Science

Knowledge Building
Processes and Changes
Change happens as a result of different **scientific processes.** Unlike in geography, where processes can be split into two distinct groups (physical and human), scientific processes can be wide-ranging. Some examples of these are: changing states of matter, growth of animals and plants and changing of one type of energy to another, such as using solar energy to product electrical power. These processes can be the subject of experimentation and changes can be observed, measured and recorded. Pupils will see how **processes and changes** work together, but how factors within the processes can affect changes.
Methods
In science, **methods** are a key part of seeking knowledge and answers to scientific problems. **Methods** are a logical way of organising scientific study and experiments so that ideas can be proven, answered and re-tested, if necessary. Most **methods** involve thinking of a hypothesis, testing that hypothesis then concluding and evaluating the results. Pupils will look at what makes a good scientific **method** and learn that using these **methods** makes for safer experimentation and leads to more reliable, accurate results.
Observing and Recording
At the most basic level, **observing and recording** is saying what you see and notice, and noting that down in some form. Being able to do this and decide what is significant is an important part of becoming a **scientist.** Progression involves using more technical equipment, then using observations and recordings to support theories, arguments and findings.
Scientific Vocabulary
The language of science can be broken down into various areas. Initially, basic language covers general science terms such as experiment, record, look, change etc. **Scientific vocabulary** then becomes more specific, depending on the area of science being studied, for example the language of biology could include animal, plant, reproduction, offspring, grow and the language of chemistry may use materials, chemical, change, liquid, gas etc. Finally, vocabulary can be used to link concepts together and be used in different contexts.
Uses and Implications
As with observing and recording, it is important to recognise that science takes place every day. Pupils will see that, even in mundane everyday activities, science is featured. Initially, it may only be the **uses** of science that are recognised but progression means they then explore how these **uses** have **implications.** For example, the use of single-use plastic, however useful to us as humans, has implications in environmental science terms.
Cross-Curricular (STEM)
With links to **uses and implications**, children will see that science has strong ties to other areas of their learning, particularly maths and technology. The use of science within these subjects has strong implications for progression and development in all three.

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End Goals
Explorers / EYFS
Our aim in teaching science in Explorers is to tap into pupils' curiosity about the world around them. By the end of this phase, pupils should be able to use their senses to investigate a range of materials and should be starting to become familiar with the concept of natural and man-made materials. Pupils should be able to talk in simple terms about how plants and animals change over the course of their life cycles and observe the growth of a plant from seed to full development. Pupils should recognise that humans and animals require a suitable place to live and need food and water to survive. By the end of this phase, they should also be aware of seasonal changes and be able to have conversations about what they see, hear and feel outdoors. Pupils should be able to identify a range of light sources and use light to create reflections and shadows. Pupils should be able to start making comparisons between two or more things e.g. objects, animals, recognising similarities and differences between them.
Pathfinders / KS1
Our aim in teaching science in Pathfinders is to embed and build on learning in Explorers by beginning to develop their ability to work more scientifically. By the end of this phase, pupils should be able to write basic methods for experiments and use some simple equipment to observe and record their findings. They should also be able to make predictions, with reasons for their ideas, before proceeding with an experiment. Pupils should be able to draw on some of their mathematical skills to create charts from data collection and use this data to draw conclusions. Pupils should be able to use a wider range of scientific vocabulary in both their class discussions and written work. We believe that learning in science develops through the experience and development of scientific concepts in incremental steps in each phase. For this reason, we have made the following changes to the Programme of Study within the Science National Curriculum to support children's learning. Exploratory units of Light, Electricity, Sound and Forces have been included in Pathfinders (Key Stage 1) to ensure that children gain initial experience of a range of 'Physical' science before Key Stage 2. They should also have a secure knowledge of what animals and plants need to survive and be able to classify things that are alive and those that are not. Pupils should also be able to explain in more detail the process of growing plants from seeds and bulbs, using a wider scientific vocabulary. When working with materials, pupils should be able to distinguish the difference between an object and material/s it is made from. They should also be able to conduct some simple experiments on the suitability of certain materials for different uses.
Adventurers / LKS2
Our aim in teaching science in Adventurers is to encourage pupils to start to become more scientifically accurate, with the introduction of a range of testing, alongside the questioning and comparing of data when drawing conclusions. In this phase, pupils will have revisited a number of areas of science from Pathfinders, and will be expected to end this phase with a deeper understanding of them through the use of a wider scientific vocabulary and more complex investigative techniques. Pupils should be able to use more technical methods of grouping and classifying, such as classification keys and food chain diagrams. Pupils should also be able to present their findings from experiments in more formal ways and provide evidence for their findings. They should be able to explain the key features of the digestive and skeletal systems in animals and should have a deeper understanding of the reproductive processes of plants and their key parts. Pupils should be able to recognise the difference between volume and pitch when investigating sound and recognise how reflections are formed in the study of light. By the end of the phase, pupils should be able to make and draw diagrams of more complex electrical circuits that include switches. They should also be able to recognise the roles of conductors and insulators in making circuits functional but safe.
Navigators / UKS2
Our aim in teaching science in Navigators is to deepen pupils' knowledge and skills in a wide range of scientific areas. Pupils should now be confident in devising and conducting experiments and presenting their methods and findings with accuracy, using a range of different methods. In this phase, pupils are now expected to, not only ensure fair testing in their experiments, but also conduct comparative tests where appropriate. Pupils should be able to analyse, discuss and argue constructively for and against particular theories or ideas and use evidence to support their own views. They should be able to research and produce explanations or theories that look at scientific concepts beyond the classroom, such as evolutionary theories or the use of renewable energy sources. They should also know about the circulatory and the solar systems, as well as more complex forces such as gravity, water, air and frictional resistance.

Science

EXPLORERS- Early Years

Knowledge Building

Processes and Changes	Methods	Observing and Recording	Scientific Vocabulary	Uses and Implications	Cross-Curricular (STEM)
Know that processes and changes occur	Know that methods are necessary when experimenting	Know that saying what you see is an important aspect of science	Understand some simple generic vocabulary linked to science e.g. experiment, record	Know when in everyday activities science is useful	Know that science links to other areas of learning

Learning Progression

3 – 4 years	Reception
• 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 • Explore how things work • 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	• 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, drawing on their experiences and what has been read in class • Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter • 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

Science

Knowledge Progression	
Explorers 1 / Nursery and Explorers 2 / Reception	
Happy to Be Me • To learn about the five senses and why they are important to us • To name and identify body parts on humans and animals • To know that animals use their senses in different ways to us • To know that there are similarities and differences between people **Key Vocabulary** senses, ears, eyes, hands, fingers, toes, mouth, nose, touch, taste, smell, sight, hear, same, difference, different, observe, patterns, food, survive, nose, paws	**What on Earth…?** • To know what a habitat is, compare a range of habitats and identify those suited to specific animals • To identify some plants, explore how they grow and identify a variety of flowers, comparing them by size, shape and colour • To identify features of two varieties of the same species and compare them • To know what the four seasons are and be able to identify the key features of spring specifically • To know what a reflection is and know that mirrors make reflections **Key Vocabulary** habitat, native, non-native, species, flower, plant, mirror, reflection, environment, creature, alive, season
Under the Sea • To identify some basic features of a fish including its life cycle and compare with the life cycle of humans • To know what fish, including sharks, need to survive • To identify how sea creatures move, including crabs • To know what teeth are for and why most animals, including humans, need them • To identify items that float or sink and say why sinking is not a good thing to happen to a boat **Key Vocabulary** fish, head, tail, scales, fin, gills, eyes, aquarium, tank, water, salt water, fresh water, crab, crustacean, sideways, marine, teeth, sharp, shark, whale, dolphin, life cycle, float, sink, boat	

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PATHFINDERS- KS1

Knowledge Building					
Processes and Changes	**Methods**	**Observing and Recording**	**Scientific Vocabulary**	**Uses and Implications**	**Cross-Curricular (STEM)**
Identify simple processes and explain in basic terms how they happen	Know the key parts of a simple scientific method	Know how to use simple equipment in observing and recording	Understand some vocabulary linked to specific area of science e.g. animals – species	Know that science is used in a range of everyday situations, both in and outside the classroom	Identify clear connections between science, technology and mathematics for basic experimenting

Skills Progression	
Science Skills Pathfinders 1 / Y1	**Science Skills Pathfinders 2 / Y2**
Sc1 Suggest what might happen and perform simple tests Sc2 Explore using senses and record findings in simple ways Sc3 Collect evidence to try to answer a question Sc4 Make simple comparisons through observation Sc5 Identify and classify based on simple criteria	Sc6 Explore and observe in order to collect data and describe and compare findings Sc7 With help, suggest some ideas and questions and predict what might happen Sc8 Use first-hand observation, own experience and simple information sources to make comparisons and answer questions Sc9 Observe closely using simple equipment Sc10 Recognise ways in which evidence can be collected Sc11 Use simple scientific language Sc12 Perform simple tests Sc13 Record findings in various formats using standard units, drawings, diagrams, photographs, simple prepared formats such as tables and charts, tally charts, and displays Sc14 Say whether what happened was what was expected and draw simple conclusions to help answer questions

Science

Knowledge Progression

Pathfinders 1 / Year 1

Unity in the Community

Pupils will build on their knowledge of plants from the Explorers Learning Pathway to learn about the structure of plants and learn the correct language to describe their parts. Through learning walks, pupils will observe a variety of different plants and trees. Pupils will learn that plants can grow from either seeds or bulbs but all require certain conditions in order to flourish and be healthy. They will conduct a simple experiment for growing their own plants and use STEM skills to record growth. Pupils will expand their knowledge of the relationship between plants and animals by learning about food chains. Pupils will learn the terms 'deciduous' and 'evergreen' in relation to trees.

NC Concepts

A. To know and describe the basic structure of a variety of common flowering plants
B. To know and describe how seeds and bulbs grow into mature plants
C. To learn that plants need water, light and a suitable temperature to grow and stay healthy
D. To name and identify a variety of common wild and garden plants, including deciduous and evergreen trees
E. To know 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

Light Up the World

Pupils will learn that, like sound, we use the term 'source' when discussing where light comes from. They will use categorisation to sort light sources and non-light sources, identifying those that require electricity to work. They will learn that the Sun is a light source and they will experiment with using the Sun's energy, recording their findings in a simple way. The concept of sustainable energy will be introduced. Pupils will investigate how shadows are formed and that light levels, as well as shadows, can change. Finally, pupils will look at how light affects animals and identify those animals (nocturnal) that prefer darkness to light.

Concepts

A. To recognise that we need light in order to see things and that dark is the absence of light (LKS2- NC)
B. To know, name and observe a variety of sources of light, including electric lights, flames and the Sun
C. To recognise that light from the Sun can be dangerous and that there are ways to protect their eyes (LKS2- NC)
D. To understand that the Sun provides energy and that solar power is a sustainable energy source
E. To be aware of simple ways to save electricity
F. To know that shadows are formed when the light from a light source is blocked by a solid object (LKS2 - NC)
G. To understand the term 'nocturnal' and learn about nocturnal animals

Pathfinders 2 / Year 2

Land Ahoy!

To begin with, pupils will look at how objects to move by creating lists and then sorting through observation. They will know what defines a push or pull force and conduct simple experiments on increasing these forces to affect speed. Language such as 'faster' and 'slower' will be used to compare how things move and pupils will recognise the importance of adjusting speed in everyday life. Pupils will be introduced to the term 'sources' when learning about where sounds come from and know that language such as 'quieter' and 'louder' is used when comparing sounds.

Concepts

A. To compare how different things move (LKS2 – NC)
B. To notice and describe how things are moving, using simple comparisons such as faster and slower
C. To understand that there are many kinds of sound and sources of sound
D. To know that sounds get fainter as the distance from the sound source increases (LKS2 – NC)

Going Wild

Pupils will continue to develop their understanding of what it is that defines a living thing through discussions and questioning and have a clear understanding of what the terms 'living' and 'non-living' mean. Further learning on adults and offspring will look at what is needed to care for a human baby and how that baby changes as it grows. Pupils will be introduced to a range of vocabulary relating to gender, age, stage and diet. Pupils will use reasoning and explanation to list things vital for survival and recognise that science can be used outside the classroom to protect habitats and endangered species.

