

The Big Ideas of Science

Physics

P1: The universe follows unbreakable rules that are all about forces, matter and energy.

P2: Forces are different kinds of pushes and pulls that act on all the matter that is in the universe. Matter is all the stuff, or mass, in the universe.

P3: Energy, which cannot be created or destroyed, comes in many different forms and tends to move away from objects that have lots of it.

Chemistry

C1: All matter (stuff) in the universe is made up of tiny building blocks.

C2: The arrangement, movement and type of the building blocks of matter and the forces that hold them together or push them apart explain all the properties of matter (e.g. hot/cold, soft/hard, light/heavy, etc).

C3: Matter can change if the arrangement of these building blocks changes.

Biology

B1: Living things are special collections of matter that make copies of themselves, use energy and grow.

B2: Living things on Earth come in a huge variety of different forms that are all related because they all came from the same starting point 3.7 billion years ago.

B3: The different kinds of life - animals, plants and microorganisms - have evolved over many generations into different forms in order to survive in the environments in which they live.

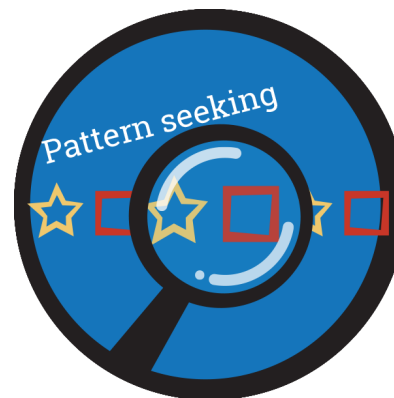
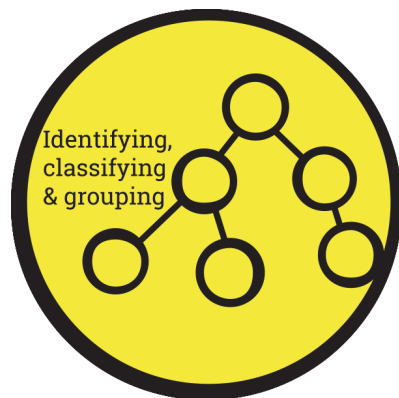
Earth science

E1: The Earth is one of eight planets that orbit the sun.

E2: The Earth is tilted and spins on its axis leading to day and night, the seasons and the climate.

E3: The Earth is made up of several layers, including a relatively thin, rocky surface which is divided into tectonic plates, and the movement of these plates leads to many geologic events (such as earthquakes and volcanoes) and geographical features (such as mountains).

Working Scientifically



Module	Topic	Big Idea	Key Vocabulary	Enquiry Questions	Type of Enquiry
1	Animals Including Humans	B2: All living things are related.	New: energy, growth, habitat, fish, amphibian, reptile, bird, mammal, offspring, carnivore, herbivore, omnivore, vertebrate, skeleton, organ	Are we all the same or are we all different? Discover what is the same and what is different about their bodies.	
2	Materials	C1 and C2: All matter (stuff) in the universe is made up of tiny building blocks. (This determines why some materials are soft or hard, etc)	New: absorption, matter, property, wood, plastic, glass, metal, water, rock	Are all materials the same? Compare a variety of materials, deciding which are hard, soft, strong, weak, smooth, rough, etc.	
3	Seasonal Changes	E2: The Earth is tilted and spins on its axis leading to the seasons.	New: energy, freezing, melting, orbit, reflection, Sun, clouds, wind, snow, ice, spring, summer, autumn, winter (NB: the Sun and the Earth are capitalised when being discussed in an astronomical context.)	Is the weather the same every day? Keep a weather diary across a period of time and compare this to a pre-made one for a different period of the year, drawing conclusions.	
4	Materials	C1 and C2: All matter (stuff) in the universe is made up of tiny building blocks. (This determines why some materials are soft or hard, etc)	New: absorption, matter, property, wood, plastic, glass, metal, water, rock	Are all materials the same? Undertake actions to test whether each material has the property (e.g. touching, weighing, etc)	
5	Animals Including Humans	B1: Living things are special collections of matter that make copies of themselves, use energy and grow.	New: energy, growth, habitat, fish, amphibian, reptile, bird, mammal, offspring, carnivore, herbivore, omnivore, vertebrate, skeleton, organ	Are all animals totally different? Using pictures of animals, children find out if they can find anything that is the same for all of the animals, thinking about what they do and how they look. Show smaller and larger versions of each animal.	
6	Plants	B2: Living things on Earth come in a huge variety of different forms.	Retrieval: energy, habitat New: component, energy, growth, deciduous, evergreen, flower, plant, tree, structure, roots, stem, leaf, trunk, flower	What are the parts of a plant? Use pages from a science encyclopaedia to draw and label different plants, spotting similarities and differences.	

Working Scientifically Assessment Criteria

Observing Closely	Performing Tests
• Can they talk about what they see, touch, smell, hear or taste? • Can they use simple equipment to help them make observations? • Can they find out by watching, listening, tasting, smelling and touching?	• Can they perform a simple test? • Can they tell other people about what they have done? • Can they give a simple reason for their answers?
Identifying and Classifying	Recording Findings
• Can they identify and classify things they observe? • Can they think of some questions to ask? • Can they answer some scientific questions? • Can they give a simple reason for their answers? • Can they explain what they have found out? • Can they talk about similarities and differences? • Can they explain what they have found out using scientific vocabulary?	• Can they show their work using pictures, labels and captions? • Can they record their findings using standard units? • Can they put some information in a chart or table? • Can they use ICT to show their working? • Can they make accurate measurements?

Year	Module	Topic	Big Idea	Enquiry Type
1	1	Animals Including Humans	B2: All living things are related.	
Vocabulary:		New: energy, growth, habitat, fish, amphibian, reptile, bird, mammal, offspring, carnivore, herbivore, omnivore, vertebrate, skeleton, organ		
Retrieval:		Know that science is a way to understand our world by carefully thinking about it and testing our guesses with observations and experiments		
Objectives:		- Know that a trout is an example of a fish; a frog is an example of an amphibian; a lizard is an example of a reptile; a robin is an example of a bird; a rabbit and a human are examples of a mammal and explore further examples of each animal type Know that herbivorous animals eat plants; carnivorous animals eat other animals; omnivorous animals eat both animals and plants - Know that a cat is an example of a carnivore; that a rabbit is an example of a herbivore; know that many humans are examples of omnivores (though not vegetarians) Know that fish, amphibians, reptiles, birds and mammals are similar in that they have internal skeletons and organs; these are known as vertebrates, which means they are animals that have a backbone Know that fish are different to other animals in having gills so that they can breathe underwater and scaly skin Know that amphibians are different to other animals in that they begin their lives with gills but then develop lungs and breathe on land		
Enquiry Question:		Are we all the same or are we all different? Discover what is the same and what is different about their bodies.		
Assessment criteria for Animals Including Humans:		- Identify and name a variety of common animals (birds, fish, amphibians, reptiles, mammals, invertebrates) - Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds, mammals) - Identify and name a variety of common animals that are carnivores, herbivores and omnivores - Classify animals by what they eat (carnivore, herbivore, omnivore) - Draw & label basic parts of the human body - Identify the main parts of the human body and link them to their senses		

Year	Module	Topic	Big Idea	Enquiry Type
1	2	Materials	C1 and C2: All matter (stuff) in the universe is made up of tiny building blocks. (This determines why some materials are soft or hard, etc)	
Vocabulary:		New: absorption, matter, property, wood, plastic, glass, metal, water, rock		
Retrieval:		Science is a way to understand our world by carefully thinking about it and testing our guesses with observations and experiments		
Objectives:		Know that an object is made from/of a material and know some examples of materials in the real world Know that materials can be hard, soft, strong, weak, absorbent, heavy, light, solid and runny, smooth and rough; these descriptions denote the properties of a material		
Enquiry Question:		Are all materials the same? Compare a variety of materials, deciding which are hard, soft, strong, weak, smooth, rough, etc.		
Assessment criteria for Materials:		- Distinguish between an object and the material from which it is made - Explain what material objects are made from - Describe the properties of materials using their senses, using specific scientific words - Explain why a material might be useful for a specific job based on its simple properties - Name some different everyday materials e.g. wood, plastic, metal, water and rock - Compare and group together a variety of everyday materials on the basis of their simple physical properties		

Year	Module	Topic	Big Idea	Enquiry Type
1	3	Seasonal Changes	E2: The Earth is tilted and spins on its axis leading to the seasons.	 
Vocabulary:		New: energy, freezing, melting, orbit, reflection, Sun, clouds, wind, snow, ice, spring, summer, autumn, winter (NB: the Sun and the Earth are capitalised when being discussed in an astronomical context.)		
Retrieval:		Science is a way to understand our world by carefully thinking about it and testing our guesses with observations and experiments		
Objectives:		Know that days are longer in the summer and shorter in winter Know that weather changes through the year, getting hotter in the summer and colder in the winter Know that the four seasons are spring, summer, autumn and winter and know the order of the cycle Know that the winter is likely to bring ice on the ground when water freezes due to the cold Know that the Earth orbits the Sun with one orbit constituting a year of roughly 365 days		
Enquiry Question:		Is the weather the same every day? Keep a weather diary across a period of time and compare this to a pre-made one for a different period of the year, drawing conclusions.		
Assessment criteria for Seasonal Changes:		- Observe changes across the four seasons - Name the four seasons in order - Observe and describe weather associated with the seasons - Observe and describe how day length varies - Observe features in the environment and explain that these are related to a specific season - Observe and talk about changes in the weather		

Year	Module	Topic	Big Idea	Enquiry Type
1	4	Materials	C1 and C2: All matter (stuff) in the universe is made up of tiny building blocks. (This determines why some materials are soft or hard, etc)	 
Vocabulary:		New: absorption, matter, property, wood, plastic, glass, metal, water, rock		
Retrieval:		Continuation from previous unit on materials. Recap and secure prior learning.		
Objectives:		Know from observation how to distinguish between materials made of wood, plastic, glass, metal, water, rock Know that matter (stuff) is made from tiny building blocks		
Enquiry Question:		Are all materials the same? Undertake actions to test whether each material has the property (e.g. touching, weighing, etc)		
Assessment criteria for Materials:		- Distinguish between an object and the material from which it is made - Explain what material objects are made from - Describe the properties of materials using their senses, using specific scientific words - Explain why a material might be useful for a specific job based on its simple properties - Name some different everyday materials e.g. wood, plastic, metal, water and rock - Compare and group together a variety of everyday materials on the basis of their simple physical properties		

