibrations • Vibrations from sounds travel through a medium to the ear • Different objects create differently pitched sounds • Changing the strength of vibrations will change the volume of a sound • Sounds become fainter when we are further from the sound source	Sound, pitch, volume, vibration, ear, strength, distance, faint, loud
		Willow Tree Experiences Links with music service
		Linked texts

Prior learning	Key questions	Future learning
	• How are sounds made? • How do we hear? • If I am playing a drum, how can I make the sound louder? Quieter? • When I move away from a sound source, what happens to sound?	At KS3, children will learn about **Sound waves:** • frequencies of sound waves, measured in hertz (Hz); echoes, reflection and absorption of sound • sound needs a medium to travel, the speed of sound in air, in water, in solids • sound produced by vibrations of objects, in loudspeakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal • the auditory range of humans and animals

Enquiry ideas

Comparative/fair testing	Identifying, grouping and classifying	Observation over time	Pattern-seeking	Research	Big question (assessment opportunity)
Pupils should explore and identify the way sound is made through vibration in a range of different musical instruments from around the world.	Children might make earmuffs from a variety of different materials to investigate which provides the best insulation against sound. They could make and play their own instruments by using what they have found out about pitch and volume	Investigate the relationship between the volume of a sound and the strength of the vibrations that produced it using drums.	Pupils might work scientifically by: finding patterns in the sounds that are made by different objects such as saucepan lids of different sizes or elastic bands of different thicknesses.	Find out how the pitch and volume of sounds can be changed in a variety of ways.	Do we all hear the same sounds in the same way?

Year 1 - Everyday Materials

National Curriculum Objectives	Key learning	Vocabulary
• distinguish between an object and the material from which it is made • identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock • describe the simple physical properties of a variety of everyday materials • compare and group together a variety of everyday materials on the basis of their simple physical properties	• Your table is made of wood but the legs are made of metal - I wonder why • Similarly, your chair is made of plastic but the legs are made of metal - I wonder why • The wood used to make this table is hard and smooth, strong, opaque and not bendy	hard/soft; stretchy/stiff; shiny/dull; rough/smooth; bendy/not bendy; waterproof/not waterproof; absorbent/not absorbent; opaque/transparent
		Willow Tree Experiences Links with DT / Great Fire of London topic (wood for houses)
		Linked texts

Prior learning	Key questions	Future learning
In EYFS, the Early Learning Goal for Materials was: Children know about similarities and differences in relation to objects and materials.	'What is the best material for an umbrella? ... for lining a dog basket? ... for curtains? ... for a bookshelf? ... for a gymnast's leotard?'	In Year 2, children will: • identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. • find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.

Enquiry ideas

Comparative/fair testing	Identifying, grouping and classifying	Observation over time	Pattern-seeking	Research	Big question (assessment opportunity)
Pupils should explore and experiment with a wide variety of materials, for example: brick, paper, fabrics, elastic, foil.	Children could group materials based on their properties eg: hard/soft, stretchy/stiff etc.	Find a number of objects made of the same material (eg: wood) and talk about how long they've been there.I wonder if this material/object has always looked the same...	Children could explore whether materials with similar properties look and feel the same too.	Can children find out which materials certain everyday objects are made from?	Can a material be both hard and soft?

Year 2 - Uses of Everyday Materials

National Curriculum Objectives	Key learning	Vocabulary
• identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. • find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.	• Wood is a suitable material for your desk because it is hard and strong, so it won't move, but also smooth for writing on. It won't bend or twist while you're writing, so it's a good material that is fit for purpose. • Plastic is a suitable material for a straw because it bends and stretches to reach my mouth. It is also smooth so it won't hurt me. • Balls and bean bags can change shape when they are squashed or twisted but a window will not because it is made of glass.	Suitable, not suitable, purpose, solid, wood, metal, squashing, bending, twisting and stretching.
		Willow Tree Experiences Links with DT / Great Fire of London topic (wood for houses)
		Linked texts

Prior learning	Key questions	Future learning
In Year 1, children were taught to: • distinguish between an object and the material from which it is made • identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock • describe the simple physical properties of a variety of everyday materials • compare and group together a variety of everyday materials on the basis of their simple physical properties	Is wood a suitable material to use for a table? Why or why not? Would glass be a suitable material for a spoon? Why or why not? Can you bend / twist / stretch wood? What about plastic? Which would make a better straw for your drink?	In Year 3, children will: • compare and group together different kinds of rocks on the basis of their appearance and simple physical properties • describe in simple terms how fossils are formed when things that have lived are trapped within rock • recognise that soils are made from rocks and organic matter.

Enquiry ideas

Comparative/fair testing	Identifying, grouping and classifying	Observation over time	Pattern-seeking	Research	Big question (assessment opportunity)
Pupils might work scientifically by: comparing the uses of everyday materials in and around the school with materials found in other places (at home, the journey to school, on visits, and in stories, rhymes and songs)	Children could observe materials closely, identifying and classifying the uses of different materials, and recording their observations.	Children might test more than one material for a particular use and observe the effectiveness of each over a given time.	Children should become familiar with how some materials are used for more than one thing (metal can be used for coins, cans, cars and table legs; wood can be used for matches, floors, and telegraph poles)	Find out why different materials can be used for the same thing (spoons can be made from plastic, wood, metal, but not normally from glass).	What makes a material really useful / fit for purpose?

