

Frittenden
CoE
Primary School



Scheme of work:
Science

What our children say about Science:

- *"I like how you learn about light and sources like makes." (Year 1)*
- *"I know the Earth spins around." (Year 1)*
- *I like "experiments because you don't know what will happen so you're doing something new." (Year 3)*
- *I enjoyed "working in groups," where we investigated "moldy bread." (Year 6)*
- *"We did an ambitious presentation." (Year 6)*
 - NB: Quotes taken from pupil voice 2021-22

Frittenden Primary's essentials for this subject:

- Provide National Curriculum based, relevant, meaningful and enriched experience that develops joy in learning through science.
- Develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics
- Nurture understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world
- Are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future.

Embedding our Intent - Science

At Frittenden, by nurturing a fascination of science within the world around us, the conceptual development of scientific enquiry should grow; From guided through to self-determined, a child's enriched learning should encourage the skills needed to flourish in this field and develop transferable foundations for continued growth beyond.

The Science curriculum aims to develop the natural, healthy curiosity in children about the universe, encouraging respect for the living and non-living and to provide opportunities for critical evaluation of evidence. Teachers encourage children to be inquisitive throughout their time at Frittenden Primary School. Through the programmes of study, children will acquire and build upon their key knowledge, in addition to the application of scientific skills. Working Scientifically, skills are built-on and developed, which enables children to gain confidence in planning, conducting investigations, and explaining concepts accurately. Children become more independent in their selection and use of scientific equipment, and interpretation of results, including cross curricular links with Maths and ICT.

Children are happy to take risks in their Science lessons, by questioning, making predictions and suggesting ideas and theories. The provision, where ever possible, of engaging, hands-on investigations and exploring outside is paramount. The Science curriculum is enriched with visits, complimented with cross-curricular links and reinforced with supportive literature when possible through the selections of related texts in English. Science Week enables children to become immersed in the subject and participate in a range of activities; it aims to nurture the understanding that science is all around and facilitates our every day.

Our **Christian values** underpin all aspects of our teaching and learning. The high aspirations and expectations the teaching team have for the children ensure that no child is given a learning limit or ceiling and that every child is given the opportunity to flourish. The school values are integrated into every science lesson as follows:

Respect: as understanding grows, children should demonstrate clearer views about science and how it influences the world; recognize and celebrate historical discoveries; and build upon this to further their own learning.

Joy: children consider learning as an inquisitive and joyful adventure: where getting your hands dirty leads to deepening knowledge, understanding and skill growth.

Compassion: children are taught to be compassionate towards each other; supporting each other in their scientific endeavours. This should enable our children to be better shepherds.

Science: Key Stage 1

Working Scientifically: Statutory Requirements (key stage 1)

During years 1 and 2, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- 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.

The principal focus of science teaching in key stage 1 is to enable pupils to experience and observe phenomena, looking more closely at the natural and humanly-constructed world around them. They should be encouraged to be curious and ask questions about what they notice. They should be helped to develop their understanding of scientific ideas by using different types of scientific enquiry to answer their own questions, including observing changes over a period of time, noticing patterns, grouping and classifying things, carrying out simple comparative tests, and finding things out using secondary sources of information. They should begin to use simple scientific language to talk about what they have found out and communicate their ideas to a range of audiences in a variety of ways. Most of the learning about 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.

'Working scientifically' is described separately in the programme of study, but must **always** be taught through and clearly related to the teaching of substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content.

Pupils should read and spell scientific vocabulary at a level consistent with their increasing word reading and spelling knowledge at key stage 1

Teaching Overview Year 1 and 2: Year A

Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Who am I?	Healthy Me	Polar Places	Young Gardener	On Safari	Master Chef

Teaching Overview Year 1 and 2: Year B

Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Our Local Environment	Celebrations	Squash, Bend, Twist and Stretch	Material Monsters	Plants and Animals where We live	On Holiday

Science: Lower Key Stage 2

Working Scientifically: Statutory Requirements (lower key stage 2)

During years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- 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.

Teaching Overview Year 3 and 4: Year A

Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Electricity 'Power it Up'	Food and our Bodies	States of Matter	Rocks, soils and fossils	How does your garden grow?	What's that sound?

Teaching Overview Year 3 and 4: Year B

Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Magnets and Forces	Teeth and Eating	Light and Shadow	The Big Build	The Nappy Challenge	Living things and their habitats

Science: Upper Key Stage 2

Working Scientifically: Statutory Requirements (upper key stage 2)

During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- 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 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.