NC Concepts

A. To understand the difference between things that are living and things that have never been alive
B. To learn that animals, as well as humans, have offspring, which grow into adults
C. To learn about the basic needs of animals, as well as humans, for survival (which are food, water and air)
D. To identify and name a variety of common animals that are birds, fish, amphibians, reptiles and mammals
E. To describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets)
F. To identify and name a variety of common animals that are carnivores, herbivores and omnivores

Additional Concept

G. To know that some animals are endangered, the reasons why and what is being done to preserve these species

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Knowledge Progression	
Pathfinders 1 / Year 1	**Pathfinders 2 / Year 2**
Come Fly With Me! Arctic Circle Initially, pupils will embed learning about the main features of each season within the UK. Pupils will also learn that seasons can be very different in other parts of the world, and this will be expanded on in Adventurers. They will move on to explore the properties of a range of materials used in everyday objects. Pupils will investigate the properties of materials through their senses. The study of materials extends into how malleable certain solid materials can be by squashing, bending, twisting and stretching. Lastly, pupils will learn about the meaning of the term 'waterproof' and experiment using simple tests on a range of materials for waterproofness. • To 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 / To identify and name a variety of plants and animals in their habitats, including microhabitats **NC Concepts** H. To learn the names of, describe weather associated with and observe changes across the four seasons I. To identify and name a variety of everyday materials, including wood, plastic, glass, metal, water and rock, and to know, describe and compare how their simple physical properties vary. Group together a variety of everyday materials on the basis of their simple physical properties J. To find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching A. To distinguish between an object and the material from which it is made and compare the uses of a variety of everyday materials	**Zero to Hero** Pupils will develop their understanding of light sources and expand this to include those sources that also provide heat energy as well as light. They will recognise that some sources require electricity to work and, therefore, need a circuit and power source in order to function. Pupils will experiment with toys that require electricity and conduct some simple tests from which they can draw conclusions on how these appliances work. Pupils will learn the correct vocabulary for circuit components and will perform some simple tests on putting the components together to make a basic functioning circuit. An introduction to switches will allow for experimenting with how circuits can be broken safely. **Concepts** A. To observe and name a variety of sources of light, including electric lights, flames and the Sun B. To know that fire has been used throughout history for heat and light C. To know about simple circuits involving batteries, wires, bulbs and other components D. To know how a switch can be used to break a circuit
Happily Ever After Pupils will learn, through class discussion, the difference between living and non-living things. They will be introduced to the concept of change and use the story of the 'Ugly Duckling' to explore the changes that occur over the life span of a swan. Pupils will use observation to identify the key characteristics of birds such a feathers, beaks etc. Simple scientific vocabulary relating to living things will be introduced. They will develop their understanding of life cycles and offspring through birds, in comparison to frogs, before looking in more detail at suitable habitats for different animals. **Concepts** F. To know the difference between living things and things that have never been alive (NC) G. To identify and name a variety of birds To know that humans and other animals can produce offspring and that these offspring can grow into adults (NC)	**Science concepts taught within 3D PSHE:-** **KS1 3D PSHE Core 1 Unit 3 Lesson 2: Body Bits (within Going Wild)** To identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense **KS1 3D PSHE Core 1 Unit 1 Lesson 4: Get Physical and Lesson 6: Workout (within Going Wild)** **KS1 3D PSHE Core 1 Unit 1 Lesson 2: Meat Eaters (within Come Fly With Me! Arctic Circle)** **KS1 3D PSHE Core 1 Unit 1 Lesson 5: Mighty Muscles (additional lesson)** **KS1 3D PSHE Core 1 Unit 2: Hygiene - Lessons L1 – 6 (additional lessons)** To describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene

Science

Working Scientifically - Jiffy Science Lessons	
Pathfinders 1 / Year 1	**Pathfinders 2 / Year 2**
Homely Habitats Pupils will be given a survey and will need to investigate an outside area that contains some minibeasts. By using magnifying glasses, they will complete the professor's survey of minibeast habitats and share their findings. Pupils will earn that information collected for the survey is called 'data' and we can use it to support our explanations. • To use simple equipment, such a magnifying glasses, to gather and record simple data and talk about what they have found	**Classifying Calamity** Pupils will work scientifically to identify and classify animals into five classification groups. They will do this by looking closely at specific features relating to each animal in order to put them into the correct groups. They will need to explain why they have made their choices using appropriate scientific vocabulary • To identify and classify • To use simple features to compare living things, and, with help, decide how to sort and group them
Paper Plane Pandemonium In this lesson, pupils will need to read, understand and organise data that is disorganised and not carefully recorded. They will need to gather the data provided and organise it in a standard form, such as a table so it is easier to read and follow. They can then carry out their own paper plane experiments and add their data to their tables. • To gather and record data to help in answering questions	**Exploding Experiments 1** By asking questions through a survey, pupils will find out which materials would be the best to use to rebuild various items in Professor Jiffy's laboratory. The pupils will also need to share their findings and listen to discussions from the class to decide on the best material choices. • To ask simple questions and recognising that they can be answered in different ways
Lifecycle Learning In this lesson, pupils will secure their knowledge and understanding of lifecycles by reviewing the changes that occur in caterpillars and then looking at the lifecycles of frogs. Pupils will discuss some basic similarities and differences between the two animals, noting each stage of the process. Finally, pupils will consider the importance of both animal species being present in the Professor's garden and pond. • To observe living things closely • To notice changes over time	**Exploding Experiments 2** This lesson follows on from Exploding Experiments 1 as the pupils will now test out materials that could be used to make a new laboratory coat for the professor. The pupils will need to consider four 'needs' for the coat and investigate the best materials and methods to reach the coat's requirements. To perform simple tests

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Year 1 – Key Knowledge Builder

Overview of theme		Animals & Living Things	Plants	Habitats	Materials	Weather
	Composite	**Happily Ever After**	**Unity in the Community**	**Come Fly With Me! Arctic Circle**		
Processes & Changes	**Identify simple processes and explain in basic terms how they happen**	Know that birds lay eggs	Know that plants, as well as animals, grow and they need food and water in order to do so	Know that the colour of some Arctic animals' fur changes in different seasons e.g. fox	Know that some materials can undergo simple changes, such as being torn or broken	Know that there are four seasons and identify their changes linked to the weather
Methods	**Know the key parts of a simple scientific method**	Understand and describe what birds need to stay alive	Know the simple methodology of planting a seed or bean	Know how to make suggestions as to why changes occur in the Arctic	Know that it is possible to suggest what might happen in a simple materials experiment	Know how to make suggestions on what might happen in a simple weather experiment
Observing and Recording	**Know how to use simple equipment in observing and recording**	Know how to observe birds using simple equipment, such as binoculars, identifying their key features	Understand how careful observation can ensure a plant grows successfully	Know that some plants can survive in harsh conditions	Know how to make simple recordings of how materials perform in simple tests	Know how to observe seasonal changes using the senses
Scientific Vocabulary	**Understand some vocabulary linked to specific area of science e.g. animals - species**	Know language related specifically to birds e.g. beak, feathers, eggs	Know and understand vocabulary linked to the structure of plants e.g. stem, root	Know and understand the terms 'habitat' and 'prey'	Know and understand language related to simple materials e.g. hard, soft, rough, smooth	Know & understand vocab linked to seasons (summer, autumn, winter, spring & weather language
Uses and Implications	**Know that science is used in a range of everyday situations, both in and outside the classroom**	Understand the importance of birds in the local area and know some ways to protect them	Know where humans obtain their plant-based food from and why it is important to eat plants	Know that observing the weather helps us choose what clothes to wear	Understand the importance of suitable materials for different jobs	Know that understanding the weather can help in everyday situations
Cross Curricular STEM	**Identify clear connections between science, technology and mathematics for basic experimenting**	Know how to use simple charts & pictograms when recording bird observations	Know how to measure how much water is given to their growing seedling (Maths)	Know that products develop through experimentation (Design Technology)	Design / Technology links – know how to design and make simple objects using different materials	Know how to create a tally chart of particular types of weather (rainy, sunny, cloudy, in a week)

Science

Year 1 Composites and Components – Knowledge	
HAPPILY EVER AFTER	
Composite	**Components**
To know the difference between living things and things that have never been alive (NC)	To know that 'difference' means when things are not the same To know that non-living things can't breathe, eat, grow, move, reproduce and they don't have senses To know that some things have never been alive To know that some things are living because they can breathe, eat, grow, move, reproduce and have senses To know that eating gives our bodies the energy it needs to grow and be healthy To know that humans have five senses that help them make sense of the world and these are sight, hearing, smell, taste and touch To know that all living things eventually die
To identify and name a variety of birds	To know that a bird is an animal with two wings, two feet, a beak and a body covered with feathers To know that most birds can fly To know that birds lay eggs to reproduce babies To know the names of some species of bird e.g. swan, robin To know the distinguishing features that help us name birds e.g. large and white, red breast
To know that humans and other animals can produce offspring and that these offspring can grow into adults (NC)	To know that offspring are babies To know that to reproduce means to have babies To know that babies grow and change into adults over time

UNITY IN THE COMMUNITY	
Composite	**Components**
To know and describe the basic structure of a variety of common flowering plants, including trees (NC)	To know that plants have roots, a stem or trunk and leaves To know that, while many do have flowers, not all plants are flowering To know that roots are usually underground, and they take water and food from the soil To know that roots also keep a plant in place and hold it upright To know that a stem is the main part of a plant that supports the leaves and flowers To know that trees are tall woody plants which usually have a stem called a trunk To know that the leaf is the flat part of a plant which grows from the stem
To know and describe how seeds and bulbs grow into mature plants (NC)	To know that all plants produce seeds or bulbs which grow into new plants To know that bulbs develop from seeds underground and can grow back year after year To know that a seed is the first stage in the life cycle of most plants
To learn that plants need water, light and a suitable temperature to grow and stay healthy (NC)	To know that plants are living things, so they need water and light to grow and stay healthy To know that plants also need to be at the right temperature to be able to grow and stay healthy
To name and identify a variety of common wild and garden plants, including deciduous and evergreen trees (NC)	To know that wild plants are not planted by humans To know that garden plants are planted by humans To know that the leaves of deciduous trees fall off in the autumn To know that the leaves on an evergreen tree are usually needle-like and stay green all year round

To know 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 (NC)	To know that plants and animals need food to stay alive and grow To know that plants get their food from the soil To know that a food chain always starts with plant life To know that a food chain describes how plants and animals are linked by what they eat

COME FLY WITH ME! ARCTIC CIRCLE	
Composite	**Components**
To 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 (NC)	To know that habitats are the places where plants and animals live To know that most habitats include plants and animals that need each other to survive To know the two main types of habitats are land habitats and water habitats To know that there are many different types of habitats, from the hottest places on Earth to the coldest e.g. deserts and rainforests To know that, over time, animals adapt or change to fit in their habitat e.g polar bears in the Arctic Circle are white to blend in with the icy landscape
To identify and name a variety of plants and animals in their habitats, including micro habitats (NC)	To know that ice covers most of the Arctic Circle all year round To know that the habitat of the Arctic Circle does not include trees To know that animals that live in cold habitats grow thick fur to keep them warm To know that polar bears, reindeer, wolves, and the Arctic fox are examples of animals that live in the Arctic Circle To know that seals and walrus are animals that live on the coast and in the sea To know that whales and many types of fish live in the ocean To know that a micro-habitat is a very small part of a habitat e.g. a space between rocks
To learn the names of, describe weather associated with and observe changes across the four seasons (NC)	To know that weather is the way that the air and the atmosphere feel e.g. sunny, rainy, cloudy To know that seasons are different times of the year with different types of weather. To know that there are four seasons in the UK i.e. spring, summer, autumn, winter
To identify and name a variety of everyday materials, including wood, plastic, glass, metal, water and rock, and to know, describe and compare how their simple physical properties vary. Group together a variety of everyday materials on the basis of their simple physical properties (NC)	To know that materials look and feel different and that these are known as their physical properties To know that wood is what trees are made from To know that plastic is man-made To know that glass is made from sand and is man-made To know that there are many different types of metal e.g. aluminium, iron and brass
To find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching (NC)	To know that to squash means to crush or squeeze something To know that to bend means to force something into a curved shape To know that to twist means to rotate or turn something around To know that to stretch means to pull out to full length
To distinguish between an object and the material from which it is made and compare the uses of a variety of everyday materials (NC)	To know that we use different materials in different ways, depending on their qualities To know that a material that keeps water out is known as waterproof To know that some objects do not let water pass through because they are waterproof e.g. cup, washing up bowl

Science

LIGHT UP THE WORLD	
Composite	**Components**
To recognise that we need light in order to see things and that dark is the absence of light (NC) (LKS2)	To know that we need light to see To know that we use different sources of light to see e.g. the sun, torch
To know, name and observe a variety of sources of light, including electric lights, flames and the Sun	To know that light is opposite of dark To know that the Sun provides us with natural light and energy To know that many of our light sources are artificial (man-made) light e.g. light bulb
To recognise that light from the Sun can be dangerous and that there are ways to protect their eyes (NC) (LKS2)	To know that the Sun is stronger at different times of the day To know that the Sun is stronger at different times of the year (seasons) To know that the rays from the Sun are so strong they can damage our eyes if we look directly at it To know that we need to wear sunglasses when outside in strong sunlight To know that wearing a hat can also protect our eyes from harmful sun rays
To understand that the Sun provides energy and that solar power is a sustainable energy source	To know that we use energy from the Sun and call it solar power To know that solar panels are designed to absorb the sun's rays as a source of energy To know that we create energy using the Sun and be able to recognise solar panels To know that we use solar power to produce electricity To know that we create energy using the wind and be able to recognise wind turbines
To be aware of simple ways to save electricity	To know that electricity costs money To know that we need to save electricity because non-renewable energy sources are being used up To know that we can save electricity by switching lights and gadgets off when we are not using them To know that we can save electricity by keeping windows closed when heating rooms
To know that shadows are formed when the light from a light source is blocked by a solid object (NC) (LKS2)	To know that we can see shadows all around us when we are outside on a sunny day To know that a shadow is made when an object blocks the light To know that the shadows created by the sun are different in length throughout the day To know that the higher the sun is in the sky, the shorter the shadow is
To understand the term 'nocturnal' and learn about nocturnal animals	To know that nocturnal means active at night To know that there are some animals and birds that can only be seen at night and that these are called nocturnal animals