Year 3 - Rocks

National Curriculum Objectives	Key learning	Vocabulary
• compare and group together different kinds of rocks on the basis of their appearance and simple physical properties • describe in simple terms how fossils are formed when things that have lived are trapped within rock • recognise that soils are made from rocks and organic matter.	• Identifying the physical properties of different rocks • Describing how fossils are formed • Recognising that soils are made from rocks and organic matter	Rocks, soils, crystals, grains, fossils, smooth, rough
		Willow Tree Experiences Soils linked to farming topic.
		Linked texts

Prior learning	Key questions	Future learning
In Year 2, children were taught to: • identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. • find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.	Is the rock smooth or rough? Does it have grains? Can you see them with / without the microscope? What are fossils? How are they formed?	In Year 4, children will: • compare and group materials together, according to whether they are solids, liquids or gases • observe that some materials change state when they are heated or cooled, and *measure or research the temperature at which this happens in degrees Celsius (°C)* • identify the part played by evaporation and condensation in the water cycle and *associate the rate of evaporation with temperature.*

Enquiry ideas

Comparative/fair testing	Identifying, grouping and classifying	Observation over time	Pattern-seeking	Research	Big question (assessment opportunity)
Pupils could explore different soils and identify similarities and differences between them and investigate what happens when rocks are rubbed together or what changes occur when they are in water.	Children could use a hand lens or microscope to help them to identify and classify rocks according to whether they have grains or crystals, and whether they have fossils in them.	Children could observe rocks, including those used in buildings and gravestones, and exploring how and why they might have changed over time	Linked with work in geography, pupils should explore different kinds of rocks and soils, including those in the local environment.	Pupils might research and discuss the different kinds of living things whose fossils are found in sedimentary rock and explore how fossils are formed.	What makes fossils unique?

Year 4 - States of Matter

National Curriculum Objectives	Key learning	Vocabulary
• compare and group materials together, according to whether they are solids, liquids or gases • observe that some materials change state when they are heated or cooled, and *measure or research the temperature at which this happens in degrees Celsius (°C)* • identify the part played by evaporation and condensation in the water cycle and *associate the rate of evaporation with temperature.*	• Identifying whether a material is a solid, liquid or gas • Observing that some materials change state when heated or cooled • Understanding evaporation and condensation and making links with the water cycle **Note: Year 4 teachers should avoid using materials where heating is associated with chemical change, for example, through baking or burning.**	Solid, liquid, gas, state, heated, cooled, degrees celsius, evaporation, condensation, **Willow Tree Experiences** Links with Meet me by the Steelmen - liquid/solid metal **Linked texts** Meet me by the Steelmen by Theresa Tomlinson

Prior learning	Key questions	Future learning
In Year 3, children were taught to: • compare and group together different kinds of rocks on the basis of their appearance and simple physical properties • describe in simple terms how fossils are formed when things that have lived are trapped within rock • recognise that soils are made from rocks and organic matter.	Is the material a solid, liquid or gas? How do you know? Can the material change state when heated or cooled? When a puddle disappears from the playground, where does the water go?	In Year 5, children will: • compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets • know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution • use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating • give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic • demonstrate that dissolving, mixing and changes of state are reversible changes • explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.

Enquiry ideas

Comparative/fair testing	Identifying, grouping and classifying	Observation over time	Pattern-seeking	Research	Big question (assessment opportunity)
Observe changes such as ice to water and water to steam (kettle boiling)	Pupils might work scientifically by: grouping and classifying a variety of different materials; exploring the effect of temperature on substances such as chocolate, butter, cream (for example, to make food such as chocolate crispy cakes and ice-cream for a party).	Children might observe and record evaporation over a period of time, for example, a puddle in the playground or washing on a line, and investigate the effect of temperature on washing drying or snowmen melting.	Compare chocolate melting and solidifying when cooled to water going through the same changes. Heat = melting and cool = solidifying Could use same moulds for each to compare eg: ice cube tray	Children could research the temperature at which materials change state, for example, when iron melts or when oxygen condenses into a liquid.	Is ice the same as water?

Year 5 - Properties and Changes of Materials

National Curriculum Objectives

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

Key learning

- Comparing materials on the basis of their properties
- Dissolving materials in liquid
- Creating solutions and then reversing these to recover the substance
- Identifying reversible and irreversible (or difficult to reverse) changes

Vocabulary

reversible changes, irreversible changes, evaporating, filtering, sieving, melting and dissolving, burning, rusting, substance, solution, soluble and insoluble

Willow Tree Experiences

Linking uses of everyday materials to Tudor / Shakespeare topic.

Linked texts

Prior learning

In Year 4, children were taught to:

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

Key questions

Will this material dissolve in liquid to form a solution?

Can dissolving be reversed? Can the substance be recovered from the solution?