Teaching Overview Year 5 and 6: Year A

Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Out of this world (Earth and Space)	Light	Electricity (Link to DT On a Page: Switches and circuits)	Healthy Bodies	Evolution and Inheritance (Darwin)	The Titanic

Teaching Overview Year 5 and 6: Year B

Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Classifying living things	Amazing Changes	Material World	Let's get moving: forces, friction	Growing up and Growing Old	Circle of life

Substantive Knowledge: Concepts

Biology

- Living things and their environment (Animals, humans, plants, habitats)
- Reproduction, inheritance and evolution (Evolution, inheritance, life processes, life cycles)

Chemistry

- States of matter (Solids, liquids, gases)
- Materials (properties and changes) (Reversible/irreversible changes, rocks, fossils)

Physics

- Energy (Light, sound, electricity)
- Forces (Friction, air resistance, gravity, magnets)

Earth Science

- Earth and space (Seasons, day and night, solar system and beyond)

Disciplinary knowledge: Working scientifically

- Methods used to answer questions (use of models, classification, correlations and patterns, experimentation, fair testing)
- Using apparatus and techniques (accurate measurement, collecting and recording data, # carrying out procedures safely and accurately)
- Data analysis (processing and presenting data, exploring relationships, communicating results in tables / graphs, identifying correlations)
- Using evidence to develop explanations (using evidence / scientific knowledge to draw conclusions, explain laws, models, concepts and findings)

Key concepts: (not exhaustive)

Through the science curriculum, pupils will develop an understanding of the following key concepts. These concepts are revisited through different units as pupils move through the school. By the end of primary school, children will know and understand these key concepts.

Biology

- Organisms require a supply of energy and materials: Living things are special collections of matter that reproduce, use energy and grow. Food provides materials and energy for life and growth. Plants and bacteria use energy from the sun to generate food. Animals break down food and are ultimately dependent on green plants for energy. In any ecosystem there is competition for the energy and materials needed to live and reproduce.
- Genetic information: Genetic information is passed down from one generation of organisms to another. Genes determine the development and structure of organisms
- Evolution: The diversity of organisms is the result of evolution. Different kinds of life, animals, plants and microorganisms, have evolved into different forms best suited to the environments in which they live. Organisms not able to respond sufficiently to changes in their environment become extinct

Chemistry

- All matter (stuff) in the universe is made of tiny building blocks.
- Materials (properties and changes): The arrangement, movement and types of building blocks of matter, and the forces that hold them together/push them apart, explain all the properties of matter (eg: hot/cold, soft/hard, light/heavy etc...)
- States of matter: Matter can change if the arrangement of these building blocks change (eg: chemical reactions)

Physics

- The universe follows unbreakable rules that are all about forces, matter and energy
- Forces are different kinds of pushes and pulls that act on all the matter in the universe. Changing the movement of an object requires a force to be acting on it. Gravity is a

universal force of attraction between all objects, however large or small

- Energy: There are many different forms of energy eg: light, sound, electricity, heat and wind. Energy can be transferred from one object to another and can cause changes. The total amount of energy in the universe is always the same but energy can be transformed when things change or are made to happen

Earth Science

- The earth in relation to the universe: The Earth is one of 8 planets orbiting the sun. Our solar system is a very small part of one of millions of galaxies in the universe.
- The earth spins on its axis: The Earth is tilted and spins on its axis leading to day and night, the seasons and climate

Enquiry strategies

As part of working scientifically which is embedded throughout all units, pupils will also learn to use a variety of enquiry strategies to answer scientific questions. Different questions lead to different types of enquiry and are not limited to fair testing. By the end of primary school, children will be able to use these enquiry strategies confidently and know that different strategies may be needed at different times.

- Observing over time: (observing or measuring how one variable changes over time)
- Identifying and classifying: (identifying and naming materials/living things and making observations or carrying out tests to organise them into groups.)
- Looking for patterns: (making observations or carrying out surveys of variables that cannot be easily controlled and looking for relationships between two sets of data)
- Comparative and fair testing: (observing or measuring the effect of changing one variable when controlling others)
- Answering questions using secondary sources of evidence: (answering questions using data or information that they have not collected first hand)

	Concepts	Dahl A	Dahl B	Wells A	Wells B	Shakes A	Shakes B
Biology	Living things and their environments						
	Reproduction, inheritance and evolution						
Chemistry	States of matter						
	Materials						
Physics	Energy						
	Forces						
Earth Science	Earth and Space						

MY LEARNING PATHWAY: SCIENCE

EYFS

Three and Four-Year-Olds

Personal, Social and Emotional Development:

Make healthy choices about food, drink, activity and tooth brushing;

Mathematics:

Compare quantities: 'more than', 'fewer than'.