Science

Year 2 – Key Knowledge Builder

Overview of theme		Forces & Motion	Sound	Light & Electricity	Living Things & Habitats
	Composite	Land Ahoy!		Zero to Hero	Going Wild
Processes & Changes	Identify simple processes and explain in basic terms how they happen	Know that different surfaces affect the way things move	Understand how and why sounds increase and decrease in volume	Know that switches stop the electricity from flowing	Understand that humans and other animals go through different developmental stages in growth
Methods	Know the key parts of a simple scientific method	Know how to record a simple conclusion for a moving object experiment	Know different ways of investigating volume and sound	Know how to give a simple explanation of what is happening when a circuit is complete	Know how the basic needs of humans compare with those of another animal and explain a method of keeping that animal alive
Observing and Recording	Know how to use simple equipment in observing and recording	Know how to order objects by speed or distance in a moving objects experiment	Know how to record simple findings from a sound experiment	Know that a bulb requires electricity in order to light	Understand how sorting & classifying can be used to determine which things are alive and those that are not
Scientific Vocabulary	Understand some vocabulary linked to specific area of science e.g. animals - species	Know and understand the terms 'surface', 'launch', 'transporter' and 'compare'	Know and understand the terms 'volume', 'distance, 'increase' and 'decrease'	Know and understand the terms 'bulb' and 'battery'	Know more complex vocabulary such as producer, consumer
Uses and Implications	Know that science is used in a range of everyday situations, both in and outside the classroom	Know simple ways in which the speed of a moving object can be increased / decreased	Know that hearing aids are used to help people who have poor hearing	Understand the basic impact that the electric light bulb had on the modern world	Know that some ways in which we can change human behaviour to prevent endangering animal species
Cross Curricular STEM	Identify clear connections between science, technology and mathematics for basic experimenting	Know how to measure distance travelled by a moving object (Maths)	Know how to use tables for comparisons (Maths)	Know that working models can use electricity e.g. buggy - motor (Design Technology)	Identify some ways that can help humans increase their life spans (PSHE/Maths)

Science

Year 2 Composites and Components – Knowledge	
LAND AHOY!	
Composite	**Components**
To compare how different things move (NC) (LKS2)	To know that different things move in different ways To know that a force is a push or a pull on an object To know that when you use a force to move a thing closer to you it is called a pull force To know that when you use force to move a thing away from you it is called a push force To know that gravity is an invisible force that pulls objects to the earth
To notice and describe how things are moving, using simple comparisons such as faster and slower	To know that when an object sits on the water this is called floating To know that some materials float better than others To know that the shape of an object determines whether it sinks or floats To know that friction is the force created when two surfaces rub against each other To know that friction always slows a moving object down To know that the rougher the surface, the more friction is produced
To understand that there are many different kinds of sound and sources of sound	To know that a sound is something we can hear with our ears To know that a source is the start of something To know that different objects make different sounds when they are hit
To know that sounds get fainter as the distance from the sound source increases (NC) (LKS2)	To know that fainter means weaker or quieter To know that the nearer we are from a sound source, the louder it will be To know that the further away we are from a sound source, the weaker it will be

ZERO TO HERO	
Composite	**Components**
To observe and name a variety of sources of light, including electric lights, flames and the Sun	To know that light is the opposite to dark To know that the Sun provides us with natural light and energy To know that fire provides light To know that many of our light sources are artificial or man-made light e.g electric lights To know that we use many different sources of light in our daily lives
To know that fire has been used throughout history for heat and light	To know that fire can be dangerous and can cause damage or injury (burns) To know that fire can keep us warm To know that fire can give us light when it's dark To know that flames from fires and candles give us light and heat To know that heat from fires and candles can be dangerous (melting) To know that Thomas Edison invented the first safe light bulb
To know about simple circuits involving batteries, wires, bulbs and other components (NC)	To know that a battery is an energy source To know that there are + and – signs on a battery

To know how a switch can be used to break a circuit (NC)	To know that batteries need to be arranged the right way round for electricity to work To know that a circuit is a complete path around which electricity can flow To know that the circuit must be complete for the batteries to work To know that we use switches on electrical appliances to turn things on and off To know that the switch creates a a gap in the flow of energy around a circuit

GOING WILD	
Composite	**Components**
To understand the difference between things that are living and things that have never been alive (NC)	To know that living things breathe, reproduce, grow and adapt and non-living things do not To know that some things were once alive e.g. fossils To know that some things have never been alive e.g. rocks
To learn that animals, as well as humans, have offspring, which grow into adults (NC)	To know that offspring are babies To know that babies need looking after including feeding in order to grow To know that animals and human bodies change shape as they grow To know that adults are all grown up
To learn about the basic needs of animals, as well as humans, for survival (which are food, water and air) (NC)	To know that all living things need food, water and air to stay alive To know that different living things need different types of food e.g. plants get their food from the soil
To identify and name a variety of common animals that are birds, fish, amphibians, reptiles and mammals (NC)	To know that different types of animals can be grouped according to things they have in common
To describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets) (NC)	To know that a bird is an animal with two wings, two feet and a body covered with feathers. To know that a fish is an animal with a backbone (vertebrates)that lives in water To know that amphibians are cold blooded, have a backbone (vertebrate) and that they live part of the time on land and part of the time in water. They do not have scales To know that reptiles are cold blooded, have a backbone (vertebrate), have scales and can lay eggs To know that mammals, including humans, are warm blooded animals, have a backbone (vertebrate), have hair and feed their young with milk
To identify and name a variety of common animals that are carnivores, herbivores and omnivores (NC)	To know that a carnivore is an animal which only eats meat To know that a herbivore is an animal which only eats plants To know that omnivores eat animals and plants
To recognise that environments can change and that this can sometimes post dangers to living things	To know that the actions we take impact the environment in which we live e.g. leaving litter can harm animals To know that an animal or species is extinct if there are no more left living To know that because of human actions in the past some animals are now extinct To know that because of the actions of humans today some animals are nearly extinct To know that animals that are nearly extinct are called endangered To know that a habitat is where animals live, feed and raise their young
To know that some animals are endangered, the reasons why and what is being done to preserve these species	To know that endangered means that an animal or species is in danger of becoming extinct To know that humans destroy habitats by cutting down forests, building more houses or draining the land of water To know that preserve means to keep safe from harm To know that there are organisations who are working to preserve habitats e.g. WWP To know that some areas are protected wildlife areas by law

Science

THE FOUR SEASONS PROJECT	
Composite	**Components**
To observe and describe weather associated with the four seasons and how day length varies	To know that the weather explains the daily conditions outside e.g. hot or cold, wet or dry, windy or calm To know that there are 4 seasons in a year in the UK and that the weather changes in each season To know that the length of daylight in the UK is shorter in winter and longer in the Summer To know that weather is coldest an winter and warmest or hottest in the Summer in the UK

Key Vocabulary

Pathfinders 1 / Year 1		
Happily Ever After		
adult	healthy	recording
alive	investigation	respiration
beak	life cycle	source
birds	life span	variety
eggs	nutrition	young
feathers	observation	
habitat	offspring	

Pathfinders 2 / Year 2		
Going Wild		
adult	fins	herbivore
air	fish	male
amphibian	food	mammal
baby	fur	needs
bird	gills	offspring
carnivore	growth	omnivore
consumer	habitat	producer
endangered		reptile
extinction		scales
female		species
		survival
		tails
		water
		hair

Science

Key Vocabulary			
Pathfinders 1 / Year 1			
Come Fly With Me! Arctic Circle			
bending	senses	conditions	adaptations
flexibility	smooth	earth	arctic fox
hard	soft	forecast	blubber
materials	squashing	freeze	camouflage
object	stretching	hemisphere	habitat
opaque	transparent	rain gauge	micro-habitat
physical properties	twisting	seasonal change	polar bear
rigid	waterproof	seasons	predator
rough		snow	prey
		survive	sun dial
			tilt

Key Vocabulary		
Pathfinders 2 / Year 2		
Land Ahoy!		
compare	movement	decrease
decrease	pull	faint
distance	push	hearing aid
faster	slower	increase
force	speed	listening
increase	surface	loud / louder
launch	transporter	quiet / quieter
motion		sound

Key Vocabulary			
Pathfinders 1 / Year 1			
Unity in the Community			
bulb	light	temperature	food
deciduous	planting	trees	food chain
evergreen	plants	vegetation	food source
flower	roots	water	habitat
food	seed	wild plants	temperature
fruit	stem		water
garden plants			
leaves			

Key Vocabulary		
Pathfinders 2 / Year 2		
Light Up the World		
appliance	light source	shade
darkness	measure	shadow
day	night	solar
electricity	nocturnal	solar
electricity source	non-renewable	solar panels
energy	renewable	sun
heat		sun safety
hydro dam		sustainable
		wind turbines

Science

Key Vocabulary	
Pathfinders 1 / Year 1	**Pathfinders 2 / Year 2**
	Zero to Hero
	appliance battery bright bulb circuit component dull electricity heat light motor power power source switch wire

Science

ADVENTURERS – LKS2

Knowledge Building					
Processes and Changes	**Methods**	**Observing and Recording**	**Scientific Vocabulary**	**Uses and Implications**	**Cross-Curricular (STEM)**
Understand more complex scientific processes and know some factors that can affect change	Understand that methods are a key part of safe experimentation and have secure knowledge of the features	Know that clear observations and recordings support findings and prove theories	Know how scientific language learned relates to new science concepts and ideas	Understand how science affects our lives and the implications its use has on them	Understand that the links between science, technology, engineering and mathematics are key to many industries

Skills Progression	
Science Skills Adventurers 1 / Y3	**Science Skills Adventurers 2 / Y4**
Sc15 Ask relevant questions Sc16 With help, set up and carry out simple practical enquiries, comparative and fair tests Sc17 Suggest what might happen in comparative and fair tests Sc18 Make careful observations and comparisons Sc19 Recognise what constitutes a fair test Sc20 Identify simple patterns, changes, similarities and differences Sc21 Make measurements using standard units Sc22 Discuss and describe findings Sc23 Communicate findings using simple scientific language in written explanations, drawing, labelled diagrams, keys, bar charts or tables Sc24 Use results to draw simple conclusions	Sc25 Set up and carry out simple practical enquiries, comparative and fair tests Sc26 Put forward ideas about testing and make predictions Sc27 Make close observations and comparisons Sc28 Observe patterns and suggest explanations Sc29 Collect data Sc30 Recognise and explain why a test is fair or unfair Sc31 Identify simple trends to answer questions Sc32 Make accurate measurements using standard units and begin to think about why measurements should be repeated Sc33 Use scientific evidence to answer questions Sc34 Use a range of equipment, including data loggers and thermometers Sc35 Gather and record findings through drawings, photographs, labelled diagrams, keys, models, presentations, tables, graphs and displays, using scientific language Sc36 Report on what the evidence shows through written explanations of results and conclusions and reports Sc37 Use results to draw simple conclusions, suggest improvements and raise further questions

Science

Knowledge Progression

Adventurers 1 / Y3

Come Fly With Me! Africa

In this unit, pupils will further develop their understanding and knowledge of classifying living things through the use of classification keys. Pupils will, using research skills, investigate one of the 'Big Five' focusing specifically on their dietary requirements. Through observations and class discussions, pupils will learn about teeth in relation to diet and the digestive system of both humans and animals. Pupils will look at various skulls and skeletal systems using reasoned predictions and conclusions to identify which animal they belong to. Knowledge of food chains will also be advanced by, not only interpreting food chains, but by constructing them.

NC Concepts

A. To recognise that living things can be grouped in a variety of ways
B. To understand and use classification keys to help group, identify and name a variety of living things in their local and wider environment
C. To know that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat
D. To know the different types of teeth on humans and their simple functions
E. To know and describe the simple functions of the basic parts of the digestive system
F. To know how to construct and interpret a variety of food chains, identifying producers, predators and prey
G. To know that humans and some other animals have skeletons and muscle for support, protection and movement

Rocky the Findosaur

In this unit, pupils will have the opportunity to devise a range of experiments to test some more complex scientific processes and observe changes, for example, the effects of erosion of various rock types. Pupils will use a range of scientific instruments such as hand lenses to observe rocks, fossils and soils at close range and thermometers to record more detailed results of changing state. They will compare the work of Mary Anning and Lorna Steel as part of this learning. Vocabulary relating to changes in rock, such as erosion and permeability, will be introduced as well as language relating to the water cycle.

NC Concepts

A. To compare and group together different kinds of rocks on the basis of their appearance and simple physical properties
B. To know and describe in simple terms how fossils are formed when things that have lived are trapped within rock
C. To recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago (UKS2 NC)
D. To know that soils are made from rocks and organic matter
E. To compare and group materials together, according to whether they are solids, liquids or gases
F. To know and observe how some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C)
G. To identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature

Adventurers 2 / Y4

A World of Difference / Cry Freedom

Pupils will learn through investigation that light can be reflected from a range of surfaces and these reflections are not a light source in themselves. They will also experiment, both independently and as a class, with how shadows can change size and shape depending on how close a light source is to the solid object, and how shadows can change size outside, depending on the location of the sun.

NC Concepts

A. To know that light is reflected from surfaces
B. To find patterns in the way that shadows change
C.

May the Force Be With You

Pupils will embed their understanding of movement, revisiting push and pull forces, but extending this further by experimenting with the concept of friction. They will investigate the effects friction has on movement by designing an experiment that includes reasoned predictions, fair testing and conclusions. Pupils will explore the concept of gravity and other 'invisible' forces. They will also investigate magnets in a variety of ways such as through independent experiments, observing magnetic materials in their local environment and discussing how magnetic fields are found on Earth. The vocabulary of attract, repel and poles will be introduced.