Year	Module	Topic	Big Idea	Enquiry Type
1	5	Animals Including Humans	B1: Living things are special collections of matter that make copies of themselves, use energy and grow.	
Vocabulary:		New: energy, growth, habitat, fish, amphibian, reptile, bird, mammal, offspring, carnivore, herbivore, omnivore, vertebrate, skeleton, organ		
Retrieval:		Know that science is a way to understand our world by carefully thinking about it and testing our guesses with observations and experiments		
Objectives:		Know that reptiles are different to other animals in that they breathe air and have scaly skin Know that birds are different to other animals in that they have feathers and wings Know that mammals are different to other animals in that they have fur/hair and they feed milk to their young Know that feet, legs, arms, hands, torso, head, skin, ears, eyes, nose, mouth and tongue are parts of the body and identify them Know that eyes are associated with sight, ears with sound, nose with smell, tongue with taste and skin with touch - Know that Ibn Sina (known also as Avicenna) was a scientific genius during early Islamic civilisation - Know that he wrote books about medicine and healing people - Know that he helped guide the modern world towards the idea of using evidence in medicine - Know that he also made major contributions to other areas of science, mathematics and philosophy		
Enquiry Question:		Are all animals totally different? Using pictures of animals, children find out if they can find anything that is the same for all of the animals, thinking about what they do and how they look. Show smaller and larger versions of each animal.		
Assessment criteria for Animals Including Humans:		- Identify and name a variety of common animals (birds, fish, amphibians, reptiles, mammals, invertebrates) - Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds, mammals) - Identify and name a variety of common animals that are carnivores, herbivores and omnivores - Classify animals by what they eat (carnivore, herbivore, omnivore) - Draw & label basic parts of the human body - Identify the main parts of the human body and link them to their senses		

Year	Module	Topic	Big Idea	Enquiry Type
1	6	Plants	B2: Living things on Earth come in a huge variety of different forms.	
Vocabulary:		Retrieval: energy, habitat New: component, energy, growth, deciduous, evergreen, flower, plant, tree, structure, roots, stem, leaf, trunk, flower		
Retrieval:		Know that science is a way to understand our world by carefully thinking about it and testing our guesses with observations and experiments		
Objectives:		- Know a rose bush, a sunflower and a dandelion by sight - Know an oak tree, a birch tree and a horse chestnut tree by sight Know that evergreen trees maintain their leaves throughout the year and that deciduous trees shed their leaves in autumn Know that a flowering plants consist of roots, stem, leaves and flowers, and that a tree's stem is called a trunk - Know that there are many kinds of jobs as a scientist including communicator scientist and teacher scientist - Know that teacher scientists teach others - often children - about science - Know that communicator scientists help the world to understand about science - Know that David Attenborough is a famous communicator scientist who has created and presented some of the most famous television programmes ever made about plants and animals		
Enquiry Question:		What are the parts of a plant? Use pages from a science encyclopaedia to draw and label different plants, spotting similarities and differences.		
Assessment criteria for Animals Including Humans:		- Identify and name a range of common plants and trees - Recognise deciduous and evergreen trees - Name the trunk, branches and root of a tree - Describe the parts of a plant (roots, stem, leaves, flowers) - Name the main parts of a flowering plant (petals, stem, leaf, bulb, flower, seed, stem and root)		

Module	Topic	Big Idea	Key Vocabulary	Enquiry Questions	Type of Enquiry
1	Materials	C1 and C2: All matter (stuff) in the universe is made up of tiny building blocks. The arrangement of these building blocks determines the properties of materials.	Retrieval: absorption, matter, property New: conductor, brick, paper, cardboard, friction, movement, suitability, surface, stretch, twist, waterproof, deformation, flexible, rigid	What materials could be used to make a good raincoat? Test whether different materials are waterproof, flexible and light.	
2	Plants and Animals Including Humans	B1: Living things are special collections of matter that use energy and grow.	Retrieval: growth, habitat, reproduction, nutrients, consumption New: offspring, adult, bulb, seed, survival, temperature, hygiene, exercise	Is all food good for us? Look at a variety of food labels (looking at the traffic light nutrition), comparing which are healthy and why.	
3	Plants and Animals Including Humans	B1: Living things are special collections of matter that use energy and grow.	Retrieval: growth, habitat, reproduction, nutrients, consumption New: offspring, adult, bulb, seed, survival, temperature, hygiene, exercise	Do all animals start off small? Pair up pictures of a variety of animals with their very young and juvenile forms.	
4	Materials	C1 and C2: All matter (stuff) in the universe is made up of tiny building blocks. The arrangement of these building blocks determines the properties of materials.	Retrieval: absorption, matter, property New: conductor, brick, paper, cardboard, friction, movement, suitability, surface, stretch, twist, waterproof, deformation, flexible, rigid	What materials could be used to make a good bike shed? Test whether different materials are strong, hard and waterproof	
5	Living Things and their Habitats	B1: Living things are special collections of matter that use energy and grow.	Retrieval: habitat, growth, absorption, deciduous, evergreen, flower, plant, tree, structure, roots, stem, leaf, trunk, flower, herbivore, carnivore, omnivore New: birth, decay, energy, reproduction, microhabitat, dead, life cycle, food chain, source, nutrients, consumption, environment	Is everything on Earth alive? Sort pictures and specimens into alive, dead, and never alive. (Include misconceptions like the sun and the sea.)	

Working Scientifically Assessment Criteria

Observing Closely	Performing Tests
• Can they use their senses (see, touch, smell, hear or taste) to help them answer questions? • Can they use some scientific words to describe what they have seen and measured? • Can they compare several things? • Can they suggest ways of finding out through listening, hearing, smelling, touching and tasting?	• Can they carry out a simple fair test? • Can they explain why it might not be fair to compare two things? • Can they say whether things happened as they expected? • Can they suggest how to find things out? • Can they say whether things happened as they expected and if not why not?
Identifying and Classifying	Recording Findings
• Can they organise things into groups? • Can they find simple patterns (or associations)? • Can they identify animals and plants by a specific criteria, eg, lay eggs or not; have feathers or not? • Can they suggest more than one way of grouping animals and plants and explain their reasons?	• Can they use text, diagrams, pictures, charts, tables to record their observations? • Can they measure using simple equipment? • Can they use information from books and online information to find things out?

Year	Module	Topic	Big Idea	Enquiry Type
2	1	Materials	C1 and C2: All matter (stuff) in the universe is made up of tiny building blocks. The arrangement of these building blocks determines the properties of materials.	 
Vocabulary:		Retrieval: absorption, matter, property New: conductor, brick, paper, cardboard, friction, movement, suitability, surface, stretch, twist, waterproof, deformation, flexible, rigid		
Retrieval:		- Know that science is a way to understand our world by carefully thinking about it and testing our guesses with observations and experiments - Know that objects are made from materials such as wood, plastic, glass, metal, water, rock - Know that materials have properties such as being hard, soft, strong, weak, absorbent, heavy, light, solid, runny, smooth and rough; these descriptions denote the properties of a material - Know that matter (stuff) is made from tiny building blocks		
Objectives:		Know that materials can have useful properties for a given job (including being waterproof, strong, hard, soft, flexible, rigid, light or heavy)		
Enquiry Question:		What materials could be used to make a good raincoat? Test whether different materials are waterproof, flexible and light.		
Assessment criteria for Mat:		- Describe the properties of different materials using words like transparent or opaque, flexible, etc. - Sort materials into groups and say why they have sorted them in that way - Say which materials are natural and which are man-made - Explore how the shapes of solid objects can be changed (squashing, bending, twisting, stretching) - Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper, and cardboard for particular uses		

Year	Module	Topic	Big Idea	Enquiry Type
2	2	Plants and Animals Including Humans	B1: Living things are special collections of matter that use energy and grow.	
Vocabulary:		Retrieval: growth, habitat, reproduction, nutrients, consumption New: offspring, adult, bulb, seed, survival, temperature, hygiene, exercise		
Retrieval:		- Know that science is a way to understand our world by carefully thinking about it and testing our guesses with observations and experiments - Know that living things move, grow, consume nutrients and reproduce; that dead things used to do these things, but no longer do; and that things that never lived have never done these things		
Objectives:		- Know that animals, including humans, need food, water and oxygen to survive - Know the basic food groups: fruit and vegetables, carbohydrates, protein, dairy, fat and sugary foods - Know that proteins are good for growth, carbohydrates for energy and fruit and vegetables provide vitamins and minerals which help keep us healthy (e.g. calcium for healthy bones and teeth) - Know that more than half of our diet should be made up of carbohydrates, fruit and vegetables - Know that fats and sugary foods should be eaten rarely and in small amounts - Know that people need to exercise often to help their body stay strong and fit - Know that keeping clean, including washing and brushing teeth, is an important part of staying healthy		
Enquiry Question:		Is all food good for us? Look at a variety of food labels (looking at the traffic light nutrition), comparing which are healthy and why.		
Assessment criteria for Animals Including Humans and Plants:		- Describe the properties of different materials using words like transparent or opaque, flexible, etc. - Sort materials into groups and say why they have sorted them in that way - Say which materials are natural and which are man-made - Explore how the shapes of solid objects can be changed (squashing, bending, twisting, stretching) - Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper, and cardboard for particular uses - Observe and describe how seeds and bulbs grow into mature plants - Find out & describe how plants need water, light and a suitable temperature to grow and stay healthy - Describe what different plants need to survive and link it to where they are found		

Year	Module	Topic	Big Idea	Enquiry Type
2	3	Plants and Animals Including Humans	B1: Living things are special collections of matter that use energy and grow.	
Vocabulary:		Retrieval: growth, habitat, reproduction, nutrients, consumption New: offspring, adult, bulb, seed, survival, temperature, hygiene, exercise		
Retrieval:		Continuation from previous module		
Objectives:		Know that seeds and bulbs need to be buried underground in soil and that they will grow into adult plants under the right conditions (water, warmth) Know that plants that are deprived of light, food or air will not grow and will die. Know that plants and animals produce offspring that grow into adults. - Know that George Washington Carver was a practical scientist and inventor - Know that he helped farmers in America to grow more crops by showing them the benefits of growing different things at different times and of using fields for different crops		
Enquiry Question:		Do all animals start off small? Pair up pictures of a variety of animals with their very young and juvenile forms.		
Assessment criteria for Animals Including Humans and Plants:		- Describe the properties of different materials using words like transparent or opaque, flexible, etc. - Sort materials into groups and say why they have sorted them in that way - Say which materials are natural and which are man-made - Explore how the shapes of solid objects can be changed (squashing, bending, twisting, stretching) - Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper, and cardboard for particular uses - Observe and describe how seeds and bulbs grow into mature plants - Find out & describe how plants need water, light and a suitable temperature to grow and stay healthy - Describe what different plants need to survive and link it to where they are found		