Understanding the World:

Use all their senses in hands-on exploration of natural materials. Explore collections of materials with similar and/or different properties. Talk about what they see, using a wide vocabulary

Plant seeds and care for growing plants.

Understand the key features of the life cycle of a plant and an animal.

Begin to understand the need to respect and care for the natural environment and all living things. Explore and talk about different forces they can feel.

Talk about the differences between materials and changes they notice

Children in Reception

Personal, Social and Emotional Development:

Show resilience and perseverance in the face of challenge;

Mathematics:

Count objects, actions and sounds.

Understanding the World:

Explore the natural world around them.

Describe what they see, hear and feel whilst outside.

Understand the effect of changing seasons on the natural world around them.

(Development Matters)

Scheme - opportunities in our enhanced provision:

- Seasonal walk including discussions about changing seasons
- Baking and cooking – discussing changing state of materials
- Hatching chicks
- Caterpillars and worms in the classroom
- Discuss freezing and melting in environment
- Water tray to include floating and sinking language

**Early Learning
Goals**

Personal, Social and Emotional Development:

Set and work towards simple goals;

Work and play cooperatively and take turns.

Mathematics:

Compare quantities up to 10 in different contexts.

Understanding the World:

Describe their immediate environment using knowledge from observation, discussion.

Explore the natural world around them, making observations and drawing pictures of animals and plants

Know some similarities and differences between the natural world around them and contrasting environments

Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter

Dahl Year A MY LEARNING PATHWAY: SCIENCE	
'I CAN' The skills I have learnt...	'I KNOW' The knowledge I have...
SEASONAL CHANGE I can ask simple questions when prompted. I can understand that they could be answered in different ways. I can observe closely, using simple equipment . I can conduct simple tests . I can identify and classify varying things e.g. seasons, materials. I can use my observations and ideas to suggest answers to questions. I can gather and record, when prompted, data to help in answering questions.	I can identify the changes across the four seasons. Recognise changes within seasons as well as between seasons. I am able to observe and describe weather associated with these seasons and how day length varies. Make and test weather related predictions. Key vocabulary: spring, autumn, summer, winter, year, month, days, seasons, temperature, sun, rain, wind, thermometer, cloudy, day length, sunny, windy, rainy, frosty, snowy.
EVERYDAY MATERIALS I can conduct simple tests . I can identify and classify varying things e.g. seasons, materials. I can use my observations and ideas to suggest answers to questions. I can gather and record, when prompted, data to help in answering questions.	I know the difference between an object and the material from which it is made. Compare same object made from different materials in terms of effectiveness. I can identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. Identify typical uses of a range of materials. I can identify and describe the simple physical properties of a variety of everyday materials. Compare the physical properties. I know how to compare and group together a variety of everyday materials on the basis of their simple physical properties. Use these properties as a method of classification. Key vocabulary: hard, soft, stretchy, dull, shiny, bendy, rigid, transparent, plastic, metal, wood, rock, glass, absorbent, waterproof.
ANIMALS, INCLUDING HUMANS	I know a variety of common animals including fish, amphibians, reptiles, birds and mammals. Compare features of familiar and unfamiliar animals. I can identify a variety of common animals that are carnivores, herbivores and omnivores. Suggest common features of one of these groups and suggest which group an unfamiliar animal might belong to. I am able to describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). I know the basic parts of the human body and can say which part of the body is associated with each sense. Suggest how senses are used in a common activity e.g. eating. Key vocabulary: carnivores, herbivores, omnivores, reptiles, amphibians, mammals, invertebrates, feathers, skeleton, senses
PLANTS	I can identify and know the names of some common evergreen and deciduous plants and trees. I can identify and describe the simple structure of common flowering plants and trees. Identify and notice similarities between various plants. Key vocabulary: deciduous, evergreen, roots, branch, trunk, leaves, stalk, petal, seeds, bulbs
Compassion, Joy, Respect	