Can this mixture be separated by filtering, sieving or evaporation?

Future learning

At KS3, children will be taught:

- the order of metals and carbon in the reactivity series
- the use of carbon in obtaining metals from metal oxides
- properties of ceramics, polymers and composites (qualitative)

Enquiry ideas

Comparative/fair testing

Children might compare materials in order to make a switch in a circuit.

Identifying, grouping and classifying

'Which materials would be the most effective for making a warm jacket, for wrapping ice cream to stop it melting, or for making blackout curtains?'

Observation over time

Children could observe and compare the changes that take place, for example, when burning different materials or baking bread or cakes.

Pattern-seeking

Look for patterns and discuss similarities between soluble materials as they are dissolving.

Research

Find out that some changes of state are irreversible while others are reversible.

Big question

(assessment opportunity)

Are all changes of state reversible?

Science and ICT

To Support Teaching and Learning

Science and ICT

Animals including humans/plants	Materials	Living things and their habitats
Digital microscopes Human body app - animated images inside the body		Data loggers (testing temperature of habitats) Weather station
Forces and magnets	**Electricity/Light**	**Earth and Space**
Data loggers (using speed probe)	Data loggers - measuring light travelling through materials.	Star walk 2 app- Star gazing NASA Education app -models,videos and images.

Useful Websites:

Animals including humans	Living things and their habitats	Plants
https://www.hamilton-trust.org.uk/science/year-3-science/animals-including-humans-keeping-healthy/ https://www.stem.org.uk/resources/community/collection/13293/year-5-animals-including-humans https://hands-on-science.co.uk/curriculum-topic/animals-including-humans/ https://www.bbc.co.uk/bitesize/topics/zn22pv4 https://www.bbc.co.uk/bitesize/topics/zcyycdm https://www.bbc.co.uk/bitesize/topics/z6wwxnb https://www.bbc.co.uk/bitesize/topics/zbnnb9q https://www.discoveryeducation.co.uk/login/eha/?service=espresso https://www.childrensuniversity.manchester.ac.uk/learning-activities/science/	https://www.bbc.co.uk/bitesize/topics/zpxnyrd/articles/z2vdjxs https://www.bbc.co.uk/bitesize/topics/zx882hv https://explorify.wellcome.ac.uk/en/activities?filtered **(Explorify)** https://www.dkfindout.com/uk/animals-and-nature/habitats-and-ecosystems/coral-reef/ https://www.dkfindout.com/uk/animals-and-nature/plants/how-seeds-are-spread/ https://www.discoveryeducation.co.uk/login/eha/?service=espresso http://flash.topmarks.co.uk/4016 https://www.bbc.co.uk/games/embed/earth-squad-go	https://www.dkfindout.com/uk/animals-and-nature/plants/what-is-plant/ https://www.dkfindout.com/uk/animals-and-nature/plants/ https://www.dkfindout.com/uk/animals-and-nature/plants/deciduous-trees/ https://www.discoveryeducation.co.uk/login/eha/?service=espresso

Useful Websites:

Materials	Light/Sound	Forces and magnets
https://www.bbc.co.uk/bitesize/topics/zryycdm http://flash.topmarks.co.uk/4055 https://www.dkfindout.com/uk/science/electricity/circuits/ http://resources.hwb.wales.gov.uk/VTC/rocks/eng/Introduction/default.htm http://sciencenetlinks.com/collections/material-marvels-series/	http://flash.topmarks.co.uk/4056 https://www.bbc.co.uk/bitesize/topics/zbssgk7	https://www.bbc.co.uk/bitesize/topics/zytturd https://www.bbc.co.uk/bitesize/topics/zvpp34j/articles/zywcrdm https://www.dkfindout.com/uk/science/forces-and-motion/laws-motion/ http://flash.topmarks.co.uk/4060 http://flash.topmarks.co.uk/4058 https://www.bbc.co.uk/bitesize/topics/zsxxsbk

Useful Websites:

Earth and space	Evolution and Inheritance	
https://www.nasa.gov/kidsclub/index.html **https://www.childrensuniversity.manchester.ac.uk/learning-activities/science/the-earth-and-beyond/introduction/** https://www.nasa.gov/multimedia/nasatv/iss_ustream.html Watch the ISS Live - be aware turn sound off live feed and astronauts sometimes swear! https://www.dkfindout.com/uk/search/space/	https://www.bbc.co.uk/bitesize/topics/zvhhvcw https://www.stem.org.uk/resources/collection/4354/primary-evolution https://www.stem.org.uk/resources/collection/3439/arkive-darwin-collection https://www.hamilton-trust.org.uk/science/year-6-science/game-survival/	

Staff CPD:

- Reach Out CPD https://www.reachoutcpd.com/
- Explorify https://explorify.wellcome.ac.uk/
- The Association For Science Education (ASE) https://www.ase.org.uk/resources/search/ages/14-16-16/topic/chemical-analysis-22
- Science Sparks https://www.science-sparks.com/
- STEM Learning https://www.stem.org.uk/
- DK Find out https://www.dkfindout.com/uk/