NC Concepts

A. To know how things move on different surfaces
B. To know that and observe how some forces need contact between two objects and some forces act at a distance
C. To know that and observe how magnets attract or repel each other and attract some materials and not others
D. To describe magnets as having two poles
E. To predict whether two magnets will attract or repel each other, depending on which poles are facing
F. To 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

Science

Knowledge Progression

Adventurers 1 / Y3	Adventurers 2 / Y4
Under the Canopy Pupils will continue to develop their understanding of flowering plants by dissecting and labelling the key parts of a plant. Pupils will be introduced to the processes of photosynthesis and water transportation in plants through experimenting and observing. They will have more in-depth class discussions on what plants need for survival and recognise that plants can vary enormously in how much of these elements they require. The reproduction of plants is explored in more depth through comparing how seeds are produced and then dispersed in different ways. **NC Concepts** A. To identify and describe the functions of different parts of flowering plants: roots, stem / trunk, leaves and flowers B. To learn about and 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 C. To investigate the way in which water is transported within plants D. To know and explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal	**Picture Our Planet** In this unit, pupils will learn about the concept of vibration in relation to how sounds are made, experimenting with tuning forks and observing the vibrations. They will further experiment with changing the volume of sounds by adapting the force used to produce them. Pupils will investigate how sounds travel to the ear and the concept of pitch will be introduced, linking to learning in music. **NC Concepts** A. To identify how sounds are made, associating some of them with something vibrating B. To know that vibrations from sounds travel through a medium to the ear C. To recognise patterns between the volume of a sound and the strength of the vibrations that produce it To identify patterns between the pitch of a sound and the feature of the object that produced it
Athens v Sparta Pupils will expand their understanding of floating and sinking by initially taking part in a class discussion and then experimenting with a range of objects that may or may not float, making reasoned predictions before their investigations. The concept of displacement of will be introduced and further experiments will take place. Pupils will need to take photographs, record data and draw conclusions from their findings. **Concepts** A. To know that some objects float in water while some others sink B. To understand that displacement occurs when something is placed in liquid	**Lightning Speed** In this unit, pupils will learn in more depth about electrical appliances, using classification, and how circuits are essential to their functioning. Pupils are then required to use their previous knowledge of simple circuits to make and draw, using pictorial representations, a range of series circuits and identify the components used. They will need to produce and present an explanation of a circuit they have designed to solve a lighting problem in the local area. An introduction to the concepts of conducting and insulating will be introduced. **NC Concepts** A. To identify common appliances that run on electricity B. To know how to construct a simple series electrical circuit and demonstrate this, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers C. To identify whether or not a lamp will light in a simple series circuit based on whether or not the lamp is part of a complete loop with a battery D. To recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit To know and identify some common conductors and insulators, and associate metals with being good conductors

Knowledge Progression

	Adventurers 2 / Y4
	Science concepts taught within 3D PSHE:- **LKS2 3D PSHE Core 1 Unit 3 Lesson 1: Plant or Animal? and Lesson 2: Balancing Act (within Come Fly With Me! Africa)** To identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat

Science

Year 3 – Key Knowledge Builder

		Rocks & State of Matter	Forces	Animals & Habitats	Plants
	Composite	**NC Essentials** **Rocky the Findosaur**	**Athens VS Sparta**	**Come Fly With Me! Africa**	**Under the Canopy**
Processes & Changes	**Understand more complex scientific processes and know some factors that can affect change**	**Rocks:** Know that rocks have developed from other parts of organic matter, such as sand **States of Matter:** Know that evaporation and condensation play a key role in the water cycle	Know that the process of displacement has an effect on water level	Know that animals are part of food chains and this is how they gain the right type and amount of food	Know the life cycle of plants, including the process of pollination and seed dispersal
Methods	**Understand that methods are a key part of safe experimentation and have secure knowledge of features**	**Rocks:** Know how to fairly test rocks for their different qualities, such as permeability **States of Matter:** Know how to safely experiment with evaporation and condensation	Know that prediction is an important element and predict whether a range of materials will float or sink	Understand how food is processed through the digestive system by observation	Know how to conduct a fair test when growing a plant from seed by using the requirements for life
Observing and Recording	**Know that clear observations and recordings support findings and prove theories**	**Rocks:** Understand how observation of fossils and their location can help us to determine what kind of creature it was **States of Matter:** Know how to make clear recordings of the evaporation process to prove theories regarding temperature and if possible, wind speed	Observe and make recordings of floating and sinking objects	Know how to group things using classification	Observe growth in plants and make some simple recordings
Scientific Vocabulary	**Know how scientific language learned relates to new science concepts and ideas**	**Rocks:** Know and use vocabulary relating to rocks and soil, such as "crumbling", "smooth" and "coarse" **States of Matter:** Know and use vocabulary relating to states of matter e.g "molecule", "evaporate" and "condensation"	Know and understand the terms 'buoyancy' and 'displacement'	Know the names of the different types of teeth e.g. canine, incisor	Know a range of vocabulary relating to the structure of flowering plants e.g. stigma, stamen
Uses and Implications	**Understand how science affects our lives and the implications its use has on them**	**Rocks:** Know what a palaeontologist does and how their work helps us understand pre -historic creatures and plants **States of Matter:** Know why we add salt to ice on icy days	Know that displacement is factored into the manufacture of boats and ships	Know that poor dental and digestive health can lead to problems in both animals and humans, such as weight gain	Know that plants can require a wide range of growing conditions and can either thrive or die in various environments
Cross Curricular STEM	**Understand that these links between science, technology, engineering and mathematics are key to many industries**	**Rocks:** Know a range of rock types that would be best suited to building structures **States of Matter:** Know how to read a thermometer in Celsius and explain how it works (Maths)	Know how to make an object that floats e.g. boat (Design Technology	Understand, in simple terms, how the medical industry works to protect our teeth	Know how to use data from plant experiments to create charts and graphs

Science

Year 3				
Theme Overview	**Rocky the Findosaur** In this unit, pupils will have the opportunity to devise a range of experiments to test some more complex scientific processes and observe changes, for example, the effects of erosion of various rock types. Pupils will use a range of scientific instruments such as hand lenses to observe rocks, fossils and soils at close range and thermometers to record more detailed results of changing state. They will compare the work of Mary Anning and Lorna Steel as part of this learning. Vocabulary relating to changes in rock, such as erosion and permeability, will be introduced as well as language relating to the water cycle. **NC Concepts** A. To compare and group together different kinds of rocks on the basis of their appearance and simple physical properties B. To know and describe in simple terms how fossils are formed when things that have lived are trapped within rock C. To recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago (UKS2 NC) D. To know that soils are made from rocks and organic matter E. To compare and group materials together, according to whether they are solids, liquids or gases F. To know and observe how some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (oC) G. To identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature	**Athens v Sparta** Pupils will expand their understanding of floating and sinking by initially taking part in a class discussion and then experimenting with a range of objects that may or may not float, making reasoned predictions before their investigations. The concept of displacement of will be introduced and further experiments will take place. Pupils will need to take photographs, record data and draw conclusions from their findings. Concepts A. To know that some objects float in water while some others sink B. To understand that displacement occurs when something is placed in liquid	**Come Fly With Me!** Africa In this unit, pupils will further develop their understanding and knowledge of classifying living things through the use of classification keys. Pupils will, using research skills, investigate one of the 'Big Five' focusing specifically on their dietary requirements. Through observations and class discussions, pupils will learn about teeth in relation to diet and the digestive system of both humans and animals. Pupils will look at various skulls and skeletal systems using reasoned predictions and conclusions to identify which animal they belong to. Knowledge of food chains will also be advanced by, not only interpreting food chains, but by constructing them. **NC Concepts** A. To recognise that living things can be grouped in a variety of ways B. To understand and use classification keys to help group, identify and name a variety of living things in their local and wider environment C. To know that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat D. To know the different types of teeth on humans and their simple functions E. To know and describe the simple functions of the basic parts of the digestive system F. To know how to construct and interpret a variety of food chains, identifying producers, predators and prey G. To know that humans and some other animals have skeletons and muscle for support, protection and movement	**Under the Canopy** Pupils will continue to develop their understanding of flowering plants by dissecting and labelling the key parts of a plant. Pupils will be introduced to the processes of photosynthesis and water transportation in plants through experimenting and observing. They will have more in -depth class discussions on what plants need for survival and recognise that plants can vary enormously in how much of these elements they require. The reproduction of plants is explored in more depth through comparing how seeds are produced and then dispersed in different ways. **NC Concepts** A. To identify and describe the functions of different parts of flowering plants: roots, stem / trunk, leaves and flowers B. To learn about and 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 C. To investigate the way in which water is transported within plants D. To know and explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal

Science

Year 3 Composites and Components – Knowledge	
NC Essential - Rocky the Findosaur	
Composite	**Components**
To compare and group together different kinds of rocks on the basis of their appearance and simple physical properties (NC)	To know that materials look and feel different and that these are known as their physical properties To know that rocks are found naturally, are solid and are made up of one or more minerals To know that a mineral is normally a solid material with a characteristic chemical composition that is naturally made and is found in rocks To know that some materials look like rocks, but they are man-made e.g. bricks To know that there are three main types of rocks – sedimentary, igneous and metamorphic To know that porous rocks have spaces or gaps in them that allow water to get in, often making the rock soft and crumbly To know that some rocks allow water to flow through and this is called permeability
To know and describe in simple terms how fossils are formed when things that have lived are trapped within rock (NC)	To know that an animal or species is declared extinct when there is no reasonable doubt that the last individual member has died To know that a fossil is the preserved remains of a dead plant or animal To know that, after an animal dies, the hard parts like the skeleton are left behind and become buried in small particles of rock called the sediment To know that the sediment builds on top of the skeleton which, over millions of years, turns into a rock To know that, over time, water passes through the rock, dissolving the bones which are replaced by minerals To know that minerals leave a rock replica of the original bone called a fossil
To recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago (NC) (UKS2)	To know that, over time, rocks can change shape or break because of wind, water or ice and this is called weathering To know that parts of the broken-down rock are then carried away in a process called erosion To know that fossils are rocks which have imprints of animals and plants that lived a long time ago To know that fossils show us how living things have changed since the time they were alive To know that we can use fossils to learn what extinct plants and animals looked like To know that a palaeontologist is a scientist who studies animals and plants that lived millions of years ago and are represented by their fossils e.g., Mary Anning
To know that soils are made from rocks and organic matter (NC)	To know that soil is natural and is the top layer of the Earth's surface To know that soil is a mixture of living and non-living organic materials To know that organic materials are recently living organisms that are capable of decay To know that decay means to rot or break down into smaller pieces To know that not all soils look or feel the same, depending on their composition To know that clay soil is usually very sticky, has few air gaps and does not let water drain through it easily To know that sandy soil has large particles, so lots of air gaps which let the water drain through it easily, leaving it usually feeling dry
To compare and group materials together, according to whether they are solids, liquids or gases (NC)	To know that materials look and feel different and that these are called their physical properties To know that solids keep their shape, can be held, cut or shaped To know that a liquid can flow or be poured easily and takes the shape of the container it is poured into, filling the same amount of space To know that gas is often invisible and does not have a fixed shape, spreading out to fill a container
To know and observe how some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C) (NC)	To know that temperature is a measure of how hot or cold something is To know that temperature can be measured using an instrument called a thermometer To know that Celsius is the unit of measurement we use to measure temperature To know that liquids change when they are heated up or cooled down To know that heating can melt a solid into a liquid To know that freezing can turn a liquid into a solid To know that if ice (solid) is heated, it changes into water (liquid) and this is called melting To know that if water (liquid) is cooled, it changes into ice (solid) and that this is called freezing

	To know that water freezes at 0°C
To identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature (NC)	To know that the water cycle is the journey water takes as it moves from the land to the sky and back again To know that when the sun heats up water on the land, it changes into a gas known as vapour and that this this process is called evaporation To know that when the water vapour rises into the air, it cools down and joins to make tiny drops of water, which make clouds, and that this is called condensation To know that, as the droplets of water in the clouds get bigger, they also get heavier and eventually fall as rain To know that when the water falls back onto land, it travels through streams and rivers back into the sea and the cycle starts again

Athens v Sparta	
Composite	**Components**
To know that some objects float in water while some others sink (NC)	To know that heavy objects sink and light objects float To know that an object is floating when it is above the surface of the liquid To know that objects which contain trapped air are more likely to float To know that an object floats when the weight force on the object is balanced by the upward push of the water
To understand that displacement occurs when something is placed in liquid (NC)	To know that when you put an object in water, the water is pushed out of the way and this is called displacement