Dahl Year B
MY LEARNING PATHWAY: SCIENCE

‘I CAN’ The skills I have learnt...		‘I KNOW’ The knowledge I have...
EVERYDAY MATERIALS	I can ask simple questions. I can understand that they could be answered in different ways. I can observe closely, using simple equipment. I can perform simple tests. I can identify and classify varying things e.g. seasons, materials. I can use my observations and ideas to suggest answers to questions. I can gather and record data to help in answering questions.	I understand how to identify and compare the suitability of a variety of everyday materials for particular uses. Identify limitations as well as suitability. I know how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. Identify that some of these changes are temporary and some permanent. Key vocabulary: fabric, plastic, metal, transparent, stretchy, dull, crumble, bend, twist, squash, rough, smooth, opaque (hard, soft, stretchy, dull, shiny, bendy, rigid, transparent, plastic, metal, wood, rock, glass, absorbent, waterproof)
ANIMALS, INCLUDING HUMANS		I know that animals, including humans, have offspring which grow into adults. Compare and contrast adults and their offspring to other animals. I understand and can describe the basic needs of animals, including humans, for survival (water, food and air). Suggest how these needs influence the choice of habitat. I know the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. Suggest effects of poor diet and hygiene. Key vocabulary: growth, nutrition, respiration, carnivore, herbivore, omnivore, amphibians, mammals, healthy, survival, excretion (carnivores, herbivores, omnivores, reptiles, amphibians, mammals, invertebrates, feathers, skeleton, senses)
LIVING THINGS AND THEIR HABITATS		I understand the differences between things that are living, dead, and things that have never been alive. I know that most living things live in habitats to which they are suited. Explain why there may be a limit to how many of a certain living thing can live in a specific area. I know that these habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other. I can name a variety of plants and animals in their habitats, including micro-habitats. Identify a range of living things and suggest why they may be found in that habitat. I am able to describe how animals obtain their food from plants and other animals. I can use a simple food chain, and identify and name different sources of food. Suggest, using a food chain, what might

		happen if one living thing became scarce. Key vocabulary: <i>habitat, micro habitat, organism, deciduous, evergreen, invertebrates, roots, branch, trunk, stalk, bulbs</i>
PLANTS		I know how seeds and bulbs grow into mature plants. Compare and contrast growth patterns. I understand how and why plants need water, light and a suitable temperature to grow and stay healthy. Identify the effects of a shortage of one of these things plants need. Key vocabulary: <i>deciduous, evergreen, light, heat, temperature, daffodils, bluebells, petal, seeds</i> <i>(deciduous, evergreen, roots, branch, trunk, leaves, stalk, petal, seeds, bulbs)</i>
Compassion, Joy, Respect		

MY LEARNING PATHWAY: SCIENCE
Wells Year A

'I CAN' <i>The skills I have learnt...</i>		'I KNOW' <i>The knowledge I have...</i>
LIGHT	I can ask relevant questions and using different types of scientific investigations to answer them. I can set up simple practical enquiries, comparative and fair tests. I can make systematic and careful observations and, where appropriate, take accurate measurements. I can use a range of equipment, including thermometers and data loggers. I can gather, record, classify and present data in a variety of ways to help in answering questions.	I know that I need light in order to see things and that dark is the absence of light. Recognise that vision involves light travelling to the eyes. I know that light is reflected from surfaces. Recognise that some surfaces are better at reflecting light than others. I know that light from the sun can be dangerous and that there are ways to protect my eyes. Explain why sunlight can be dangerous and how types of protection works. I understand that shadows are formed when the light from a light source is blocked by a solid object. Suggest how light is travelling to form a shadow. I know that the time of the day and the month of the year will affect the size of a shadow. Relate position of an object and position of a screen to the size of the shadow. Key vocabulary: opaque, transparent, translucent, reflection, light source, absence, position, block, bounce
ROCKS	I can record my findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables. I can report my findings, including oral and written explanations, displays or presentations of results and conclusions.	I know how to compare and group different kinds of rocks on the basis of their appearance and simple physical properties. Suggest uses for different kinds of rocks based on their properties. I understand how fossils are formed when things that have lived are trapped within rock. Explain the importance of studying fossils. I know that soils are made from rocks and organic matter. Compare different soils in terms of composition. Key vocabulary: sedimentary, metamorphic, igneous, minerals, permeable, impermeable, erosion
ANIMALS, INCLUDING HUMANS	I can use my results to draw simple conclusions, make predictions for new results, suggest improvements and raise further questions. I can identify differences, similarities or changes related to simple scientific ideas and processes. I can use straightforward scientific evidence to answer questions or to support my findings.	I know that animals, including humans, need the right types and amount of nutrition. Explain why a varied diet is important. I know that they cannot make their own food; they get nutrition from what they eat. I know that humans and some other animals have skeletons and muscles for support, protection and movement. Compare the ways that the skeletons of different animals provide support, protection and movement. Key vocabulary: skeleton, muscles, nutrition, diet, protein, carbohydrates, vitamins, fats, minerals (growth, nutrition, respiration, carnivore, herbivore, omnivore, amphibians, mammals, healthy, survival, excretion, carnivores, herbivores, omnivores, reptiles, amphibians, mammals, invertebrates, feathers, skeleton, senses)