Year	Module	Topic	Big Idea	Enquiry Type
2	4	Materials	C1 and C2: All matter (stuff) in the universe is made up of tiny building blocks. The arrangement of these building blocks determines the properties of materials.	 
Vocabulary:		Retrieval: absorption, matter, property New: conductor, brick, paper, cardboard, friction, movement, suitability, surface, stretch, twist, waterproof, deformation, flexible, rigid		
Retrieval:		Continuation from previous unit on materials. Recap and secure prior learning.		
Objectives:		Know that many types of plastic are waterproof, that steel (a type of metal) is strong, that rock is hard, that cotton wool is soft, that rubber is flexible, that rock is rigid, that polystyrene (a type of plastic) is light and that iron (a type of metal) is heavy Know that when objects move across a surface there is friction when they rub against each other and that sometimes this friction is larger or smaller Know that applying forces to objects can change their shape, by squeezing, stretching, bending and twisting - Know that Isambard Kingdom Brunel was a famous scientist who used materials to build impressive and important things; know that he was an engineer - Know that Brunel lived in the Victorian era and that he designed steamships, railways, bridges, tunnels and dockyards		
Enquiry Question:		What materials could be used to make a good bike shed? Test whether different materials are strong, hard and waterproof		
Assessment criteria for Materials:		- Describe the properties of different materials using words like transparent or opaque, flexible, etc. - Sort materials into groups and say why they have sorted them in that way - Say which materials are natural and which are man-made - Explore how the shapes of solid objects can be changed (squashing, bending, twisting, stretching) - Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper, and cardboard for particular uses		

Year	Module	Topic	Big Idea	Enquiry Type
2	5	Living Things and their Habitats	B1: Living things are special collections of matter that use energy and grow.	
Vocabulary:		Retrieval: habitat, growth, absorption, deciduous, evergreen, flower, plant, tree, structure, roots, stem, leaf, trunk, flower, herbivore, carnivore, omnivore New: birth, decay, energy, reproduction, microhabitat, dead, life cycle, food chain, source, nutrients, consumption, environment		
Retrieval:		Science is a way to understand our world by carefully thinking about it and testing our guesses with observations and experiments Know that dandelions, rose bushes, grass, ash trees, birch trees and conifers trees are examples of plants. Know that trees can be deciduous or evergreen. Know that a trout is an example of fish, a frog is an example of an amphibian; a lizard is an example of a reptile; a robin is an example of a bird; a rabbit and a human are examples of a mammal Know that herbivorous animals eats plants; a carnivorous animal eats other animals; omnivorous animals eat both animals and plants		
Objectives:		Know that living things move, grow, consume nutrients and reproduce; that dead things used to do these things, but no longer do; and that things that never lived have never done these things. - Know that there are many kinds of jobs as a scientist including communicator scientist, teacher scientist, technician scientist and explorer scientist - Know that technician scientists are scientists that help other scientists to do their job - Know that explorer scientists try to find out new things that no one has ever learned before; many of the most famous scientists in history were explorer scientists		
Enquiry Question:		Is everything on Earth alive? Sort pictures and specimens into alive, dead, and never alive. (Include misconceptions like the sun and the sea.)		
Assessment criteria for Living Things and their Habitats:		- Decide whether something is living, dead or never-living - Explain the differences between living and never-living things - Match certain living things to the habitats they are found in - Describe how a habitat provides for the basic needs of things living there - Describe a range of different habitats - Describe how plants and animals are suited to their habitat - Explain how animals obtain their food from plants and other animals and identify and name different sources of food		

Year	Module	Topic	Big Idea	Enquiry Type
2	6	Living Things and their Habitats	B1: Living things are special collections of matter that use energy and grow.	
Vocabulary:		Retrieval: habitat, growth, absorption, deciduous, evergreen, flower, plant, tree, structure, roots, stem, leaf, trunk, flower, herbivore, carnivore, omnivore New: birth, decay, energy, reproduction, microhabitat, dead, life cycle, food chain, source, nutrients, consumption, environment		
Retrieval:		Continuation from the previous module		
Objectives:		Know that light is a form of energy Know that plants absorb energy from the Sun; that this energy is consumed by herbivorous animals; and that carnivorous animals eat other animals Know that the arrows on a food chain show the direction that the energy travels Know that polar bears are an example of an animal adapted to its environment – thick fur for warmth and oily paw pads to ensure that they don't freeze to the ice - Know that sharks are another example – smooth skin and streamlined shape for quick swimming; and gills for breathing underwater Know that cacti are an example of a plant adapted to its environment – thick skin keeps a store of water safe; sharp spikes keep animals from stealing the water - Know that pine trees are adapted to their environment in that they have thick bark and pine cones to protect against cold winters - Know that woodlice live under logs – an example of a microhabitat - as they need somewhere dark and damp so that they do not dry out - Know that frogs can live in ponds – an example of a microhabitat - as they water in which to lay their eggs (frogspawn)		
Enquiry Question:		Do plants grow the same amount every week? Measure the height of a growing plant over a period of days and weeks.		
Assessment criteria for Living Things and their Habitats:		- Decide whether something is living, dead or never-living - Explain the differences between living and never-living things - Match certain living things to the habitats they are found in - Describe how a habitat provides for the basic needs of things living there - Describe a range of different habitats - Describe how plants and animals are suited to their habitat - Explain how animals obtain their food from plants and other animals and identify and name different sources of food		

Module	Topic	Big Idea	Key Vocabulary	Enquiry Questions	Type of Enquiry
1	Animals Including Humans	B3: The different kinds of life, animals, plants and microorganisms, have evolved over millions of generations into different forms in order to survive in the environments in which they live.	Retrieval: component, energy, growth, habitat, reproduction, decay, offspring, adult, bulb, seed, survival, temperature nutrients, consumption, deciduous, evergreen, flower, plant, tree, structure, roots, stem, leaf, trunk, flower, vertebrate, skeleton New: extinction, fruit, nectar, anther, ovary, ovule, petal, pollen, stigma, style, stamen, function, exchange, dispersal, fertilisation, vitamin, balanced diet, cartilage, invertebrate, contract, loosen, rib cage, insect	How does our body move and stand up? Use information from science encyclopaedias / textbooks to label a human skeleton and answer simple questions about it.	
2	Forces and Magnets	P2: Forces are different kinds of pushes and pulls that act on all the matter that is in the universe. (Magnets can exert a force.)	Retrieval: energy, matter, property, wave, metal, material, surface, friction, force, stretch, squash, rough, smooth New: magnetic, non-magnetic, pole, north, south, sliding friction, static friction, elastic, resist, attraction, repulsion	Are all metals attracted to magnets? Sort materials into magnetic and non-magnetic materials using a magnet and find other materials around the room that are magnetic.	
3	Rocks and Fossils	C1: All matter (stuff) in the universe is made up of tiny building blocks. C2: Matter can change if the arrangement of these building blocks changes.	Retrieval : decay, matter, melting, material, New: extinction, particle, igneous, metamorphic, sedimentary, palaeontologist, weathering, molten rock, crust, tectonic plates, scavengers, fossil	Are all rocks made in the same way? Using criteria, children sort rock samples (and pictures) into the three types.	
4	Light	P3: Energy, which cannot be created or destroyed, comes in many different forms and tends to move away from objects that have lots of it. (In this case, the rule is that light energy travels in straight lines and doesn't pass through	Retrieval: absorption, energy, property, reflection New: wave, mirror, incident ray, image, beam, photons, solid, opaque, transparent, object, source, data logger (NB: the Sun and the Moon are capitalised	Does the amount of light we experience only change a lot at night? Using 'Lux' ipad app, children gather data on light levels over the period of an hour and over the period of 24 hours. Children interpret the gathered data.	

		some objects.)	when being discussed in an astronomical context.)		
5	Light	E2: The Earth spins on its axis. P3: Energy, which cannot be created or destroyed, comes in many different forms and tends to move away from objects that have lots of it. (In this case, the rule is that light energy travels in straight lines and doesn't pass through some objects.)	Retrieval: absorption, energy, property, reflection New: wave, mirror, incident ray, image, beam, photons, solid, opaque, transparent, object, source, data logger	Why do shadows change during the day? On a sunny day, using a metre stick, children note the changing length of a shadow thrown by a metre stick or other object.	
6	Plants	B3: The different kinds of life, animals, plants and microorganisms, have evolved over millions of generations into different forms in order to survive in the environments in which they live.	Retrieval: component, energy, growth, habitat, reproduction, decay, offspring, adult, bulb, seed, survival, temperature nutrients, consumption, deciduous, evergreen, flower, plant, tree, structure, roots, stem, leaf, trunk, flower, vertebrate, skeleton New: extinction, fruit, nectar, anther, ovary, ovule, petal, pollen, stigma, style, stamen, function, exchange, dispersal, fertilisation, vitamin, balanced diet, cartilage, invertebrate, contract, loosen, ribcage, insect	Do all plants need exactly the same things? Give both a parsley plant and a small cactus minimal water over a two week period and observe the changes (perhaps drawing the result).	

Working Scientifically Assessment Criteria

Planning	Obtaining and Presenting Evidence	Considering Evidence and Evaluating
• Can they use different ideas and suggest how to find something out? • Can they make and record a prediction before testing? • Can they plan a fair test and explain why it was fair? • Can they set up a simple fair test to make comparisons? • Can they explain why they need to collect information to answer a question? • Can they record and present what they have found using scientific language, drawings, labelled diagrams, bar charts and tables?	• Can they measure using different equipment and units of measure? • Can they record their observations in different ways? (labelled diagrams, charts etc) • Can they describe what they have found using scientific language? • Can they make accurate measurements using standard units? • Can they explain their findings in different ways (display, presentation, writing)? • Can they use their findings to draw a simple conclusion? • Can they suggest improvements and predictions for further tests?	• Can they explain what they have found out and use their measurements to say whether it helps to answer their question? • Can they use a range of equipment (including a datalogger) in a simple test? • Can they suggest how to improve their work if they did it again?