COME FLY WITH ME! AFRICA	
Composite	**Components**
To recognise that living things can be grouped in a variety of ways (NC)	To know that living things can be grouped as animals (including humans) or plants To know that animals can be grouped as vertebrates or invertebrates To know that vertebrates have a backbone/spine To know that vertebrates can be grouped as amphibians, reptiles, birds, fish and mammals To know that invertebrates do not have a backbone To know that amphibians are cold-blooded animals that live partly on the land and partly in water To know that reptiles are cold-blooded, have scaly skin and usually lay soft-shelled eggs To know that fish live in water and breathe through special organs called gills To know that mammals (including humans) are warm-blooded with hair
To understand and use classification keys to help group, identify and name a variety of living things in their local and wider environment (NC)	To know that a classification key asks a series of questions to help group living things or objects in the natural world by their physical characteristics To know the names of a variety of living things in the local area and be able to identify them To know the names of a variety of living things in the wider environment and be able to identify them
To know that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat (NC)	To know that a carnivore is an animal which only eats meat To know that a herbivore is an animal which only eats plants To know that an omnivore eats animals and plants To know that nutrition is the study of food and how it works inside your body To know that a food chain describes how plants and animals are linked by what they eat

To know the different types of teeth on humans and their simple functions (NC)	To know that teeth are hard structures found in vertebrates to help them bite and chew food To know that Incisors are at the front of the mouth and help you to bite off and chew pieces of food To Know that canines are next to the incisors and are used for tearing and ripping food To know that molars are teeth at the back of the mouth and these help you to crush and grind food
To know and describe the simple functions of the basic parts of the digestive system (NC)	To know that all living things need food, water and air to stay alive To know that the digestive system is the part of the body that helps to break down food for the body to process and use To know that food enters the digestive system as soon as you put it into your mouth To know that once food has been swallowed it travels down a tube called the oesophagus into the stomach To know that the stomach contains acid that kill any germs within the food To know that food then travels to the small intestine where food is broken down into nutrients that are absorbed into the blood To know that water is absorbed into the blood through the large intestine To know that any food that can't be absorbed is stored in the anus until we go to the toilet
To know how to construct and interpret a variety of food chains, identifying producers, predators and prey (NC)	To know that a food chain describes how plants and animals are linked by what they eat To know that every living thing needs food to survive and, because of this, all living things are part of a food chain To know that animals eat plants or other animals to get their energy To know that a predator is an animal that hunts and kills other animals for food To know that animals that are hunted and eaten by animals are called prey To know that plants are at the beginning of most food chains because they make their own food, so they are called producers To know that plants get their energy from sunlight and that this is called photosynthesis To know that the animal at the top of the food chain is called the top predator To know that any changes in the food chain affects all living things, as they depend on each other (interdependence)
To know that humans and some other animals have skeletons and muscle for support, protection and movement (NC)	To know that a skeleton is a framework of bones that supports the body and keeps it upright To know that the human skeleton is made up of bones which grow as we grow To know that the skeleton protects the softer body parts e.g the skull protects the brain, and the ribs protect the heart, lungs and other vital organs To know that muscles pull on the bones so that they can move To know that some bones have joints to make this movement easier e.g. elbow and knees

Science

UNDER THE CANOPY	
Composite	**Components**
To identify and describe the functions of different parts of flowering plants: roots, stem / trunk, leaves and flowers (NC)	To know that plants need roots, leaves and a stem To know that a root is the part of a plant that is underground To know that a root's main function is to anchor the plant in the ground and to absorb water and nutrients from the soil To know that the stem carries water and nutrients to different parts of the plant To know that the leaves are the green part of a plant that use sunlight to make their own food (photosynthesis) To know that a flower is the part of a plant that produces seeds, which become new plants To know that the main stem of a tree is called a trunk and this often splits into smaller branches
To learn about and 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 (NC)	To know that all plants need air, light, water, nutrients (nourishment found in food) and the right temperature to grow healthily To know that plants come in many different shapes and sizes To know that some plants have flowers and others do not To know that rainforests are an important part of life on our planet To know that rainforests provide us with oxygen, which we need to breathe and help stabilise the Earth's climate
To investigate the way in which water is transported within plants (NC)	To know that plants need water to survive To know that water is absorbed from the soil through the roots and carried up the stem To know that the stem contains small tubes that carry water to different parts of the plant
To know and explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal (NC)	To know that when a plant grows from a seed it is called germination and that the stem, leaves and flowers emerge above the soil To know that pollen is a fine powder produced by plants so that they can make seeds To know that pollen is carried by insects or blown by the wind and that this process is called pollination To know that, when the pollen reaches another flower, it travels to the ovary, where it fertilises the egg cells which makes seeds, and that this process is called fertilisation To know that seeds are scattered by animals or the wind and that this is called seed dispersal To know that different plants have adapted to grow in different environments e.g. cacti in the desert To know how environments can be managed to ensure successful plant growth and reproduction e.g. farming

Science

Year 4 – Key Knowledge Builder

Overview of theme		May the Force be with you	Electricity	Sound
	Composite	NC Essentials	Lightning Speed	Picture Our Planet
Processes & Changes	Understand more complex scientific processes and know some factors that can affect change	Know that forces are affected by distance	Understand how using a switch affects an electrical circuit	Know that sounds travel in order to reach our ears and that materials they travel through affect what we hear
Methods	Understand that methods are a key part of safe experimentation and have secure knowledge of features	Know how to draw conclusions based on an experiment involving magnets	Understand how some components work within the circuit and how their use affects the effectiveness of it	Know that sounds that are too loud can affect hearing so safety is important when experimenting with sound
Observing and Recording	Know that clear observations and recordings support findings and prove theories	Know how to use observations to prove hypotheses about magnetic and nonmagnetic materials	Know how to draw a simple circuit using correct symbols	Know how to hypothesise regarding volume and vibration strength or object size and pitch and test them out, recording findings
Scientific Vocabulary	Know how scientific language learned relates to new science concepts and ideas	Know and use language relating to magnets and force, such as 'poles' and 'repulsion'	Know and understand a range of vocabulary relating to electricity such as 'circuit' and 'current'	Know and understand the terms 'insulate' and 'sound waves'
Uses and Implications	Understand how science affects our lives and the implications its use has on them	Understand why magnets are important to a range of industries	Understand how electricity can make a range of appliances perform different tasks e.g. move, heat up, make a noise	Understand how noise can be a pollutant and suggest some ways that this can be stopped or improved
Cross Curricular STEM	Understand that these links between science, technology, engineering and mathematics are key to many industries	Know that magnets are used for lifting, holding, separating and moving (Engineering)	Know that metals in general are better conductors and begin to learn which are better conductors than others	Know that we can send sound without wires/strings, through wireless sound systems

Science

Year 4

	NC Essentials May the Force Be With You	Cry Freedom	Lightning Speed	Picture Our Planet
Theme Overview	Pupils will embed their understanding of movement, revisiting push and pull forces, but extending this further by experimenting with the concept of friction. They will investigate the effects friction has on movement by designing an experiment that includes reasoned predictions, fair testing and conclusions. Pupils will explore the concept of gravity and other 'invisible' forces. They will also investigate magnets in a variety of ways such as through independent experiments, observing magnetic materials in their local environment and discussing how magnetic fields are found on Earth. The vocabulary of attract, repel and poles will be introduced. **NC Concepts** A. To know how things move on different surfaces B. To know that and observe how some forces need contact between two objects and some forces act at a distance C. To know that and observe how magnets attract or repel each other and attract some materials and not others D. To describe magnets as having two poles E. To predict whether two magnets will attract or repel each other, depending on which poles are facing F. To 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	Pupils will learn through investigation that light can be reflected from a range of surfaces and these reflections are not a light source in themselves. They will also experiment, both independently and as a class, with how shadows can change size and shape depending on how close a light source is to the solid object, and how shadows can change size outside, depending on the location of the sun. **NC Concepts** A. To know that light is reflected from surfaces B. To find patterns in the way that shadows change	In this unit, pupils will learn in more depth about electrical appliances, using classification, and how circuits are essential to their functioning. Pupils are then required to use their previous knowledge of simple circuits to make and draw, using pictorial representations, a range of series circuits and identify the components used. They will need to produce and present an explanation of a circuit they have designed to solve a lighting problem in the local area. An introduction to the concepts of conducting and insulating will be introduced. **NC Concepts** A. To identify common appliances that run on electricity B. To know how to construct a simple series electrical circuit and demonstrate this, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers C. To identify whether or not a lamp will light in a simple series circuit based on whether or not the lamp is part of a complete loop with a battery D. To recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit E. To know and identify some common conductors and insulators, and associate metals with being good conductors	In this unit, pupils will learn about the concept of vibration in relation to how sounds are made, experimenting with tuning forks and observing the vibrations. They will further experiment with changing the volume of sounds by adapting the force used to produce them. Pupils will investigate how sounds travel to the ear and the concept of pitch will be introduced, linking to learning in music. **NC Concepts** • To identify how sounds are made, associating some of them with something vibrating • To know that vibrations from sounds travel through a medium to the ear • To recognise patterns between the volume of a sound and the strength of the vibrations that produce it • To identify patterns between the pitch of a sound and the feature of the object that produced it Jiffy Science Here Comes the Band With a link to music, pupils will produce their own musical instruments. They will, however, need to carefully consider the pitch of their instruments. They will design and then make their instrument but will need to share with the class, how their instrument works and the variations in pitch that it makes. • To record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables • To report on findings from enquiries, including oral and written explanations, displays or presentation of results and conclusions

Science

Year 4 Composites and Components – Knowledge	
LIGHTNING SPEED	
Composite	**Components**
To identify common appliances that run on electricity (NC)	To know that electricity is a form of energy To know that electricity is created by generators which are powered by a) non-renewable fuels, such as coal, gas and oil or b) renewable fuels, such as solar power and wind power To know that we use electricity to create light, heat, movement and sound To know how and why electricity is such an important part of our everyday lives
To know how to construct a simple series electrical circuit and demonstrate this, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers (NC)	To know that electricity is a type of energy that can build up in one place or flow from one place to another To know that the flow of electricity is called the current To know that an electrical circuit is a complete route that an electric current can flow around To know that the components are the parts of an electrical circuit e.g. wires, bulbs, buzzers and motors To know that electricity can flow through lots of different components to make an electrical circuit To know that a circuit must be complete for all the components to work To know that all circuits need a power source such as a battery or cell To know that a switch is a device for opening and closing electrical circuits
To identify whether or not a lamp will light in a simple series circuit based on whether or not the lamp is part of a complete loop with a battery (NC)	To know how to identify the component parts of a circuit To know the effects of an open or closed circuit To know that the circuit needs to be closed for the lamp to light To know how to draw simple circuits using the correct symbols To know how to safely experiment with basic components to make a circuit
To recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit (NC)	To know that using a switch can stop the flow of electricity To know that if the switch is open there is no electricity flow To know that if the switch is closed then the electricity can flow, and the bulb will light up
To know and identify some common conductors and insulators, and associate metals with being good conductors (NC)	To know that a conductor is a material that allows electricity to pass through it To know that many metals are good conductors e.g. iron, copper and steel To know that plugs and sockets include metal to allow the flow of electricity To know that an insulator is a material that does not allow electricity to pass through e.g. plastic, wood, glass and rubber To know that plastic is used to surround wires as an insulator to prevent us from getting an electric shock

Science

CRY FREEDOM	
Composite	**Components**
To know that light is reflected from surfaces (NC)	To know that reflection involves a source of light bouncing off a surface To know that the light travels towards the surface and bounces off it To know that all surfaces reflect some light, but some surfaces reflect light better than others
To find patterns in the way that shadows change (NC)	To know that light travels in straight lines and shadows are formed when anything blocks that light To know that the outline of a shadow is called a silhouette To know that the length of a shadow outdoors depends on how low or high the Sun is in the sky i.e. if the Sun is high, we see a shorter shadow To know that the closer a light source is to an object, the bigger the shadow will be

MAY THE FORCE BE WITH YOU	
Composite	**Components**
To know how things move on different surfaces (NC) (Land Ahoy! KS1)	To know that friction is a force between two surfaces that are sliding or trying to slide across each other To know that friction always slows a moving object down To know that the rougher the surface, the more friction is produced
To know that and observe how some forces need contact between two objects and some forces act at a distance (NC)	To know that some things float and some things sink and this is because of density To know that objects that are denser will sink and those less dense will float To know that gravity is an invisible force that pulls things together To know that the Earth's gravity pulls things to the ground To know that when forces are balanced, things don't move
To know that and observe how magnets attract or repel each other and attract some materials and not others (NC)	To know that magnetism is another force which is invisible, it is a non-contact force To know that magnetic forces can push or pull objects without touching them To know that when two magnets are close to each other, they create attracting (pulling) or repelling (pushing) forces To know that the forces are the strongest at the ends of the magnet To know that magnetic materials are made of metal, but not all metals are magnetic
To describe magnets as having two poles (NC)	To know that the two ends of a magnet are called the north pole and the south pole
To predict whether two magnets will attract or repel each other, depending on which poles are facing (NC) **To 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 (NC)**	To know that if you put two magnets together with the same two poles they will repel each other, which means they will push away from each other To know that if you put two magnets together with different poles they will attract each other, which means they will pull towards each other To know that magnetic materials are always metal To know that iron is magnetic, so any metal that contains iron is magnetic To know that steel is a metal that contains iron To know that not all metals are magnetic e.g. gold and aluminium