FORCES AND MAGNETS	I know how and why things move differently on different surfaces. Predict how an object will move on other surfaces and suggest why. I know that some forces need contact between two objects, but magnetic forces can act at a distance. Explore how magnetic attraction and repulsion are affected by distance. I understand that magnets attract or repel each other and attract some materials and not others. Explore whether some magnets are stronger than others. I understand how to group everyday materials based on magnetism, and identify magnetic materials. Identify some applications of magnets and magnetic materials. I understand that magnets have two poles, and the effect this has on whether they will attract or repel. I can make predictions based on my understanding. Explore the similarities and differences between the two poles. Apply ideas about the interaction of magnets to contexts such as toys. Key vocabulary: magnets, attract, repel, poles, magnetic, magnetic field
PLANTS	I understand the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers. Suggest why parts may vary in size and shape from one species of flowering plant to another. I know what plants require for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant. Compare the requirements of different plants and link these to particular habitats. I understand the way in which water is transported within plants. Suggest how this process might vary from one type of plant to another. I understand the role that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. Suggest why pollination, seed formation and seed dispersal may vary from one type of plant to another. Key vocabulary: petal, stamen, carpel, pollination, fertilisation, germination (light, heat, temperature, daffodils, bluebells, deciduous, evergreen, roots, branch, trunk, leaves, stalk, petal, seeds, bulbs)
Compassion, Joy, Respect	

MY LEARNING PATHWAY: SCIENCE

Wells Year B

'I CAN'

The skills I have learnt...

'I KNOW'

The knowledge I have...

ELECTRICITY

I can ask relevant **questions** and using different types of scientific **investigations** to answer them.

I can set up simple practical enquiries, **comparative** and **fair tests**.

I can make **systematic** and careful **observations** and, where appropriate, take accurate **measurements**.

I can use a range of **equipment**, including thermometers and data loggers.

I can gather, record, **classify** and present data in a variety of ways to help in answering questions.

I can record my **findings** using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.

I can report my findings, including oral and written explanations, displays or presentations of results and conclusions.

I know several common appliances that run on electricity. **Compare and contrast appliances that run on mains electricity with those that run on batteries.**

I know the features needed to construct a simple series electrical circuit. **Identify the functions of components within a circuit.**

I know whether a lamp will light or not in a simple circuit. **Explain why certain arrangements will not result in the bulb lighting.**

I know that a switch opens and closes a circuit and the affect this has on whether a lamp will light or not. **Explain how altering the location of a switch affects the operation of the circuit.**

I know some common conductors and insulators, and know that metals are good conductors. **Investigate graphite as a conductor and relate to other materials.**

Key vocabulary: conductor, insulator, series circuit, switch, battery, lamp, buzzer, movement, heat, light, bright, dim, flow

SOUND

I can use my results to draw simple **conclusions**, make **predictions** for new **results**, suggest improvements and raise further questions.

I can identify differences, similarities or changes related to simple scientific ideas and processes.

I can use straightforward scientific evidence to answer questions or to support my findings.