Year	Module	Topic	Big Idea	Enquiry Type
3	1	Animals Including Humans	B3: The different kinds of life, animals, plants and microorganisms, have evolved over millions of generations into different forms in order to survive in the environments in which they live.	
Vocabulary:		Retrieval: component, energy, growth, habitat, reproduction, decay, offspring, adult, bulb, seed, survival, temperature nutrients, consumption, deciduous, evergreen, flower, plant, tree, structure, roots, stem, leaf, trunk, flower, vertebrate, skeleton New: extinction, fruit, nectar, anther, ovary, ovule, petal, pollen, stigma, style, stamen, function, exchange, dispersal, fertilisation, vitamin, balanced diet, cartilage, invertebrate, contract, loosen, rib cage, insect		
Retrieval:		- Know that proteins are good for growth, carbohydrates for energy and fruit and vegetables provide vitamins and minerals which help keep us healthy (e.g. calcium for healthy bones and teeth) - Know that getting the right amount of each food group (including over half of the diet made up of fruit, vegetables and carbohydrates) is called a balanced diet - Know that lack of a nutrient can cause ill health; for example, a lack of vitamin D leads to a disease called rickets		
Objectives:		- Know that animals, including humans, have a skeleton made up of solid objects - Know that some animals (such as insects) have an exoskeleton – a solid covering on the outside of their body - Know that many invertebrates (such as earthworms and slugs) have water held inside by muscles which acts like a skeleton - Know that skeletons provide support for muscles and protect the body; for example, the rib cage protects the vital organs in the human body - Know that human skeletons are made up of bones and cartilage - Know that muscles can only contract, so they must be arranged in pairs in the body so that as one contracts the other loosens - Know that excess of a food group can cause ill health, such as tooth decay due to excess sugar - Know that excess fat from fatty foods such as butter and cheese - and created in the body from excess calories – builds up in the body and can cause obesity - Know that excess body fat can lead to heart disease and increases the strain on joints and growing bones - Know that there are many kinds of jobs as a scientist including communicator scientist, teacher scientist, technician scientist, explorer scientist, entrepreneur scientist and regulator scientist - Know that entrepreneur scientists are people who use things learned in science to start new businesses and make money - Know that regulatory scientists use science to make sure things that people use are reliable and safe		
Enquiry Question:		How does our body move and stand? Use information from science encyclopaedias/textbooks to label a human skeleton and answer simple questions about it.		
Assessment criteria for Animals Including Humans:		- Explain the importance of a nutritionally balanced diet - Identify that animals, including humans, cannot make their own food: they get nutrition from what they eat - Describe and explain the skeletal system of a human - Describe and explain the muscular system of a human - Explain how the muscular and skeletal systems work together to create movement		

Year	Module	Topic	Big Idea	Enquiry Type
3	2	Forces and Magnets	P2: Forces are different kinds of pushes and pulls that act on all the matter that is in the universe. (Magnets can exert a force.)	
Vocabulary:		Retrieval: energy, matter, property, wave, metal, material, surface, friction, force, stretch, squash, rough, smooth New: magnetic, non-magnetic, pole, north, south, sliding friction, static friction, elastic, resist, attraction, repulsion		
Retrieval:		- Know that science is a way to understand our world by carefully thinking about it and testing our guesses with observations and experiments - Know that metal is a material from which objects can be made - Know that as objects move across a surface there is friction when they rub against each other and that sometimes this friction is larger or smaller - Know that applying forces to objects can change their shape - Know that the roughness of a material is an example of a property		
Objectives:		- Know that a force can be thought of as a push or a pull - Know that there are different types of contact force: impact forces (when two surfaces collide), frictional forces (when two surfaces are already in contact) and strain forces (when an elastic material is stretched or squashed) - Know that objects move differently on rough and smooth surfaces; objects resist movement more on rough surfaces because there is higher friction as the object moves - Know that there are also non-contact forces that can act between objects without them touching and that magnetism is an example of a non-contact force - Know that magnets have two poles called north and south - Know that like poles (south-south and north-north) of two magnets repel each other and that opposite poles of two magnets (north-south) attract each other - Know that there is a magnetic field around a magnet which is strongest at each pole - Know that some materials are magnetic, meaning that they are attracted to a magnet, while other materials are non-magnetic		
Enquiry Question:		Are all metals attracted to magnets? Sort materials into magnetic and non-magnetic materials using a magnet and find other materials around the room that are magnetic.		
Progression:		Science Knowledge Pathway		
Assessment criteria for Forces and Magnets:		- Compare how things move on different surfaces - Observe how magnets attract or repel each other - Notice that some forces need contact between two objects, but magnetic forces can act at a distance - Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet or not - Describe magnets as having two poles - Predict whether 2 magnets will attract or repel, depending on which poles are facing		

Year	Module	Topic	Big Idea	Enquiry Type
3	3	Rocks and Fossils	C1: All matter (stuff) in the universe is made up of tiny building blocks. C2: Matter can change if the arrangement of these building blocks changes.	
Vocabulary:		Retrieve : decay, matter, melting, material, New: extinction, particle, igneous, metamorphic, sedimentary, palaeontologist, weathering, molten rock, crust, tectonic plates, scavengers, fossil		
Retrieval:		- Know that science is a way to understand our world by carefully thinking about it and testing our guesses with observations and experiments - Know that rock is a type of solid material. - Know that applying forces to objects can change their shape, by squeezing, stretching, bending and twisting		
Objectives:		- Know that the Earth has a solid crust made up of tectonic plates with molten rock beneath - Know that there are three kinds of rocks: igneous, sedimentary and metamorphic - Know that granite and basalt are types of igneous rock and that igneous rocks form from molten rock below the Earth's crust - Know that limestone and sandstone are types of sedimentary rock which form when small, weathered fragments of rock or shell settle and stick together, often in layers - Know that marble and slate are types of metamorphic rock which form when rocks in Earth's crust get squashed and heated in processes such as when tectonic plates press against each other - Know that fossils form when a plant or animal dies and is quickly covered with silt or mud so that it cannot be rotted by microbes or eaten by scavenging animals; in time layers of sediment build, squashing the mud and turning it to stone around the dead plant or animal; the materials in the body are replaced by minerals that flow in water through the rock, leaving a rock in the shape of the animal or plant that was once there - Know that fossils can help us learn about things that lived long ago - Know that soil is made from tiny particles of rock broken down by the action of weather (weathering) - Know that Zhang Heng was a genius in many areas: he was a scientist, mathematician, poet, inventor and artist - Know that Zhang Heng invented the world's first seismoscope that was able to detect where and when earthquakes had happened (when the Earth's tectonic plates suddenly shift causing massive vibrations)		
Enquiry Question:		Are all rocks made in the same way? Using criteria, children sort rock samples (and pictures) into the three types.		
Assessment criteria for Rocks and Fossils:		- Compare and group together different rocks on the basis of their appearance and simple physical properties - Describe and explain how different rocks can be useful to us - Can they begin to relate the properties of rocks with their uses - Describe and explain the differences between sedimentary and igneous rocks, considering the way they are formed - Describe in simple terms how fossils are formed when things that have lived are trapped within rock - Recognise that soils are made from rocks and organic matter		

Year	Module	Topic	Big Idea	Enquiry Type
3	4	Light	P3: Energy, which cannot be created or destroyed, comes in many different forms and tends to move away from objects that have lots of it. (In this case, the rule is that light energy travels in straight lines and doesn't pass through some objects.)	
Vocabulary:		Retrieval: absorption, energy, property, reflection New: wave, mirror, incident ray, image, beam, photons, solid, opaque, transparent, object, source, data logger (NB: the Sun and the Moon are capitalised when being discussed in an astronomical context.)		
Retrieval:		- Know that science is a way to understand our world by carefully thinking about it and testing our guesses with observations and experiments - Know that light is a form of energy		
Objectives:		- Know that energy comes in different forms and can be neither created nor destroyed, only changed from one form to another - Know that we need light to see things and that darkness is the absence of light - Know that light travels in straight lines - Know that light is reflected when it travels from a light source and then 'bounces' off an object - Know that everything that we can see is either a light source or something that is reflecting light from a light source into our eyes		
Enquiry Question:		Does the amount of light we experience only change a lot at night? Using 'Lux' ipad app, children gather data on light levels over the period of an hour and over the period of 24 hours. Children interpret the gathered data.		
Assessment criteria for Light:		- Recognise that they need light in order to see things, that dark is the absence of light - Notice that light is reflected from surfaces - Recognise that light from the sun can be dangerous and that there are ways to protect their eyes - Recognise that shadows are formed when the light from a light source is blocked by a solid object - Find patterns in the way that the size of shadows change, explain why their shadow changes when the light source is moved closer or further from the object - Explain the difference between transparent, translucent and opaque		

Year	Module	Topic	Big Idea	Enquiry Type
3	5	Light	E2: The Earth spins on its axis. P3: Energy, which cannot be created or destroyed, comes in many different forms and tends to move away from objects that have lots of it. (In this case, the rule is that light energy travels in straight lines and doesn't pass through some objects.)	
Vocabulary:		Retrieval: absorption, energy, property, reflection New: wave, mirror, incident ray, image, beam, photons, solid, opaque, transparent, object, source, data logger		
Retrieval:		Continuation from previous module		
Objectives:		Know that the Sun is a light source, but that the Moon is not and is merely reflecting light from the Sun Know that many light sources give off light and heat - Know that the Sun gives off light and heat when hydrogen turns into helium - Know that filaments in traditional bulbs heat up until they glow, giving off light and heat - Know that fluorescent bulbs glow when electricity adds energy to a gas within the bulb Know that opaque objects block light creating shadows and that light passes easily through transparent objects Know that opacity/transparency and reflectiveness are properties of a material Know that sunglasses can protect eyes from sunlight but looking at the Sun directly – even with sunglasses – can damage the eyes Know that as objects move towards a light source, the size of the shadow increases Know how to show the changing of shadow size by drawing a diagram with straight lines representing light - Know that a data logger can keep track of light levels and that this can be plotted on a graph to show how this changes over the course of a day Know that Hasan Ibn al-Haytham - sometimes known as Alhazen - was a scientist and mathematician during early Islamic civilisation Know that al-Haytham was the first to explain that we see objects because light reflects from objects into our eyes Know that al-Haytham was an early pioneer of the scientific method which used evidence to find things out about the world		
Enquiry Question:		Why do shadows change during the day? On a sunny day, using a metre stick, children note the changing length of a shadow thrown by a metre stick or other object.		
Assessment criteria for Light:		- Recognise that they need light in order to see things, that dark is the absence of light - Notice that light is reflected from surfaces - Recognise that light from the sun can be dangerous and that there are ways to protect their eyes - Recognise that shadows are formed when the light from a light source is blocked by a solid object - Find patterns in the way that the size of shadows change, explain why their shadow changes when the light source is moved closer or further from the object - Explain the difference between transparent, translucent and opaque		