Science

PICTURE OUR PLANET	
Composite	**Components**
To identify how sounds are made, associating some of them with something vibrating (NC)	To understand that there are many different kinds of sound and sources of sound To know that vibration means the rapid backward and forward movement of a physical object To know that a sound is made when objects vibrate To know that the vibrations make the air around the objects vibrate and these air vibrations form sound waves
To know that vibrations from sounds travel through a medium to the ear (NC)	To know that sound waves enter our ears, and we hear them as sounds To know that sound waves can travel through solids, liquids and gases to the ear To know that sound travels differently through different materials
To recognise patterns between the volume of a sound and the strength of the vibrations that produce it (NC)	To know that the stronger the vibrations, the louder the volume To know that noise pollution happens when sounds become too loud for too long, which is harmful to our hearing
To know that sounds get fainter as the distance from the sound source increases (NC) (Land Ahoy! KS1)	To know that the further we move away from a sound source, the quieter the sound becomes To know that the closer we move towards a sound source, the louder the sound becomes
To identify patterns between the pitch of a sound and the feature of the object that produced it (NC)	To know that sound changes, depending on how fast or slow an object vibrates to make sound waves To know that sounds can be high or low and that this is called pitch To know that the pitch depends on the speed of the vibrations To know that when an object vibrates quickly, high-pitched sounds are heard To know that low-pitched sounds come from objects that vibrate more slowly

Key Vocabulary

Adventurers 1 / Year 3

Come Fly With Me! Africa

biodiversity	food chain/ food web	nutrition	skeleton
canine	incisor	oesophagus	stomach
chew	intestine	pre-molar	swallow
classification	molar	predator	teeth
classification keys	muscles	prey	
consumer		producer	
dental			
digestion/ digestive system			

Adventurers 2 / Year 4

May the Force Be With You

air resistance	pole
attract	repel
friction	resistance
gravity	water resistance
magnetic	
non-magnetic	

Science

Key Vocabulary			
Adventurers 1 / Year 3			
Rocky the Findosaur			
coarse	geology	permeable	temperature
condensation	global warming	precipitation	volume
crumbling	liquid	rock	
erosion	loamy	sand	
evaporation	metal	silt	
evolution	mineral	smooth	
fossil	molecule	soil	
gas	organic matter	solid	
	palaeontology	state of matter	

Key Vocabulary	
Adventurers 2 / Year 4	
Picture Our Planet	
insulate	volume
noise pollution	wireless
pitch	wires
rhythm	
sound waves	
tuning fork	
vibrations	

Key Vocabulary			
Adventurers 1 / Year 3			
Under the Canopy			
adaptations	fungi	pollinator	stamen
carbon dioxide	growth	reproduction	stem
citrus fruit	oxygen	root	stigma
dispersal	photosynthesis	seed formation	trunk
flowering plants	pollination	seeds	
		sepal	
		soil nutrients	

Key Vocabulary	
Adventurers 2 / Year 4	
Lightning Speed	
appliance	efficiency
battery	electric circuit
bulbs	insulator
buzzer	motors
cells	series circuit
component	switch
conductor	wires
current	

Science

Key Vocabulary	
Adventurers 1 / Year 3	**Adventurers 2 / Year 4**
Athens v Sparta	**A World of Difference / Cry Freedom**
buoyancy	block
displacement	dark
float	hypothesis
mass	light
materials	opaque
resistance	reflect
sink	shadow
	solid

Science

Working Scientifically - Jiffy Science Lessons	
Adventurers 1 / Year 3	**Adventurers 2 / Year 4**
Define: States of Matter Pupils will recall their knowledge and understanding of states of matter by producing a visual display sharing what they know. They will need to include how different types of matter can change through heating or cooling with some basic scientific understanding of how this occurs. • To identify differences, similarities or changes related to simple scientific ideas and processes • To report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions	**Here Comes the Band** With a link to music, pupils will produce their own musical instruments. They will, however, need to carefully consider the pitch of their instruments. They will design and then make their instrument but will need to share with the class, how their instrument works and the variations in pitch that it makes. • To record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables • To report on findings from enquiries, including oral and written explanations, displays or presentation of results and conclusions
Hockey Puck Ponderings In this lesson, pupils will set up an experiment that measures the distance a 'hockey puck' (made a bottle top) skids across a frozen surface. They will need to consider the need for comparative and fair testing whilst carrying out their enquiries. They will need to work scientifically to carry out, observe and record their findings using standard units and the correct equipment for measuring length. • To set up simple practical enquiries, comparative and fair tests • To make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers • To use straightforward scientific evidence to answer questions or to support their findings	**Pollution Problem** Pupils will gather and record data from surveys on the problem of pollution and litter in their local area. After carrying out surveys on the local area and recording the pollution and litter types found, the pupils will need to write a report on their findings that can be shared with Professor Jiffy. Pupils will be encouraged to include diagrams with captions before writing a conclusion to their findings. • To gather, record, classify and present data in a variety of ways to help in answering questions • To use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
Materials on Trial Once the pupils have made their posters in 'Define: States of Matter', they will then carry out tests on a range of materials for strength, solubility and magnetism. They will initially focus on thinking of two questions they would like to answer in their experiments. Once they have done this, they will carry out experiments to test the suggested materials and answer their questions. • To ask relevant questions and use different types of scientific enquiries to answer them • To set up simple practical enquiries, comparative and fair tests • To make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers • To gather, record, classify and present data in a variety of ways to help in answering questions	

NAVIGATORS- UKS2

Science

Knowledge Building					
Processes and Changes	**Methods**	**Observing and Recording**	**Scientific Vocabulary**	**Uses and Implications**	**Cross-Curricular (STEM)**
Understand that numerous factors can affect or prevent change	Know what makes a good methodology and explain how adaptations can lead to improvements	Identify, analyse and explain findings that support or dismiss theories or arguments	Know how to use a range of scientific vocabulary in various contexts	Know that science has implications for world issues and that it can be used for good or bad	Understand how their own STEM skills can benefit future science work in school and beyond

Skills Progression

Science Skills Navigators 1 / Y5	Science Skills Navigators 2 / Y6
Sc38 Plan different types of scientific investigations Sc39 Make predictions based on scientific knowledge Sc40 Carry out a range of scientific investigations Sc41 Begin to recognise and control variable where appropriate during investigations Sc42 Identify trends and patterns and offer explanations for these Sc43 Carry out a fair test explaining why it is fair Sc44 Take measurements using a range of scientific equipment with increasing accuracy and precision Sc45 Understand why observations and measurements need to be repeated Sc46 Select information from provided sources Sc47 Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, bar and line graphs Sc48 Produce written explanation of results, causal explanations and conclusions Sc49 Use results to make predictions for further tests	Sc50 Select and plan the most appropriate type of scientific enquiry to answer specific questions Sc51 Make predictions based on scientific knowledge and understanding Sc52 Carry out a range of scientific investigations Sc53 Recognise and control variables where appropriate during investigations Sc54 Identify scientific evidence that has been used to support or refute ideas Sc55 Take measurements using a range of scientific equipment with accuracy and precision Sc56 Decide when observations and measurements need to be checked, by repeating, to give more reliable data Sc57 Select information from a range of sources Sc58 Record data and results of increasing complexity, using scientific diagrams and labels, classification keys, table, bar and line graphs, and models, making appropriate use of ICT Sc59 Reporting findings from investigations, including written explanations of results, explanation involving causal relationships, and conclusions Sc60 Present reports of findings in written form, displays and presentations Sc61 Use test results to make predictions and set up further comparative and fair tests

Science

Knowledge Progression	
Navigators 1 / Y5	**Navigators 2 / Y6**
Global Warning Pupils will explore changing states of matter in more detail. Initially, they will research the numerous factors and processes that are used to recycle glass and paper. Pupils will then have several opportunities to experiment with changing materials by the introduction of processes such as dissolving, filtering and evaporating etc. They will also test whether changes can be reversible. The experiments that the pupils will devise will require a greater focus on fair testing, using comparisons and retesting to ensure the data collected in accurate. Vocabulary such as substance, solution and mixture will be introduced. **NC Concepts** A. To know that some changes result in the formation of new materials, and that this kind of change is not usually reversible B. To compare and group together everyday materials based on evidence from comparative and fair tests, including their hardness, solubility, conductivity (electrical and thermal), and response to magnets C. To suggest how mixtures might be separated, including through filtering, sieving and evaporating, using their knowledge of solids, liquids and gases D. To know how to demonstrate that dissolving, mixing and changes of state are often reversible changes E. To understand how some materials will dissolve in liquid to form a solution and describe how to recover a substance from a solution F. To show understanding by giving reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic	**Full of Beans** In this unit, pupils will further develop their knowledge and understanding of electricity. They will embed and extend their understanding of circuits by experimenting with variations of components, and the concept of voltage will be introduced through changing the number of cells in their circuits. They will also use scientifically correct symbols for components when completing circuit diagrams. They will now learn and use the correct symbols to represent components. Furthermore, pupils will look at energy, identifying its various forms (thermal, light, kinetic), how it is created through renewable and non-renewable sources and the implications this has on real-world use. **Concepts** A. To identify common appliances that run on electricity B. To compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on / off positions of switches (NC) C. To be able to associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit (NC) D. To know how to use recognised symbols when representing a simple circuit in a diagram (NC) E. To understand the term 'energy' and identify a range of different renewable and non-renewable energy sources

Knowledge Progression	
Navigators 1 / Y5	**Navigators 2 / Y6**
	"I Have A Dream…" **Concepts (cont.)** C.
Mission Control In this unit, pupils will look at the relationship between the Sun, Earth and Moon and how their movements and location in the solar system affect one another. Pupils will produce detailed labelled diagrams and written explanations, including graphs, to support their ideas. Pupils will deepen their knowledge of the Moon's relationship with the Earth, through self-directed research that will be shared with their peers for discussion. **NC Concepts** A. To know that the Sun, Earth and Moon are approximately spherical bodies B. To know about and explain the movement of the Earth relative to the Sun in the solar system C. To use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky D. To know about and explain the movement of the Moon relative to the Earth	**A World of Bright Ideas** In this unit, pupils will research and present findings on Sir Isaac Newton and develop their understanding of gravity. Pupils will carry out a number of experiments on the effects of water, air and frictional resistance. The experiments will require reasoned predictions, accurate recording of data and will be shared with the class once complete. Finally, pupils will carry out investigations into mechanisms and use STEM skills to make and test them. Pupils will discuss how these mechanisms are used in everyday life. **NC Concepts** A. To know that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object B. To identify the effect of air resistance and friction, that act between moving surfaces C. To recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect

Science

Knowledge Progression	
Navigators 1 / Y5	**Navigators 2 / Y6**
Go With the Flow Pupils will develop their understanding of growth and change in animals and humans by researching, sorting and comparing the gestational periods, life cycles and life spans of humans and animals. Using established research, pupils will investigate how diet, drugs and exercise can affect health and life expectancy in humans. The circulatory system will be introduced and pupils will investigate pulse rate, producing graphs to show their findings. They will investigate how vital water is for survival and compare how long animals can survive without water, discussing their findings with the class. **NC Concepts** A. To know and describe the changes as humans develop to old age B. To recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function C. To identify and name the main parts of the human circulatory systems, and explain the functions of the heart, blood vessels and blood D. To describe the ways in which nutrients and water are transported within animals, including humans	**Wars of the World** Pupils will carry out a range of experiments to test the theory of light travelling in a straight line, and the concept of refraction when creating rainbows. Pupils will observe what happens and record their findings appropriately. The structure of the human eye will be introduced with the correct vocabulary and pupils will create labelled diagrams. Finally, pupils will embed their knowledge of shadows by creating shadow puppet theatres, which will include the use of transparent, translucent and opaque materials. **NC Concepts** A. To understand that light appears to travel in straight lines B. To use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye C. To know that we see things because light travels from light sources to our eyes or from light sources to objects and then our eyes see them D. To use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them
Science concepts taught within 3D PSHE:- **UKS2 3D PSHE Core 1 Unit 1 Lesson 3: You Choose! (additional lesson)** To recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function	

Science

Year 5 – Key Knowledge Builder

	Composite	Mission Control	NC Essentials Go With The Flow	Come Fly with Me! America	Global Warning
Processes & Changes	**To understand that numerous factors can affect or prevent change**	Know that the Earth orbits the sun and the Earth rotates, creating the change between day and night	Know how the human body changes as we age	Know the basic changes that cotton undergoes as part of the manufacturing process	Know that, while some materials can be changed and made into new materials, others cannot
Methods	**To know what makes a good methodology and explain how adaptations can lead to improvements**	Know how to explain a theory well by backing it up with evidence, such a diagrams and clear labelling	Know how to plan an investigation involving height and arm span, making hypotheses	Know how to develop an experiment based on cotton, showing a clear focus on one quality of the material	Know how adaptations can be used in an investigation to separate solids and liquids
Observing and Recording	**To identify, analyse and explain findings that support or dismiss theories or arguments**	Know the basis of Copernicus's theory of planetary motion	Know how to make clear recordings for a range of body tests to support hypotheses and analyse health	Understand, through observation, why cotton is a good material for moisture control in hot weather	Know how to use a range of recording methods when sorting and analysing materials
Scientific Vocabulary	**To know how to use a range of scientific vocabulary in various contexts**	Know and understand the terms 'orbit', 'spherical' and 'solar system'	Know and understand the terms 'skeletal', 'digestive' and 'circulatory', relating to systems	Know and understand the terms 'man-made', 'natural' and use in different contexts	Know and understand the terms 'recycling' and 'reusing'
Uses and Implications	**To know that science has implications for world issues and that it can be used for good or bad**	Know that the research of the Earth and Moon is used by space agencies and companies globally	Know that being aware of your own health (resting heart rate etc.) is important	Know that the cotton industry developed into a manufacturing process that involves many countries	Know that recycling can change a material so it can be used for something else
Cross Curricular STEM	**To understand how their own STEM skills can benefit future science work in school and beyond**	Know how to put together a presentation of findings, share it with a group and prepare for questions	Know how to make clear graphs and calculate averages (Maths)	Explore ways of producing materials so they have a global benefit	Know how use ratios to create solutions (Maths)