I know how sounds are made and can associate some of them with something vibrating. **Group sound-making objects in terms of how they make sounds.**

I know that vibrations from sounds travel through a medium to the ear. **Compare the effectiveness of different media in terms of their ability to transmit sound.**

I am able to find patterns between the pitch of a sound and features of the object that produced it. **Identify generic features that cause the pitch of a note to be changed.**

I am able to find patterns between the volume of a sound and the strength of the vibrations that produced it. **Identify generic features that cause the volume of a note to be changed.**

		I know that sounds get fainter as the distance from the sound source increases. Explain with reference to examples how sounds get fainter as the distance from the source increases. Key vocabulary: <i>pitch, vibration, source, volume, fainter, quiet, loudest, bang, pluck, shake, high, low</i>
ANIMALS INCLUDING HUMANS		I know the simple functions of the basic parts of the digestive system in humans. Explain why the simple functions of the basic parts of the digestive system in humans are necessary. I know the different types of teeth in humans and their simple functions. Explain why humans have different types of teeth. I understand what a food chain shows and can identify producers, predators and prey. Suggest what might happen in a food chain if the population of one of the organisms changes. I know how to create a food chain. Key vocabulary: <i>digestion, oesophagus, acid, stomach, incisors, canines, molars, premolars, producers, consumers, predator, prey, enzyme, nutrients, intestine (skeleton, muscles, nutrition, diet, protein, carbohydrates, vitamins, fats, minerals, growth, nutrition, respiration, carnivore, herbivore, omnivore, mammals, healthy, survival, excretion, carnivores, herbivores, omnivores, reptiles, feathers, skeleton, senses)</i>
LIVING THINGS AND THEIR HABITATS		I know that living things can be grouped in a variety of ways. Suggest why some ways of grouping living things may be more useful than others, e.g. why grouping by number of legs is an easy aid to identification I know how to use classification keys to help group, identify and name a variety of living things. Devise own classification keys to group living things. I know that environments can change and that this can sometimes pose dangers to living things. Describe examples of living things adapting to environmental change, e.g. urban foxes, and examples of extinction

	due to environmental change. Key vocabulary: pond, meadow, woodland, river, organism, classification, adaptation, classification key, vertebrates, birds, amphibians, mammals, reptiles, invertebrates (habitat, micro habitat, organism, deciduous, evergreen, invertebrates, roots, branch, trunk, stalk, bulbs)
STATES OF MATTER	I understand how to group materials together, according to whether they are solids, liquids or gases. Recognise that some materials (e.g. toothpaste) cannot be easily classified as solid, liquid or gas. I know that some materials change state when they are heated or cooled, and can explain at what temperature this happens in degrees Celsius (°C). Suggest patterns in which kinds of materials change state at higher or lower temperatures. I know the part played by evaporation and condensation in the water cycle and can explain the link between the rate of evaporation and temperature. Apply the relationship between rate of evaporation with temperature to everyday contexts. Key vocabulary: properties, heat, solid, liquid, gas, energy, particle, evaporate, condense (fabric, plastic, metal, transparent, stretchy, dull, crumble, bend, twist, squash, rough, smooth, opaque, hard, soft, stretchy, dull, shiny, bendy, rigid, transparent, plastic, metal, wood, rock, glass, absorbent, waterproof)

MY LEARNING PATHWAY: SCIENCE
Shakespeare Year A

'I CAN'

*The skills I have
learnt...*

'I KNOW'

*The knowledge I
have...*

LIFE CYCLES

I can raise questions, make **predictions** and plan different types of scientific **investigations** to answer them.

I can identify and control **variables** where necessary.

I can suggest what impact these variables would have on the results of an investigation.

I can use a range of scientific equipment to take **measurements**, with increasing accuracy and precision, taking repeat readings when appropriate.

I can record **data** and results with increasing detail using scientific diagrams and labels, **classification** keys, tables, scatter graphs, bar and line graphs.

I can use my test results to make predictions to set up further **comparative** and fair tests.

I can report and present findings from enquiries, including **conclusions**.

I know the differences in the life cycles of a mammal, an amphibian, an insect and a bird. **Suggest similarities in a number of vertebrates e.g. comparison of dog, human and bird.**

I can describe the life process of reproduction in some plants and animals. **Compare these processes.**

I can describe the changes as humans develop to old age. **Suggest why some of the changes that take place in humans happen.**

Key vocabulary: metamorphosis, amphibian, pollination, fertilisation, germination, gestation, adolescent

(enzyme, nutrients, intestine, digestion, oesophagus, acid, stomach, incisors, canines, molars, premolars, producers, consumers, predator, prey, skeleton, muscles, nutrition, diet, protein, carbohydrates, vitamins, fats, minerals, growth, nutrition, respiration, amphibians, mammals, healthy, carnivores, herbivores, omnivores, reptiles, mammals, invertebrates, feathers, skeleton)

EARTH & SPACE

I can explain my results and their accuracy, presenting this information either orally or written such as displays or ICT presentations.