Year	Module	Topic	Big Idea	Enquiry Type
3	6	Plants	B3: The different kinds of life, animals, plants and microorganisms, have evolved over millions of generations into different forms in order to survive in the environments in which they live.	 
Vocabulary:		Retrieval: component, energy, growth, habitat, reproduction, decay, offspring, adult, bulb, seed, survival, temperature nutrients, consumption, deciduous, evergreen, flower, plant, tree, structure, roots, stem, leaf, trunk, flower, vertebrate, skeleton New: extinction, fruit, nectar, anther, ovary, ovule, petal, pollen, stigma, style, stamen, function, exchange, dispersal, fertilisation, vitamin, balanced diet, cartilage, invertebrate, contract, loosen, ribcage, insect		
Retrieval:		- Know that evergreen trees maintain their leaves throughout the year and that deciduous trees shed their leaves in autumn - Know that flowering plants consist of roots, stem, leaves and flowers, and that a tree's stem is called a trunk - Know that living things move, grow, consume nutrients and reproduce; that dead things use to do these things, but no longer do; and that things that never lived have never done these things. - Know that plants absorb energy from the Sun; that this energy is consumed by herbivorous animals; and that carnivorous animals eat other animals. - Know that seeds and bulbs need to be buried underground in soil and that they will grow into adult plants under the right conditions (water, warmth) - Know that the arrows on a food chain show the direction that the energy travels. - Know that plants that are deprived of light, food or air will not grow and will die. - Know that animals, including humans, need food, water and air to survive - Know that there are food groups: fruit and vegetables, carbohydrates, protein, dairy, fat and sugary foods - Know that more than half of our diet should be made up of carbohydrates, fruit and vegetables - Know that fats and sugary foods should be eaten rarely and in small amounts		
Objectives:		- Know that different parts of plants have one or more functions (jobs) - Know that the roots collect water and minerals from the soil, and hold the plant firmly in the ground - Know that the stem holds up the leaves so that they can gather light to make food and holds up the flowers so that they can receive pollen and disperse their fruits; know that the stem also transports water and minerals from the roots to the other parts of the plant - Know that the leaves make food by absorbing light and using its energy to turn carbon dioxide and water into carbohydrates - Know that the function of a flower is reproduction, where flowers of the same kind exchange pollen – made by an anther – in a process called fertilisation, and a structure in the flower's ovary called an ovule becomes a seed; the ovary then becomes a fruit which helps the seed leave the plant in a process called dispersal		
Enquiry Question:		Do all plants need exactly the same things? Give both a parsley plant and a small cactus minimal water over a two week period and observe the changes (perhaps drawing the result).		
Assessment criteria for Plants:		- Identify and describe the functions of different parts of flowering plants (roots, stem/trunk, leaves and flowers) - Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) - Explain how the requirements vary from plant to plant - Investigate the way in which water is transported within plants - Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal		

Module	Topic	Big Idea	Key Vocabulary	Enquiry Questions	Type of Enquiry
1	Animals Including Humans	B3: The different kinds of life, animals, plants and microorganisms, have evolved over millions of generations into different forms in order to survive in the environments in which they live. (e.g. the right teeth for their food.)	Retrieval: absorption, component, dissolving, energy, nutrients, consumption, hygiene, herbivore, carnivore, organ New: digestion, excretion, peristalsis, anus, duodenum, small intestine, large intestine, stomach, rectum, oesophagus, tongue, saliva, acid, bile, enzymes, incisors, canines, molars, predator, prey, producer, consumer, primary, secondary, tertiary	How can we know things about a dinosaur when they have been extinct for 65 million years? Following learning about human teeth, children use information and pictures of different teeth from dinosaurs to try to work out what they might have eaten, justifying their answers. (Use language of carnivore, omnivore and herbivore.)	 
2	Sound	P3: Energy, which cannot be created or destroyed, comes in many different forms and tends to move away from objects that have lots of it. (Sound is one form of energy.)	Retrieval: absorption, conductor, energy, insulator, particle, wave New: vibration, percussion instrument, wind instrument, string instrument, frequency, volume, pitch, transverse wave, longitudinal wave, medium, vacuum	How do instruments make different sounds? Make a basic guitar or flute with different notes possible to show how different vibrations make notes of different pitch	
3	States of Matter	C3: Matter can change if the arrangement of the building blocks, of which it is made, changes.	Retrieval: absorption, dissolving, energy, evaporation, freezing, matter, melting, particle, temperature, ice, water, solid New: bond, condensation, evaporation, reversible, boiling point, melting point, liquid, gas, thermometer, water cycle, continuous precipitation, transpiration, surface runoff process, sublimation	Does ice always melt at the same speed? Observe and record as ice melts in different conditions (e.g. outside vs radiator, wrapped in insulation vs not)	 
4	Electricity	P3: Energy, which cannot be created or destroyed, comes in many different forms and tends to move away from objects that have lots of it. (Electrical energy in this case 'moves away from' the battery.)	Retrieval: absorption, conductor, energy, insulator, particle, property, wave New: circuit, component, appliance, charge, electron, battery, cell, bulb, buzzer, switch, wire, current electricity, static electricity, negative terminal, positive terminal, voltage, chemical reaction	Does electricity flow easily through all objects? Create a small circuit to test whether objects are conductors or insulators (e.g. circuit with a bulb which lights when a gap in the circuit is bridged).	 

5	Living Things and their Habitats	B2: Living things on Earth come in a huge variety of different forms that are all related because they all came from the same starting point 3.7 billion years ago.	Retrieval: decay, energy, habitat, freezing plant, structure, herbivore, carnivore, omnivore, microhabitat, environment, reproduction, vertebrate New: kingdom, classification key, species, fungi, bacteria, climate change, characteristics, offspring, extinction, pollution	Are some animals more alike than others? Use pictures to put animals into groups in different ways (e.g. where they live, what they eat, how they move, how many legs, etc) moving on to using keys to differentiate between closely related animals.	
6	Living Things and their Habitats	B2: Living things on Earth come in a huge variety of different forms that are all related because they all came from the same starting point 3.7 billion years ago.	Retrieval: decay, energy, habitat, freezing plant, structure, herbivore, carnivore, omnivore, microhabitat, environment, reproduction, vertebrate New: kingdom, classification key, species, fungi, bacteria, climate change, characteristics, offspring, extinction, pollution	Why are animals and plants going extinct? Use online resources and books to find out why plants and animals are going extinct and what humans are doing to help.	

Working Scientifically Assessment Criteria

Planning	Obtaining and Presenting Evidence	Considering Evidence and Evaluating
• Can they set up a simple fair test to make comparisons? • Can they plan a fair test and isolate variables, explaining why it was fair and which variables have been isolated? • Can they suggest improvements and predictions? • Can they decide which information needs to be collected and decide which is the best way for collecting it? • Can they use their findings to draw a simple conclusion? • Can they plan and carry out an investigation by controlling variables fairly and accurately? • Can they use test results to make further predictions and set up further comparative tests?	• Can they take measurements using different equipment and units of measure and record what they have found in a range of ways? • Can they make accurate measurements using standard units? • Can they explain their findings in different ways (display, presentation, writing)? • Can they record more complex data and results using scientific diagrams, classification keys, tables, bar charts, line graphs and models?	• Can they find any patterns in their evidence or measurements? • Can they make a prediction based on something they have found out? • Can they evaluate what they have found using scientific language, drawings, labelled diagrams, bar charts and tables? • Can they use straightforward scientific evidence to answer questions or to support their findings? • Can they report findings from investigations through written explanations and conclusions? • Can they report findings from investigations through written explanations and conclusions? • Can they use a graph or diagram to answer scientific questions?

Year	Module	Topic	Big Idea	Enquiry Type
4	1	Animals Including Humans	B3: The different kinds of life, animals, plants and microorganisms, have evolved over millions of generations into different forms in order to survive in the environments in which they live. (e.g. the right teeth for their food).	 
Vocabulary:		Retrieval: absorption, component, dissolving, energy, nutrients, consumption, hygiene, herbivore, carnivore, organ New: digestion, excretion, peristalsis, anus, duodenum, small intestine, large intestine, stomach, rectum, oesophagus, tongue, saliva, acid, bile, enzymes, incisors, canines, molars, predator, prey, producer, consumer, primary, secondary, tertiary		
Retrieval:		- Know that science is a way to understand our world by carefully thinking about it and testing our guesses with observations and experiments - Know that proteins are good for growth, carbohydrates for energy and fruit and vegetables provide vitamins and minerals which help keep us healthy (e.g. calcium for healthy bones and teeth) - Know that a food group can cause ill health, such as tooth decay due to excess sugar - Know that living things move, grow, consume nutrients and reproduce - Know that plants absorb energy from the Sun; that this energy is consumed by herbivorous animals; and that carnivorous animals eat other animals		
Objectives:		- Know that food passes through the body with the nutrients being extracted and the waste products excreted, and that this process is called digestion - Know that the process of digestion involves breaking complex foodstuffs into simpler building blocks that can be absorbed by the body - Know that the process of digestion begins with food being chewed in the mouth by the teeth and saliva added - Know that a human has three types of teeth – incisors, canines and molars – and that these each perform different functions - Know that incisors slice food, canines tear food (especially meat) and that molars grind food - Know that children develop an initial set of teeth which are gradually replaced between the ages of 6 and 12 - Know that food is squeezed down the oesophagus towards the stomach in a wave-like action called peristalsis - Know that the stomach releases acid and enzymes to continue breaking down the food; the stomach is an organ; an organ is a part of living thing that is self-contained and has a specific important job - Know that further enzymes and bile break down the food further as it moves through the duodenum towards the small intestine - Know that the small intestine adds more enzymes and then absorbs the nutrients - Know that the large intestine absorbs water from the undigested food - Know that undigested food is stored in the rectum before being excreted through a muscle called the anus - Know that a food chain traces the path of energy through a habitat - Know that the arrows in a food chain show the direction that energy is travelling through a habitat - Know that all energy for a food chain initially comes from the Sun which is absorbed and turned into energy by plants which are called producers - Know that consumers take in energy by eating - Know that an animal that is eaten by another is called prey, and that an animal that eats other animals is called a predator - Know that the first consumer in a food chain is called a primary consumer, the second is called a secondary consumer and above it is called a tertiary consumer		