Science

Year 5

	Mission Control	NC Essentials Go With The Flow	Come Fly With Me! America	Global Warning
Theme Overview	In this unit, pupils will look at the relationship between the Sun, Earth and Moon and how their movements and location in the solar system affect one another. Pupils will produce detailed labelled diagrams and written explanations, including graphs, to support their ideas. Pupils will deepen their knowledge of the Moon's relationship with the Earth, through self - directed research that will be shared with their peers for discussion. **NC Concepts** A. To know that the Sun, Earth and Moon are approximately spherical bodies B. To know about and explain the movement of the Earth relative to the Sun in the solar system C. To use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky D. To know about and explain the movement of the Moon relative to the Earth	Pupils will develop their understanding of growth and change in animals and humans by researching, sorting and comparing the gestational periods, life cycles and life spans of humans and animals. Using established research, pupils will investigate how diet, drugs and exercise can affect health and life expectancy in humans. The circulatory system will be introduced and pupils will investigate pulse rate, producing graphs to show their findings. They will investigate how vital water is for survival and compare how long animals can survive without water, discussing their findings with the class. **NC Concepts** A. To know and describe the changes as humans develop to old age B. To recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function C. To identify and name the main parts of the human circulatory systems, and explain the functions of the heart, blood vessels and blood D. To describe the ways in which nutrients and water are transported within animals, including humans	Pupils will learn that objects are made from materials which are often combined e.g. a window is made of glass, wood and metal. They will look at objects, identify what they are made from and discuss why the chosen material is suitable for that object. Pupils will also differentiate between man -made and natural materials. With a focus on cotton wool, pupils will devise their own investigations to test either absorbency, flexibility or strength etc. They will be expected to produce a sound methodology and analyse their findings. **Concepts** A. To distinguish between an object and the material from which it is made B. To understand the difference between man - made and natural materials and identify and sort both	Pupils will explore changing states of matter in more detail. Initially, they will research the numerous factors and processes that are used to recycle glass and paper. Pupils will then have several opportunities to experiment with changing materials by the introduction of processes such as dissolving, filtering and evaporating etc. They will also test whether changes can be reversible. The experiments that the pupils will devise will require a greater focus on fair testing, using comparisons and retesting to ensure the data collected in accurate. Vocabulary such as substance, solution and mixture will be introduced. **NC Concepts** A. To know that some changes result in the formation of new materials, and that this kind of change is not usually reversible B. To compare and group together everyday materials based on evidence from comparative and fair tests, including their hardness, solubility, conductivity (electrical and thermal), and response to magnets C. To suggest how mixtures might be separated, including through filtering, sieving and evaporating, using their knowledge of solids, liquids and gases D. To know how to demonstrate that dissolving, mixing and changes of state are often reversible changes E. To understand how some materials will dissolve in liquid to form a solution and describe how to recover a substance from a solution F. To show understanding by giving reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic

Science

Year 5 Composites and Components – Knowledge	
MISSION CONTROL	
Composite	**Components**
To describe the movement of the Earth and other planets relative to the sun in the Solar System (NC)	To know that the Sun is one star and that there are billions more stars similar to the Sun To know that the Solar System is made up of the Sun, the planets and all the other smaller objects that move around it e.g. asteroids and moons To know that there are eight planets that orbit (move around) the Sun and to be able to name them in distance order from the Sun i.e. Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune To know that the further a planet is away from the Sun, the more days it has in a year and that this is because it takes longer to orbit the Sun To know that it takes the Earth 365 days to orbit the Sun
To describe the movement of the Moon relative to the Earth (NC)	To know that the Moon is a large natural object that orbits the Earth To know that the Moon reflects light from the Sun and that is why we can see it To know that it takes 28 days for the Moon to orbit the Earth To know that, as the moon revolves around Earth, different portions of the moon's sunlit surface are visible from Earth To know that these changes in shape, when we appear to see more or less of the Moon, are called phases of the Moon To know that the Moon and Earth exert a gravitational pull on each other To know that the Moon's gravitational pull causes the oceans to bulge on both sides closest to and furthest from the Moon To know that these bulges create high tides
To describe the Sun, Earth and Moon as approximately spherical bodies (NC)	To know how that a sphere is a ball shape To know the Earth orbits the Sun, and the Moon orbits the Earth To know that the Sun is bigger than the Earth and the Earth is bigger than the Moon
To use the idea of the Earth's rotation to explain day and night and the apparent movement of the Sun across the sky (NC)	To know that, as the Earth orbits the Sun, it spins on an imaginary line called its axis To know that Earth's rotational axis is an imaginary straight line that runs through the North and South Pole To know that it takes 24 hours or one day to complete a rotation To know that, when parts of the Earth face the Sun, it's daytime To know that, when parts of the Earth are in the shade, its night-time To know that shadows are longer when the Sun appears lower in the sky i.e. early morning or early evening

GO WITH THE FLOW	
Composite	**Components**
To describe the changes as humans develop to old age (NC)	To know that humans go through different stages of change, from baby to old age To know that human bodies change even from before we are born To know that it takes nine months for a human baby to develop in the womb To know that gestation means the development of a child or young animal while it is still inside its mother's body To know that different animals have different gestation periods To know that our bones continue to grow until we are about 25 years old To know that family genes influence how tall we grow To know that teenagers usually experience a 'growth spurt' as they reach puberty To know that puberty is the time when bodies change from childhood to adulthood To know that the changes in puberty are different for boys and girls

	To know that our skin becomes less elastic as we grow older and wrinkles form To know that often people, usually men, start to lose their hair as they get older
To recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function (NC)	To know that diet means the food and drink consumed by humans and animals To know that, in order to grow and stay healthy, we need to eat certain types of foods To know that exercise helps our bodies to stay healthy To know that some drugs can help our bodies to stay healthy, but that some drugs also harm our bodies To know that food additives are substances added to food to maintain or improve its safety, freshness, taste, texture, or appearance To know that additives in foods are not always good for our bodies To know what it means to have a healthy lifestyle
To identify and name the main parts of the human circulatory system, and describe the function of the heart, blood vessels and blood (NC)	To know that the bones in our bodies form a framework called a skeleton To know that the skeleton supports our body and protects the soft tissues inside To know that muscles are attached to our bones to help them move To know that the circulatory system is the body's system that moves blood around the body To know that the heart is a muscle that pumps blood around the body through blood vessels To know that red blood cells carry oxygen and essential nutrients around the body To know that white blood cells keep our bodies healthy by fighting bacteria To know that the smallest blood cells are called platelets which stick together to form blood clots which help stop bleeding To know that the watery part of the blood is called plasma
To describe the ways in which nutrients and water are transported within animals, including humans (NC)	To know that living things, including humans, need water to stay alive To know that water is absorbed in the digestive system, alongside other nutrients To know that water is removed from the body by sweating and urinating To know that some animals are adapted to living in areas with very little water e.g. camels and desert cats

COME FLY WITH ME! AMERICA	
Composite	**Components**
To distinguish between an object and the material from which it is made	To know that different materials have different properties which help us decide how they are to be used (To know which materials the native Americans used to build their homes and why)
To understand the difference between man-made and natural materials and identify and sort both	To know that some materials have been made by man to replace natural materials e.g natural fabrics and synthetic fabrics To know that these are usually made in factories To know how to identify man-made materials To know how to identify natural materials

Science

GLOBAL WARNING	
Composite	**Components**
To know that some changes result in the formation of new materials, and that this kind of change is not usually reversible (NC)	To know that some materials can be changed and made into new materials and others cannot and these include paper, cardboard, glass, metal, food and some rigid plastics To know that some changes are not always reversible i.e. materials cannot be changed back to how they were before e.g. when a piece of wood is burned To know that recycling means collecting materials that would otherwise be thrown away and using them to create new products To know that waste materials are a major cause of pollution, especially plastic waste which cannot be recycled e.g nurdles in the sea To know the impact of pollutants on different parts of the planet and identify which are not reversible
To compare and group together everyday materials based on evidence from comparative and fair tests, including their hardness, solubility, conductivity (electrical and thermal), and response to magnets (NC)	To know that, if you put a soluble material into water, it disappears e.g salt, sugar To know that some materials allow electricity to pass through them and these are called electrical conductors To know that an insulator is a material that does not allow electricity to pass through To know that some materials allow heat to pass through them and these are called thermal conductors To know that some materials keep heat from being lost e.g. wool To know that some materials are magnetic and give examples
To suggest how mixtures might be separated, including through filtering, sieving and evaporating (using their knowledge of solids, liquids and gases) (NC) **To know how to demonstrate that dissolving, mixing and changes of state are often reversible changes (NC)**	To know that separating solids through a fine mesh is called sieving To know that materials can be separated by filtering, where an insoluble solid is passed through a very fine mesh or special paper (To know that filtering is used to turn wastewater into safe drinking water) To know that evaporation occurs when a liquid is turned into a gas To know that condensation occurs when a gas is turned into a liquid To know that dissolving and mixing can often be reversible and, therefore, helpful when separating solids, liquids or gases e.g. water can be a solid, liquid or gas
To understand how some materials will dissolve in liquid to form a solution and describe how to recover a substance from a solution (NC) **To show understanding by giving reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic (NC)**	To know that a solution is a type of mixture where one substance is dissolved into another e.g. salt and water both dissolve in water to make a solution To know that we can reverse this by boiling water until it becomes steam and letting it evaporate, leaving behind the solid To know how adaptations can be made in an investigation to separate solids and liquids To know that observation is an essential part of scientific enquiry To know that it is important that the same method is used to measure the results of each test to ensure that it is fair To know how to draw conclusions from test-based evidence

Science

Year 6 – Key Knowledge Builder

	Composite	A World of Bright Ideas	Wars of the World	"I Have a Dream…"	Full of Beans
Processes & Changes	**To understand that numerous factors can affect or prevent change**	Know that air resistance affects the speed at which items fall towards Earth	Know that objects are seen through reflected or given out light and that a shiny surface reduces the absorption of light	Know that animal reproduction can be more or less successful depending on external factors such as poor nutrition, climate change	Know that some changes are not always reversible and explain why
Methods	**To know what makes a good methodology and explain how adaptations can lead to improvements**	Know how to provide a clear hypothesis and conclusion linked to an investigation and suggest improvements 'If we...'	Understand how to use previous knowledge to support a methodology when conducting an experiment about light	Know what a biome is and understand how adaptations differ in different biomes	Know that dissolving and mixing can often be reversible and, therefore, helpful when separating solids, liquids or gases
Observing and Recording	**To identify, analyse and explain findings that support or dismiss theories or arguments**	Know how to build a lever, pulley or gear system and explain how it is making it easier to move heavier or larger items	Know how to analyse and identify how light can be refracted	Know the basic theory of evolution and compare it to alternative theories and arguments about the existence of life	Know how to use comparative testing to sort materials and give evidence for placing materials in certain categories
Scientific Vocabulary	**To know how to use a range of scientific vocabulary in various contexts**	Know and understand the terms 'pulley', 'gear', 'spring' and 'resistance'	Know the names of different parts of the eye and understand the terms 'refraction' and 'translucent'	Know a wider range of vocabulary relating to specific species, such as 'tendrils' and 'gills'	Know language that connects to other subjects to support scientific knowledge e.g. 'dredging ', ' pollution
Uses and Implications	**To know that science has implications for world issues and that it can be used for good or bad**	Compare gear, lever or pulley systems in a range of everyday situations and find those that are most effective	Know that studying how light behaves can support a wide range of industries and technologies such as improving eye health	Understand how humans can affect habitats and biomes and know some solutions to help save animals and plants living there	Know the process of recycling paper or glass and what can be made from these substances
Cross Curricular STEM	**To understand how their own STEM skills can benefit future science work in school and beyond**	Know how to use a Newton Meter and take measurements	Know how adaptations have lead to improvements in the use and quality of light-emitting devices	Understand that information needs to be relevant and carefully read to ensure that theories are supported by evidence	Know how to record findings correctly, using mathematical diagrams (Maths)