I can identify scientific **evidence** that has been used to support or disprove ideas or arguments.

I understand the movement of the Earth, and other planets, relative to the Sun in the solar system. **Explain that the further out a planet is, the longer its orbit is around the Sun.**

I understand the movement of the Moon relative to the Earth. **Relate the Moon's orbit of the Earth to the Earth's orbit of the Sun.**

I understand the Sun, Earth and Moon as approximately spherical bodies.

I know that the idea of the Earth's rotation can be used to explain day and night and the apparent movement of the sun across the sky. **Explain the effect of a planet rotating at a different rate to Earth.**

Key vocabulary: Earth, axis, rotate, Solar System, orbit, phases, planets, revolve,

sphere

I understand how materials can be grouped together and compared based on their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. **I know why these properties might influence the selection of those materials for certain uses.**

I know that some materials will dissolve in liquid to form a solution, and I can describe how to recover a substance from a solution. **I know that some soluble materials are more soluble than others.**

I use my knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. **I know why some methods are more effective.**

I know that dissolving, mixing and changes of state are reversible changes. **I know which processes are reversible and irreversible.**

I am able to explain that some changes result in the forming a new material, and that this kind of change is not usually reversible. **I can explain when irreversible changes are a good thing or not e.g. non-biodegradable plastic bags.**

Key vocabulary: properties, solution, soluble, insoluble, sieve, filter, evaporate, condense, dissolve, filter, permeable, translucent, reversible, irreversible

(properties, heat, solid, liquid, gas, energy, particle, evaporate, condense, fabric, plastic, metal, transparent, stretchy, dull, crumble, bend, twist, squash, rough, smooth, opaque, hard, soft, stretchy, dull, shiny, bendy, rigid, transparent, plastic, metal, wood, rock, glass, absorbent, waterproof)

FORCES

I know that unsupported objects fall towards the Earth because of the force of gravity. **Explain that gravity acts between all masses e.g. the Sun and the Earth.**

I know the effects of air resistance, water resistance and friction, which acts between moving surfaces. **Explain how forces that oppose motion may be useful e.g. bicycle handlebar grips or a nuisance e.g. bicycle chain.**

I know that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. **Explain, with reference to an everyday context, why a force multiplier might be useful.**

Key vocabulary: gravity, air resistance, friction, push / pull, balance, surface area, mechanisms

(magnets, attract, repel, poles, magnetic, magnetic field)

Compassion. Respect. Joy

MY LEARNING PATHWAY: SCIENCE
Shakespeare Year B

	'I CAN' <i>The skills I have learnt...</i>	'I KNOW' <i>The knowledge I have...</i>
LIVING THINGS AND THEIR HABITATS	I can raise questions, make predictions and plan different types of scientific investigations to answer them. I can identify and control variables where necessary. I can suggest what impact these variables would have on the results of an investigation. I can use a range of scientific equipment to take measurements, with increasing accuracy and precision, taking repeat readings when appropriate. I can record data and results with increasing detail using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs. I can use my test results to make predictions to set up further comparative and fair tests.	I know how living things are classified into broad groups according to common observable characteristics. Explore why some living things, such as the duck billed platypus, don't neatly fit into one group. I can use specific characteristics to explain why plants and animals have been classified in a particular way. Explain why other features are less useful as a basis for classification, such as size or colour. Key vocabulary: vertebrate, invertebrate, feathers, scales, kingdoms, classes, order, kingdom, classification (pond, meadow, woodland, river, organism, classification, adaptation, classification key, vertebrates, birds, amphibians, mammals, reptiles, invertebrates, habitat, micro habitat, organism, deciduous, evergreen, invertebrates, roots, branch, trunk, stalk, bulbs)
EVOLUTION AND INHERITANCE	I can report and present findings from enquiries, including conclusions. I can explain my results and their accuracy, presenting this information either orally or written such as displays or ICT presentations. I can identify scientific evidence that has been used to support or disprove ideas or arguments.	I understand that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. Suggest possible reasons for changes to living things over time, e.g. why penguins can't fly but are good at swimming. I know that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents. Recognise that selective breeding may result in offspring with certain features, e.g. pedigree dogs with a certain shape or colour. I can explain how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution. Give examples of living things that have evolved in different ways, e.g. different types of finch.