Enquiry Question:	How can we know things about a dinosaur when they have been extinct for 65 million years? • Following learning about human teeth, children use information and pictures of different teeth from dinosaurs to try to work out what they might have eaten, justifying their answers. (Use language of carnivore, omnivore and herbivore.)
Assessment criteria for Animals Including Humans:	• Identify and name the basic parts of the digestive system in humans • Describe the simple functions of the basic parts of the digestive system in humans • Identify the simple function of different types of teeth in humans • Compare the teeth of herbivores and carnivores • Explain what a simple food chain shows • Construct and interpret a variety of food chains, identifying producers, predators and prey

Year	Module	Topic	Big Idea	Enquiry Type
4	2	Sound	P3: Energy, which cannot be created or destroyed, comes in many different forms and tends to move away from objects that have lots of it. (Sound is one form of energy.)	
Vocabulary:		Retrieval: absorption, conductor, energy, insulator, particle, wave New: vibration, percussion instrument, wind instrument, string instrument, frequency, volume, pitch, transverse wave, longitudinal wave, medium, vacuum		
Retrieval:		- Know that science is a way to understand our world by carefully thinking about it and testing our guesses with observations and experiments - Know that energy comes in different forms and can be neither created nor destroyed, only changed from one form to another		
Objectives:		- Know that sound is generated when an object vibrates; some of the energy from the vibrating object is transferred to the air, making the air particles move - Know that sound is a form of energy that transfers in a longitudinal wave - like that seen in a slinky - <u>not</u> a transverse wave - like that seen in water ripples (see diagram below) - Know that sound travels through a medium (e.g. particles in the air) and thus sounds does <u>not</u> travel through a vacuum which has no particles in it at all - Know that longitudinal sound waves are detected in the ear by humans and that the brain interprets this as the sounds we hear - Know that sound travels at different speeds through different objects; it travels at around 340 metres per second in air, much slower than light travels; this is why we often hear thunder <u>after</u> we see lightning as the light reaches our eye before the sound reaches our ears - Know that pitch is how high or low a sound is and that this is determined by how many vibrations per second are being made by the vibrating object; the number of vibrations per second is called frequency - Know that volume is how loud or quiet a sound is and that this is determined by the amount of energy in the wave (e.g. from how hard or soft a percussion instrument is hit) - Know that the volume of a sound is quieter if the listener is further away from the object - Know that there are many kinds of jobs as a scientist including communicator scientist, teacher scientist, technician scientist, explorer scientist, entrepreneur scientist, regulator scientist, investigator scientist and developer scientist - Know that investigative scientists to make connections between different areas of science - Know that developer scientists find new uses for scientific discoveries that other people hadn't thought of		
Enquiry Question:		How do instruments make different sounds? Make a basic guitar or flute with different notes possible to show how different vibrations make notes of different pitch		
Assessment criteria for Sound:		- Describe a range of sounds and explain how they are made - Associate some sounds with something vibrating - Recognise how vibrations from sound travel through a medium to the ear - Find patterns between the pitch of a sound and the features of the object that produce it - Find patterns between the volume of the sound and the strength of the vibrations that produced it - Explain how you could change the pitch of a sound		

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| | <ul style="list-style-type: none">• Explain why sound gets fainter or louder according to the distance• Work out which materials give the best insulation for sound |
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Year	Module	Topic	Big Idea	Enquiry Type
4	3	States of Matter	C3: Matter can change if the arrangement of the building blocks, of which it is made, changes.	 
Vocabulary:		Retrieval: absorption, dissolving, energy, evaporation, freezing, matter, melting, particle, temperature, ice, water, solid New: bond, condensation, evaporation, reversible, boiling point, melting point, liquid, gas, thermometer, water cycle, continuous precipitation, transpiration, surface runoff process, sublimation		
Retrieval:		- Know that science is a way to understand our world by carefully thinking about it and testing our guesses with observations and experiments - Know that an object is made from/of a material - Know that materials can be hard, soft, strong, weak, absorbent, heavy, light, solid and runny, smooth and rough; these descriptions denote the properties of a material - Know that matter (stuff) is made from tiny building blocks		
Objectives:		- Know that things are composed of a matter commonly in one of three states of matter: solid, liquid or gas - Know that things are made of particles (tiny building blocks) and that these are organised differently in different states - Know that materials can change state when temperature changes - Know that there are bonds between the particles (building blocks) in a solid; as temperature increases, these bonds are somewhat overcome as the particles absorb energy and solids can change into liquids; with a further increase in temperature, the particles become even more energetic and the bonds are overcome entirely so the liquid changes into a gas - Know that when solids turn into liquids, this is called melting and that the reverse process is called freezing - Know that when liquids turn into gases, this is called evaporation and that the reverse process is called condensation - Know that when a solid turns into a gas without passing through the liquid state, this is called sublimation - Know that the melting point of water is 0°C and that the boiling point of water is 100°C - Know that water flows around our world in a continuous process called the water cycle - Know that, along with evaporation, water on the Earth's surface moves to the air in a process called transpiration in which water turns into water vapour (gas) on the surface of leaves on plants - Know that rain condenses in clouds and falls to earth as rain, snow or hail in a process called precipitation - Know that water flows across the land in rivers and streams in a process called surface run-off and under the ground as groundwater		
Enquiry Question:		Does ice always melt at the same speed? Observe and record as ice melts in different conditions (e.g. outside vs radiator, wrapped in insulation vs not)		
Assessment criteria for States of		- Compare and group materials together, according to whether they are solids, liquids or gases - Observe what happens to materials when they are heated or cooled - Use measurements to explain changes to the state of water		

Matter:	• Identify the part that evaporation and condensation have in the water cycle • Associate the rate of evaporation with temperature • Relate temperature to the change of state of materials
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Year	Module	Topic	Big Idea	Enquiry Type
4	4	Electricity	P3: Energy, which cannot be created or destroyed, comes in many different forms and tends to move away from objects that have lots of it. (Electrical energy in this case ‘moves away from’ the battery.)	 
Vocabulary:		Retrieval: absorption, conductor, energy, insulator, particle, property, wave New: circuit, component, appliance, charge, electron, battery, cell, bulb, buzzer, switch, wire, current electricity, static electricity, negative terminal, positive terminal, voltage, chemical reaction		
Retrieval:		- Know that science is a way to understand our world by carefully thinking about it and testing our guesses with observations and experiments - Know that an object is made from/of a material - Know that metal is a material from which objects can be made. - Know that matter (stuff) is made from tiny building blocks - Know that energy comes in different forms and can be neither created nor destroyed, only changed from one form to another		
Objectives:		- Know that electrical energy is one of many forms of energy - Know that static electricity is an imbalance of charged particles on a material; it does <u>not</u> operate by flowing around a complete circuit - Know that current electricity is the flow of charged particles called electrons around a circuit - Know that current electricity is the form of electricity that we use in our lives in lights, computers, televisions, etc - Know that electrical current flows well through some materials, called electrical conductors, and poorly through other materials, called electrical insulators - Know that conductors have free electrons (tiny, negatively charged particles) and that when electrical current flows around a conductor the electrons move - Know that electrical conductivity (how well a material conducts electricity) is an example of a property - Know that metals are good electrical conductors - Know that a chemical reaction inside a cell produces the charged particles that can flow around a circuit - Know that more than one cell lined up to work together is called a battery - Cells, batteries and the mains are all sources of electrical energy - Know that electrical current can flow if there is a complete circuit - Know that wires – which contain a conductor inside them, usually made of metal – can allow electrical current to flow around a circuit - Know that when electrical current flows through a circuit components within that circuit – such as buzzers which make a noise and bulbs which emit light – begin to work - Know that a switch functions by completing or breaking a complete circuit - Know how to construct a simple circuit using components - Know that exposure to high levels of electrical current can be dangerous - Know that Michael Faraday was a scientist who studied electricity - Know that he invented the electric motor and showed that the movement of a magnet could create electricity, which is the reason we can generate electricity to power our world - Know that he is considered “the father of electricity”		

Enquiry Question:	Does electricity flow easily through all objects? • Create a small circuit to test whether objects are conductors or insulators (e.g. circuit with bulb which lights when a gap in the circuit is bridged).
Assessment criteria for Electricity:	• Identify common appliances that run on electricity • Construct a simple series electric circuit • Identify and name the basic parts in a series circuit, including cells, wires, bulbs, switches and buzzers • Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery • Recognise that a switch opens and closes a circuit • Associate a switch opening with whether or not a lamp lights in a simple series circuit • Recognise some common conductors and insulators • Associate metals with being good conductors • Explain why cautions are necessary for working safely with electricity

Year	Module	Topic	Big Idea	Enquiry Type
4	5	Living Things and their Habitats	B2: Living things on Earth come in a huge variety of different forms that are all related because they all came from the same starting point 3.7 billion years ago.	
Vocabulary:		Retrieval: decay, energy, habitat, freezing plant, structure, herbivore, carnivore, omnivore, microhabitat, environment, reproduction, vertebrate New: kingdom, classification key, species, fungi, bacteria, climate change, characteristics, offspring, extinction, pollution		
Retrieval:		- Know that science is a way to understand our world by carefully thinking about it and testing our guesses with observations and experiments - Know that living things move, grow, consume nutrients and reproduce; that dead things use to do these things, but no longer do; and that things that never lived have never done these things. - Know that polar bears are an example of an animal adapted to its environment – thick fur for warmth and oily paw pads to ensure that they don't freeze to the ice. - Know that a trout is an example of fish, a frog is an example of an amphibian; a lizard is an example of a reptile; a robin is an example of a bird; a rabbit and a human are examples of a mammal - Know that herbivorous animals eats plants; a carnivorous animal eats other animals; omnivorous animals eat both animals and plants - Know that a cat is an example of a carnivore; that a rabbit is an example of a herbivore; know that many humans are examples of omnivores (though not vegetarians) - Know that fish, amphibians, reptiles, birds and mammals are similar in that they have internal skeletons and organs; these are known as vertebrates, which means they are animals that have a backbone - Know that fish are different to other animals in having gills so that they can breathe underwater and have scaly skin - Know that amphibians are different to other animals in that they begin their lives with gills but then develop lungs and breath on land - Know that reptiles are different to other animals in that they breath air and have scaly skin - Know that birds are different to other animals in that they have feathers and wings - Know that mammals are different to other animals in that they have fur/hair and they feed milk to their young - Know a rose bush, grass, dandelion by sight - Know an ash tree, birch tree and conifer tree by sight		
Objectives:		- Know that animals can be grouped based on their physical characteristics (e.g. vertebrates and invertebrates) and based on their behaviour (e.g. herbivores, carnivores and omnivores) - Know that living things are divided into kingdoms: the animal kingdom, plants, fungi, bacteria, and single-celled organisms - Know that a species is a group of living things have many similarities that can reproduce together produce offspring		
Enquiry Question:		Are some animals more alike than others? Use pictures to put animals into groups in different ways (e.g. where they live, what they eat, how they move, how many legs, etc) moving on to using keys to differentiate between closely related animals.		
Assessment		Recognise and explore possible ways of grouping a wide selection of living things that include animals, flowering plants and non-flowering plants		

criteria for
Living Things
and Their
Habitats:

- Explore and use a classification key to group, identify and name a variety of living things
- Recognise that environments can change, and this can sometimes pose a danger to living things
- Give examples of human impact (both positive and negative) on environments

Year	Module	Topic	Big Idea	Enquiry Type
4	6	Living Things and their Habitats	B2: Living things on Earth come in a huge variety of different forms that are all related because they all came from the same starting point 3.7 billion years ago.	 
Vocabulary:		Retrieval: decay, energy, habitat, freezing plant, structure, herbivore, carnivore, omnivore, microhabitat, environment, reproduction, vertebrate New: kingdom, classification key, species, fungi, bacteria, climate change, characteristics, offspring, extinction, pollution		
Retrieval:		Continuation from previous module		
Objectives:		Know that a classification key uses questions to sort and identify different living things Know how to use a classification key to identify living things - Know how to create a classification key to sort plants on the school premises Know that changes to the environment can make it more difficult for living things to survive and reproduce; in extreme cases this leads to extinction, where an entire species dies Know that human activity – such as climate change caused by pollution - can change the environment for many living things, endangering their existence Know that many species of living things have already been made extinct as a result of human activity Know that the polar bear is a famous example of climate change endangering the existence of a species; as the climate changes and gets warmer, the sea ice on which polar bears live reduces in amount making it harder for them to survive and reproduce - Know that Carl Linnaeus was a famous scientist who studied life and created a system for sorting living things into different groups - Know that the concept of species and kingdoms (such as the animal kingdom or the plant kingdom) was his invention, and that all living things are given a name that uses his method of classification		
Enquiry Question:		Why are animals and plants going extinct? Use online resources and books to find out why plants and animals are going extinct and what humans are doing to help.		
Assessment criteria for Living Things and Their Habitats:		- Recognise and explore possible ways of grouping a wide selection of living things that include animals, flowering plants and non-flowering plants - Explore and use a classification key to group, identify and name a variety of living things - Recognise that environments can change, and this can sometimes pose a danger to living things - Give examples of human impact (both positive and negative) on environments		

Module	Topic	Big Idea	Key Vocabulary	Enquiry Questions	Type of Enquiry
1	Living Things & their Habitats Animals Including Humans	B1: Living things are special collections of matter that make copies of themselves, use energy and grow.	Retrieval: decay, plant, structure, reproduction, nutrients, reproduction, fish, bird, amphibian, reptile, mammal, fruit, nectar, anther, ovary, ovule, petal, pollen, stigma, style, stamen, function, exchange, dispersal, fertilisation, insect, vertebrates New: life cycle, life span, embryo, womb, weaned, adolescence, metamorphosis, pupa, larva, chrysalis, caterpillar, tadpole, hatchling, fledgling, insect	If life has existed for billions of years, why are there still people alive today? Use a variety of information and online resources to research and describe the life cycles of different animals, looking for the similarities between each.	
2	Forces	P2: Forces are different kinds of pushes and pulls that act on all the matter that is in the universe.	Retrieval: energy, matter, particle, surface, friction, force, stretch, squash, rotation, rough, smooth, sliding friction, static friction New: acceleration, air resistance, buoyancy, effort, force meter, fulcrum, gravity, load, mass, mesh, Newton, pivot, rigid, streamlined, terminal velocity, unsupported, water resistance, weight	How do parachutes work? Create parachutes, changing a variable to try to isolate what is needed for an effective parachute (e.g. changing parachute material, size, shape, etc)	
3	Earth and Space	E1: The Earth is one of eight planets that orbit the sun. It has one large natural satellite called the Moon that orbits the Earth.	Retrieval: absorption, energy, freezing, melting, orbit, reflection, wave, Sun, spring, summer, autumn, winter (NB: the Sun and the Earth are capitalised when being discussed in an astronomical context.) New: planet, satellite, sphere, solar system, eclipse, star, universe, constellation, axis, celestial body, Moon, rotating, lunar, solar, telescope, rotation	What shape is the moon and does it change? Keep a moon diary over the period of a month (focusing on moon shape) and a moon diary for one clear evening (focusing on position in the sky) and analyse their results.	
4	Materials	C3: Matter can change if the arrangement of these building blocks changes.	Retrieval: absorption, bond, condensation, conductor, evaporation, matter, melting, particle, property, reversible, freezing, wood, plastic, glass, metal, water, rock, suitability, surface, waterproof, flexible, rigid, boiling point, melting point, solid, liquid, gas, sublimation, magnetic New: irreversible, dissolve, soluble, insoluble, solvent, solute, solution, filter, sieve, saturation, crystallisation, thermal, chemistry	What happens to salt in water? Stir a small amount of salt, sugar, small stones and sand into water and to observe what happens with each and to determine which is soluble in water and which is insoluble in water	

5	Materials	C3: Matter can change if the arrangement of these building blocks changes.	Retrieval: absorption, bond, condensation, conductor, evaporation, matter, melting, particle, property, reversible, freezing, wood, plastic, glass, metal, water, rock, suitability, surface, waterproof, flexible, rigid, boiling point, melting point, solid, liquid, gas, sublimation, magnetic New: irreversible, dissolve, soluble, insoluble, solvent, solute, solution, filter, sieve, saturation, crystallisation, thermal, chemistry	Can I make a gas using a solid and a liquid? Add vinegar (ethanoic acid) to bicarbonate of soda and observe the reaction, specifically the bubbles of carbon dioxide given off.	
6	Materials	C2: Matter can change if the arrangement of these building blocks changes. (In this case, dissolving, breaks the bonds between building blocks.)	Retrieval: absorption, bond, condensation, conductor, evaporation, matter, melting, particle, property, reversible, freezing, wood, plastic, glass, metal, water, rock, suitability, surface, waterproof, flexible, rigid, boiling point, melting point, solid, liquid, gas, sublimation, magnetic New: irreversible, dissolve, soluble, insoluble, solvent, solute, solution, filter, sieve, saturation, crystallisation, thermal, chemistry	Is it possible to separate even very small things like sand, salt and stones? Use filtering and evaporation to separate a mixture of sand, salt and stones.	

Working Scientifically Assessment Criteria

Planning	Obtaining and Presenting Evidence	Considering Evidence and Evaluating
• Can they set up a simple fair test to make comparisons? • Can they plan a fair test and isolate variables, explaining why it was fair and which variables have been isolated? • Can they suggest improvements and predictions? • Can they decide which information needs to be collected and decide which is the best way for collecting it? • Can they use their findings to draw a simple conclusion? • Can they plan and carry out an investigation by controlling variables fairly and accurately? • Can they use test results to make further predictions and set up further comparative tests?	• Can they take measurements using different equipment and units of measure and record what they have found in a range of ways? • Can they make accurate measurements using standard units? • Can they explain their findings in different ways (display, presentation, writing)? • Can they record more complex data and results using scientific diagrams, classification keys, tables, bar charts, line graphs and models?	• Can they find any patterns in their evidence or measurements? • Can they make a prediction based on something they have found out? • Can they evaluate what they have found using scientific language, drawings, labelled diagrams, bar charts and tables? • Can they use straightforward scientific evidence to answer questions or to support their findings? • Can they identify differences, similarities or changes related to simple scientific ideas or processes? • Can they report findings from investigations through written explanations and conclusions? • Can they use a graph or diagram to answer scientific questions?

Year	Module	Topic	Big Idea	Enquiry Type
5	1	Living Things & their Habitats Animals Including Humans	B1: Living things are special collections of matter that make copies of themselves, use energy and grow.	
Vocabulary:		Retrieval: decay, plant, structure, reproduction, nutrients, reproduction, fish, bird, amphibian, reptile, mammal, fruit, nectar, anther, ovary, ovule, petal, pollen, stigma, style, stamen, function, exchange, dispersal, fertilisation, insect, vertebrates New: life cycle, life span, embryo, womb, weaned, adolescence, metamorphosis, pupa, larva, chrysalis, caterpillar, tadpole, hatchling, fledgling, insect		
Retrieval:		- Know that science is a way to understand our world by carefully thinking about it and testing our guesses with observations and experiments - Know that living things move, grow, consume nutrients and reproduce; that dead things use to do these things, but no longer do; and that things that never lived have never done these things - Know that a trout is an example of fish, a frog is an example of an amphibian; a lizard is an example of a reptile; a robin is an example of a bird; a rabbit and a human are examples of a mammal - Know that fish, amphibians, reptiles, birds and mammals are similar in that they have internal skeletons and organs; these are known as vertebrates, which means they are animals that have a backbone - Know that fish are different to other animals in having gills so that they can breathe underwater and have scaly skin - Know that amphibians are different to other animals in that they begin their lives with gills but then develop lungs and breathe on land - Know that reptiles are different to other animals in that they breath air and have scaly skin - Know that birds are different to other animals in that they have feathers and wings - Know that mammals are different to other animals in that they have fur/hair and they feed milk to their young - Know that different parts of plants have one or more functions (jobs) - Know that roots collect water and minerals from the soil, and hold the plant firmly in the ground - Know that the stem holds up the leaves so that they can gather light to make food and holds up the flowers so that they can receive pollen and disperse their fruits; the stem also transports water and minerals from the roots to the other parts of the plant - Know that the leaves make food by trapping light and using its energy to turn carbon dioxide and water into carbohydrates - Know that the function of a flower is reproduction, where flowers of the same kind exchange pollen - made by an anther - in a process called fertilisation, and a structure in the flower's ovary called an ovule becomes a seed; the ovary then becomes a fruit which helps the seed leave the plant in a process called dispersal		
Objectives:		- Know that the life cycle of a living thing is a series of stages of development starting with a fertilised egg in animals or a seed in many plants - Know that in most mammals (e.g. dogs) a fertilised egg develops in the womb into an embryo and is then born and fed on milk before it is weaned onto the food that is adapted to eat; it then develops to maturity in a period called adolescence after which it can reproduce and the cycle can begin again (- Know that in amphibians (e.g. frogs) a fertilised egg develops into an embryo and then hatches into a tadpole; the tadpole develops adult characteristics, metamorphoses into the adult form after which it can reproduce and the cycle can begin again - Know that in many insects (e.g. butterflies) a fertilised egg develops into wingless feeding form called a larva (caterpillar); the larva feeds then later becomes a pupa (chrysalis) with a protective cocoon; inside this cocoon, the pupa metamorphoses into the adult butterfly after which it can reproduce and the cycle can begin again - Know that in birds (e.g. robins) a fertilised egg hatches in a nest (a hatchling) and is fed by its parents until it is ready to fly (i.e. becomes a fledgling); it then leaves the nest		