Science

Year 6

	A World of Bright Ideas	Wars of the World	"I Have a Dream…"	Full of Beans
Theme Overview	In this unit, pupils will research and present findings on Sir Isaac Newton and develop their understanding of gravity. Pupils will carry out a number of experiments on the effects of water, air and frictional resistance. The experiments will require reasoned predictions, accurate recording of data and will be shared with the class once complete. Finally, pupils will carry out investigations into mechanisms and use STEM skills to make and test them. Pupils will discuss how these mechanisms are used in everyday life. **NC Concepts** A. To know that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object B. To identify the effect of air resistance and friction, that act between moving surfaces C. To recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect	Pupils will develop their understanding of growth and change in animals and humans by researching, sorting and comparing the gestational periods, life cycles and life spans of humans and animals. Using established research, pupils will investigate how diet, drugs and exercise can affect health and life expectancy in humans. The circulatory system will be introduced and pupils will investigate pulse rate, producing graphs to show their findings. They will investigate how vital water is for survival and compare how long animals can survive without water, discussing their findings with the class. **NC Concepts** A. To know and describe the changes as humans develop to old age B. To recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function C. To identify and name the main parts of the human circulatory systems, and explain the functions of the heart, blood vessels and blood D. To describe the ways in which nutrients and water are transported within animals, including humans	Pupils will use their previous knowledge of life cycles to explore the similarities and differences between various animal and plant species. Based on specific criteria and questions, pupils will research the life and reproductive cycles of a variety of animals and plants with opportunity for analysis, discussion and comparison. Pupils will be expected to start to give more scientific reasoning for the groupings of plants and animals by using established classification systems. They will also start to investigate adaptations of various plants and animals to suit particular biomes and how some of these adaptations have led to evolutionary changes. **NC Concepts** A. To know the difference in the life cycles of a mammal, an amphibian, an insect and a bird B. To recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents C. To be able to describe the life process of reproduction in some plants and animals D. To be able to classify plants and animals based on specific characteristics and give reasons E. To describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences F. To know and identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution	In this unit, pupils will further develop their knowledge and understanding of electricity. They will embed and extend their understanding of circuits by experimenting with variations of components, and the concept of voltage will be introduced through changing the number of cells in their circuits. They will also use scientifically correct symbols for components when completing circuit diagrams. They will now learn and use the correct symbols to represent components. Furthermore, pupils will look at energy, identifying its various forms (thermal, light, kinetic), how it is created through renewable and non -renewable sources and the implications this has on real -world use. **Concepts** A. To identify common appliances that run on electricity B. To compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on / off positions of switches (NC) C. To be able to associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit (NC) D. To know how to use recognised symbols when representing a simple circuit in a diagram (NC) E. To understand the term 'energy' and identify a range of different renewable and non -renewable energy sources

Science

Year 6 Composites and Components – Knowledge	
A WORLD OF BRIGHT IDEAS	
Composite	**Components**
To explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object (NC)	To know that gravity is an invisible force that pulls objects towards the centre of the Earth To know that gravity keeps the Earth and the other planets in their orbits around the Sun To know that the gravity on the Moon is not as strong as gravity on the Earth because the moon is much smaller To know that it is the Earth's gravity keeps us on the ground and makes things fall To know that Isaac Newton was a scientist who was famous for his discoveries about gravity
To identify the effects of air resistance, water resistance and friction, that act between moving surfaces (NC)	To know that friction is the resistance that one surface or object encounters when moving over another To know that air resistance is a type of friction between air particles and another material, making it more difficult to move through air To know that water resistance is a type of friction between water particles and another material, making it more difficult to move through water To know that streamlined objects are designed to reduce resistance e.g. shapes of cars, airplanes or boats
To recognise some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect (NC)	To know that mechanisms, such as levers, pulleys and gears are devices that we use to help move things To know that a lever is a simple mechanism designed to lift objects To know that a pulley is a machine with a wheel and rope mechanism, designed to lift objects To know that a gear is a wheel with teeth that connects with other wheels to turn objects, control the speed of an object or help an object change direction To know that all of these mechanisms reduce the force you need to apply to lift or move heavy objects

WARS OF THE WORLD	
Composite	**Components**
To recognise that light appears to travel in straight lines (NC)	To know that light is a form of energy To know that light travels in straight lines until it hits an object To know that shadows are formed when light is blocked by an opaque object
To use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye (NC)	To know that, when we see an object, we are actually seeing the light bouncing off it To know that there are different parts to the human eye and these all have their own function
To explain that we see things because light travels from light sources to our eyes off from light sources to objects and then to our eyes (NC)	To know that there are different parts to the eye and to be able to name them To know that the reflected light enters the eye through the opening in the iris called the pupil To know that the retina at the back of the eye is sensitive to light and changes the light into electrical signals which are sent to the brain To know that the brain interprets these signals as an image or picture
To use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them (NC)	To know that, when an opaque or solid object comes between the light source and a surface, a shadow is formed To know that light travels in straight lines To know that the size of a shadow depends on how close the object is to the light source To know that if an object is close to the light source, it casts a big shadow To know that if an object is further away from the light source, the shadow is smaller

Science

"I HAVE A DREAM..."	
Composite	**Components**
To know the difference in the life cycles of a mammal, an amphibian, an insect and a bird (NC)	To know that a life cycle represents the stages a living thing goes through in its life, from birth to death To know that animals are small when they are born and, over time, they grow and their bodies change To know that most animals have babies of their own when they grow up, and the life cycle begins again To know that a mammal gives birth to its young which suckles on its mother's milk, has hair or fur on its body, and is warm-blooded To know that an amphibian lives partly in water and partly on land, has moist slimy skin and lays eggs To know that birds lay eggs, have feathers and wings and most can fly To know that an insect has a body with three segments that are protected by a hard shell, three pairs of legs and a pair of antennae To know that most insects produce eggs which are left to hatch into young
To recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents (NC)	To know that plants and animals produce offspring differently To know that the creation of offspring is called sexual reproduction and involves two parents, producing offspring that are genetically unique To know that to reproduce offspring, most animals need a male and a female To know that some living things lay eggs, which contain their offspring To know that some living things grow their babies inside them until they are developed enough to be born To know that all living things contain a material called DNA that carries all the information about how a living thing will look and function To know that living things produce offspring of the same species i.e. with the same pattern of DNA as their parents To know that offspring have some of the features of their parents, but are not born to be an exact copy of them To know that some living things produce offspring asexually which means there is only one adult involved in reproduction, and they reproduce an exact copy of themselves e.g. stick insects can reproduce asexually
To be able to describe the life process of reproduction in some plants and animals (NC)	To know that there are seven life processes common to all living things and these include nutrition, movement, growth, reproduction, sensitivity, respiration, and excretion To know that reproduction means producing offspring or babies within a life cycle To know that a life cycle is the process from birth, through to growing into an adult, through to reproducing when the process begins again To know that the life cycles of mammals, amphibians, insects and birds are different To know that mammals begin life growing inside the female adults until they are ready to be born To know that amphibians begin life as eggs and grow through different stages called metamorphosis To know that during metamorphosis, there is a series of physical changes an animal goes through to become an adult e.g. frog > egg > tadpole > frog To know that insects go through four stages of metamorphosis i.e. egg, larva, pupa and adult To know that larva is usually worm-like e.g. caterpillar To know that, at the pupa stage the larva builds itself a protective covering called a cocoon To know that, inside the cocoon, the larva develops its adult body parts To know that plants can reproduce by sexual reproduction and by asexual reproduction To know that sexual reproduction in plants involves the pollen from one flower fertilizing the egg (ovule) of another flower to produce a seed To know that germination happens when a plant seed begins to grow into a seedling, when the roots grow under the soil and the stem, leaves and flowers begin to emerge above the soil To know that plants that reproduce asexually produce an identical copy of themselves To know that asexual plants produce bulbs e.g. daffodils and tulips, or tubers e.g. potatoes To know that bulbs or tubers stay under the soil until they are ready to develop into new plants in the following year

To be able to classify plants and animals based on specific characteristics and give reasons (NC) **To describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences (NC)**	To know that classification is a system used by scientists to describe and group living things, according to common observable features To know that classification is based on similarities and differences To know that a vertebrate is an animal with a backbone (spine) To know that an invertebrate is an animal without a backbone (spine) To know the main differences between mammals, birds, amphibians, reptiles and fish To know the difference between seed-bearing plants and those that don't have seeds To know that very small living things are called micro-organisms e.g. bacteria
To know and identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution (NC)	To know that some animals have adapted to suit their environments to increase their chances of survival To know that living things have adapted to their environments in many different ways e.g. change of body shape or colour To know that evolution is the theory that species have adapted to their environments To know that evolution involves changes in living things through many generations with the changes being passed on from adult to offspring

FULL OF BEANS	
Composite	**Components**
To identify common appliances that run on electricity	To know that electricity is a type of energy that can build up in one place To know that electricity can flow from one place to another To know that the flow of electricity is called the current To know that we turn electrical energy into heat, movement, light or sound
To compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on / off positions of switches (NC)	To know that a circuit is a complete path around which electricity will flow To know that components are parts of an electrical circuit e.g. bulbs, motors and buzzers To know that a circuit must be complete for the components to work To know that a switch is a device for opening and closing electrical circuits To know that the brightness of a bulb or volume of a buzzer can be changed by altering the components
To be able to associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit (NC)	To know that voltage is the name for the electric force that pushes electrons through a circuit to produce electricity To know how to construct a circuit and introduce a larger number of, or higher voltage of cells to make a bulb brighter To know that more voltage is used when more components are added To know that a circuit can be improved by adding more voltage to make it more efficient or produce more power
To know how to use recognised symbols when representing a simple circuit in a diagram (NC)	To know how to draw an accurate circuit diagram with standard symbols To know how to identify, from circuit diagrams, those circuits that will or won't work
To understand the term 'energy' and identify a range of different renewable and non-renewable energy sources	To know that energy is how things change and move and that there are many different types of energy To know that thermal energy refers to heat To know that radiant energy refers to light To know that kinetic energy refers to movement To know that some sources of energy are natural, while some are man-made To know that non-renewable sources cannot be replaced when they run out and that they cause pollution e.g. oil, gas To know that renewable energy sources are unlikely to run out and these include solar power, hydropower, and wind power To know that the electricity we use is created by either non-renewable or renewable sources of energy To know that many renewable sources do not produce pollution and are better for the environment

Science

Key Vocabulary		
Navigators 1 / Year 5		
Global Warning		
biodegradable	irreversible	reuse
conductivity	liquid	reversible
(electrical and	magnet	separating sieving
thermal)	mixing	solid
dissolve	nurdles	solubility
dredging	pollutants	solution
evaporating	recycle	substance
filtering	reduce	waste
gas		

Navigators 2 / Year 6		
Full of Beans		
brightness	efficiency	pollution
bulb	energy	radioactive renewable/
buzzer	fuel	non-renewable energy sources
calorie	gas	sustainable
cell	kinetic	thermal
circuit diagram	nuclear	uranium
coal	oil	voltage
consumption	plutonium	volume
		wind power

Key Vocabulary	
Navigators 1 / Year 5	
Come Fly With Me! America	
absorbency	manufacturing
classify	natural
cotton	process
environmentally	properties
friendly	strength
flexibility	
man-made materials	

Navigators 2 / Year 6		
"I Have A Dream…"		
adaptation	evolution	reproduction
amphibian	gills	sexual reproduction
appearance	habitat	tendrils
biomes	hereditary	theories of evolution
bird	insect	vertebrate
birth rate	invertebrate	
classification	mammal	
egg		
environment		

Science

Key Vocabulary							
Navigators 1 / Year 5				**Navigators 2 / Year 6**			
Mission Control				**A World of Bright Ideas**			
axis	galaxy	satellite		accelerate	force	load	
constellations	moon	solar system		air resistance	friction	newton meter	
cycle	orbit	space agencies		block and tackle	fulcrum	pulley	
day and night	planet	spherical bodies		brake	gears	resistance	
device	planetary motion	sun		decelerate	gravity	spring	
earth	rotation	tides		effort	lever	water resistance	
flat earth theory				fall			

Key Vocabulary							
Navigators 1 / Year 5				**Navigators 2 / Year 6**			
Go With the Flow				**Wars of the World**			
additive	blood pressure	lungs	sweat	absorption	lens	translucent	
adolescent	blood vessel	oxygenated	urine	beam	light	transparent	
blood	dehydration	plasma	veins	cornea	light-emitting devices	reflect	
cardiac	drug	platelets	womb	eye	opaque	refraction	
cell	function	pore		iris	periscope	retina	
gestation	life cycle	pregnant				shadows	
heart		pulse				shiny	
joints		stethoscope				torch	

Science

Working Scientifically - Jiffy Science Lessons	
Navigators 1 /Year 5	**Navigators 2 /Year 6**
Solar System Searching Pupils will develop their skills in using research to aid their scientific enquiries. Once they have carried out research into the solar system, pupils will need to present their findings in a way that is easy to read, contains images and captions and uses suitable scientific vocabulary. Pupils will also start to understand the need for citations when using quotes or statements from websites or books. • To report and present 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 • To identify scientific evidence that has been used to support or refute ideas or arguments.	**What time is it, Professor Jiffy?** This lesson involves looking at how shadows work in helping to tell the time using sundials. Pupils will learn about how sundials work by looking at traditional round sundials but also the unusual 'Dolphin Sundial' at the Greenwich Observatory. They will make their own sundials and test them. Once tested, the pupils will need to present their findings, highlighting any issues with their sundials and how they could potentially be fixed. • To report and present 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
Keeping Cosy In this lesson, pupils will conduct an experiment that looks at the thermal properties of materials and their effectiveness at keeping a cup and its contents warm for the longest period of time. The focus will be on how the pupils set up their experiment, how they consider fair testing and how they then write up their enquiry, including how the data was collected and the conclusions drawn. • To plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary • To take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate • To record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs • To use test results to make predictions to set up further comparative and fair tests	
Melting Madness 'Keeping Cosy' and 'Melting Madness' work together as a pair of lessons. In this lesson, pupils will be given the instructions for three experiments. They will need to use the basic instructions to set up the experiments and carefully record the data that comes from them. Pupils will, before starting, need to consider what the variables could be with the three experiments and how to the best of their ability keep their tests fair. • To plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary • To take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate • To record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs • To use test results to make predictions to set up further comparative and fair tests	