Key vocabulary: offspring, characteristics, evolution, adaptation, inherited, genetics, genes, environmental

I know the main parts of the human circulatory system, and can describe the functions of the heart, blood vessels and blood. **Explain some characteristics of the heart, blood vessels and blood, e.g. explain that the arteries are thicker because they carry blood at a higher pressure.**

I understand the impact of diet, exercise, drugs and lifestyle on the way my body functions. **Explain how decisions about lifestyle can affect the quality of life, e.g. recognise that making excessive use of convenience foods may introduce more additives into the diet.**

I know the ways in which nutrients and water are transported within animals, including humans. **Compare the ways in which nutrients and water are transported in two animals that are quite different.**

Key vocabulary: circulatory system, blood, pulse, arteries, veins, alcohol, caffeine, drugs, nicotine, healthy, component, cells, platelets, plasma

(Metamorphosis, pollination, fertilisation, germination, gestation, adolescent, enzyme, nutrients, intestine, digestion, oesophagus, acid, stomach, incisors, canines, molars, premolars, producers, consumers, predator, prey, skeleton, muscles, nutrition, diet, protein, carbohydrates, vitamins, fats, minerals, growth, nutrition, respiration, amphibians, mammals, healthy, carnivores, herbivores, omnivores, reptiles, mammals, invertebrates, feathers, skeleton)

LIGHT		I know that light appears to travel in straight lines. Recognise that even when light changes in direction, the path is still continuous. I can use this knowledge to explain that objects are seen because they give out or reflect light into the eye. Draw diagrams using straight lines showing light reflecting off objects and into the eye. I can use this knowledge to explain why shadows have the same shape as the objects that cast them. Use a diagram to explain that although a shadow is the same shape as the object, it may not be the same size. I know that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes. Refer to the idea that some objects may be better reflectors than others. Key vocabulary: absence of light, shadow, mirror, straight lines, reflection, refraction (opaque, transparent, translucent, reflection, light source, absence, position, block, bounce)
ELECTRICITY		I understand the link between the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. Relate the number or voltage of cells to the number and operation of bulbs or buzzers that can be run from them. I understand the variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches. Explain the effect of changing the order of the components in a circuit. I know how to use recognised symbols when representing a simple circuit in a diagram. Design circuits using symbols. Key vocabulary: electricity, volts, series circuit, resistance, bulb, wires (conductor, insulator, series circuit, switch,

		<i>battery, lamp, buzzer, movement, heat, light, bright, dim, flow)</i>
Compassion. Respect. Joy		

Scientific figures		
Dahl Year A	Sir Joseph Banks (Plants)	http://www.bbc.co.uk/history/historic_figures/banks_sir_joseph.shtml https://www.joseph-banks.org.uk/banks/ https://www.nhm.ac.uk/discover/joseph-banks-scientist-explorer-botanist.html
Dahl Year B	Sir David Attenborough (Living things & their habitats) Jane Goodall (Living things & their habitats)	https://attenboroughfilm.com/ https://www.britannica.com/biography/David-Attenborough https://www.bbc.co.uk/teach/nine-astonishing-ways-david-attenborough-shaped-your-world/z4k2kmn https://www.janegoodall.org.uk/
Wells Year A	Isaac Newton (Forces and Magnets) Marie Curie (Animals inc humans)	https://www.britannica.com/biography/Isaac-Newton https://www.bbc.co.uk/teach/isaac-newton-the-man-who-discovered-gravity/zh8792p https://makinsscience.royalsociety.org/s/rs/people/fst01801333 https://www.mariecurie.org.uk/who/our-history/marie-curie-the-scientist
Wells Year B	Galileo Galilei (Sound) Inventors linked to this topic: Alexander Graham Bell Heinrich Hertz Lewis Howard Latimer Edison	https://www.britannica.com/biography/Galileo-Galilei http://www.bbc.co.uk/history/historic_figures/galilei_galileo.shtml
Shakes Year A	Archimedes (Earth & Space) Mae C. Jemison (Earth & Space)	https://www.britannica.com/biography/Archimedes http://www.bbc.co.uk/history/historic_figures/archimedes.shtml https://www.famousscientists.org/archimedes/ https://www.womenshistory.org/education-resources/biographies/mae-jemison First female black astronaut in space
Shakes Year B	Charles Darwin (Evolution)	https://www.britannica.com/biography/Charles-Darwin https://www.nhm.ac.uk/discover/charles-darwin-most-famous-biologist.html http://darwin-online.org.uk/
Compassion, Joy, Respect		