	and grows into an adult after which it can reproduce and the cycle can begin again • Know that humans go through stages of development; they begin as fertilised eggs and then develop into embryos before developing into babies; once they are born, these newborn babies become infants (roughly 2 months to 2 years) then into young children (roughly 2-12 years old); children develop into adults during adolescence (roughly 12-16 years old) at which age they become physically capable of reproduction; as adults develop into old age (roughly 55+ years old) they experience changes in their body which require them to move more carefully and rest more frequently <i>NB: the changes of adolescence in humans is taught as part of mandatory sex and relationship education; it must be taught with due sensitivity to children's backgrounds and must reflect the PSHE curriculum</i>
Enquiry Question:	If life has existed for billions of years, why are there still people alive today? • Use a variety of information and online resources to research and describe the life cycles of different animals, looking for the similarities between each.
Assessment criteria for Living Things and Their Habitats and Animals Including Humans:	• Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird • Describe the life process of reproduction in some plants • Describe the life process of reproduction in some animals • Describe the changes as humans develop to old age • Create a timeline to indicate stages of growth in certain animals (i.e. frogs and butterflies) to compare to humans • Describe the changes experienced in puberty • Draw a timeline to indicate stages in the growth and development of humans

Year	Module	Topic	Big Idea	Enquiry Type
5	2	Forces	P2: Forces are different kinds of pushes and pulls that act on all the matter that is in the universe	
Vocabulary:		Retrieval: energy, matter, particle, surface, friction, force, stretch, squash, rotation, rough, smooth, sliding friction, static friction New: acceleration, air resistance, buoyancy, effort, force meter, fulcrum, gravity, load, mass, mesh, Newton, pivot, rigid, streamlined, terminal velocity, unsupported, water resistance, weight		
Retrieval:		• Know that science is a way to understand our world by carefully thinking about it and testing our guesses with observations and experiments • Know that a force can be thought of as a push or a pull • Know that as objects move across a surface there is friction when they rub against each other and that sometimes this friction is larger or smaller. • Know that applying forces to objects can change their shape. • Know that the roughness of a material is an example of a property • Know that there are three types of contact force: impact forces (when two surfaces collide), frictional forces (when two surfaces are already in contact) and strain forces (when an elastic material is stretched or squashed). • Know that objects move differently on rough and smooth surfaces; objects resist movement more on rough surfaces because there is higher friction as the object moves		
Objectives:		• Know that a force is measured in a unit called Newtons, named after a British scientist called Sir Isaac Newton who discovered lots about gravity and how planets move • Know that Newton was undoubtedly one of the greatest scientists who ever lived, a genius who discovered a great deal about forces, including gravity, mathematics and light • Know that pull forces can be measured using a device called a force meter • Know that the amount of matter (stuff) in an object is its mass • Know that gravity is a force that acts between all objects in the universe, but that it acts much more strongly between objects that have more mass and that are close together • Know that unsupported objects are pulled towards the Earth by the force of gravity • Know that acceleration is a change in speed and that unbalanced forces acting on an object cause it to accelerate • Know that air resistance is a force felt by an object as it moves through the air; it is caused by the object bumping into the gas particles that make up air; the quicker an object moves, the more gas particles it bumps into and the more air resistance it experiences • Know that a falling object will accelerate until its air resistance matches the gravitational force pulling it down; at this point, the object will continue to move at this speed (called its terminal velocity) without getting any quicker or slowing down (see diagram below) • Know that a parachute's shape increases the air resistance that a falling object experiences, giving it a much lower terminal velocity • Know that water resistance is a force felt by an object as it moves through water; it is caused by the object bumping into the water particles • Know that the shape of an object determines how much air resistance or water resistance it experiences; shapes of object that experience little air resistance or water resistance are described as streamlined • Know how to draw a force diagram with arrows representing the different forces acting on an object		

	• Know that a lever is a rigid length pivoting around a fulcrum • Know that a pulley is a wheel with a fulcrum that supports a moving cable or belt • Know that a gear is a rotating wheel with cut teeth that mesh with the teeth of another gear so that turning one gear turns an adjacent gear in the opposite direction (see diagram below) • Know that gears, levers and pulleys are simple machines that are used to allow a smaller force to have a greater effect; they do this by moving a smaller force over a longer distance at one end of the machine, which the machine turns into a larger force over a small distance at the other end
Enquiry Question:	How do parachutes work? • Create parachutes, changing a variable to try to isolate what is needed for an effective parachute (e.g. changing parachute material, size, shape, etc)
Assessment criteria for Forces:	• Explain that unsupported objects fall towards the earth because of the force of gravity acting between the earth and the falling object • Identify the effects of air resistance that act between moving surfaces • Identify the effects of water resistance that act between moving surfaces • Identify the effects of friction that act between moving surfaces • Recognise that some mechanisms, (levers, pulleys and gears), allow a smaller force to have a greater effect • Describe and explain how motion is affected by forces (gravitational attractions, magnetic attraction and friction)

Year	Module	Topic	Big Idea	Enquiry Type
5	3	Earth and Space	E1: The Earth is one of eight planets that orbit the sun. It has one large natural satellite called the Moon that orbits the Earth.	
Vocabulary:		Retrieval: absorption, energy, freezing, melting, orbit, reflection, wave, sun, spring, summer, autumn, winter New: planet, satellite, sphere, solar system, eclipse, star, universe, constellation, axis, celestial body, moon, rotating, lunar, solar, telescope, rotation		
Retrieval:		- Know that science is a way to understand our world by carefully thinking about it and testing our guesses with observations and experiments - Know that days are longer in the summer and shorter in winter - Know that weather changes through the year, getting hotter in the summer and colder in the winter - Know that Earth orbits the Sun with one orbit constituting a year of 365/366 days - Know that light is a form of energy - Know that we need light to see things and that darkness is the absence of light - Know that light travels in straight lines - Know that everything that we can see is either a light source or something that is reflecting light from a light source into our eyes - Know that the Sun is a light source, but that the Moon is not and is merely reflecting light from the Sun - Know that many light sources give off light and heat - Know that the Sun gives off light and heat when hydrogen turns into helium		
Objectives:		- Know that the universe comprises all matter and space in existence - Know that a celestial body is a large object in the universe - Know that a star is an exceptionally hot ball of gas, originally made from hydrogen and helium - Know that the Sun is a star - Know that a planet (e.g Earth) is defined as a spherical celestial body that orbits a star and that has cleared the neighbourhood of its orbit of other objects, some of which crash into the planet and others that become moons of that planet - Know it was once thought that everything orbited the Earth, but that scientists like Copernicus and Galileo used telescopes and measurement to show that the Earth orbited the Sun - The Sun and the objects that orbit it are collectively known as our Solar System - Know that there are eight major planets in our solar system: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune - Know that a satellite orbits a planet and that moons are natural satellites - Know that humans have sent man-made satellites into orbit that assist with telecommunication - Know that all the planets in the solar system orbit the Sun and that the further away they are from the Sun, the longer their orbit - Know that the Earth spins around an imaginary line through its centre called an axis and that this axis is tilted relative to the Earth's orbit - Know that night and day are the result of the Earth rotating on its axis - Know that the tilt of the Earth towards and away from the Sun's light as the Earth orbits the Sun leads to the seasons as during winter the light is spread over a wider area		

	• Know that the Moon orbits the Earth roughly every 28 days • Know that as the Moon orbits the Sun, different parts of it are lit up by the Sun, which is why we see a different shape lit up on the Moon as the lunar cycle progresses; these are called phases of the Moon • Know that a solar eclipse occurs when the Moon is between the Sun and the Earth, casting a shadow on the Earth; a lunar eclipse occurs when the Earth is between the Sun and the Moon, casting a shadow on the Moon • Know that Katherine Johnson was a scientist and mathematician from America • She worked for NASA and her calculations and work were critical to the success of the first and subsequent manned space flights • She was one of the first black women to attend an integrated university in her state, West Virginia, having been handpicked due to her ability
Enquiry Question:	What shape is the moon and does it change? • Keep a moon diary over the period of a month (focusing on moon shape) and a moon diary for one clear evening (focusing on position in the sky) and analyse their results.
Assessment criteria for Earth and Space:	• Describe the movement of the Earth and other planets relative to the sun in the solar system • Describe and explain the movement of the Moon relative to the Earth • Describe the sun, earth and moon as approximately spherical bodies • Use the idea of the earth's rotation to explain day and night and the apparent movement of the sun across the sky

Year	Module	Topic	Big Idea	Enquiry Type
5	4	Materials	C3: Matter can change if the arrangement of these building blocks changes.	
Vocabulary:		Retrieval: absorption, bond, condensation, conductor, evaporation, matter, melting, particle, property, reversible, freezing, wood, plastic, glass, metal, water, rock, suitability, surface, waterproof, flexible, rigid, boiling point, melting point, solid, liquid, gas, sublimation, magnetic New: irreversible, dissolve, soluble, insoluble, solvent, solute, solution, filter, sieve, saturation, crystallisation, thermal, chemistry		
Retrieval:		- Know that science is a way to understand our world by carefully thinking about it and testing our guesses with observations and experiments - Know that one can distinguish between materials made of wood, plastic, glass, metal, water, rock - Know that an object is made from/of a material - Know that materials can have useful properties for a given job (including being waterproof, strong, weak, hard, soft, flexible, rigid, solid, runny, light, heavy, smooth, rough, flexible or rigid) - Know that electrical conductivity (how well a material conducts electricity) is an example of a property - Know that metals are good electrical conductors - Know that many types of plastic are waterproof, that steel (a type of metal) is strong, that rock is hard, that cotton wool is soft, that rubber is flexible, that rock is rigid, that polystyrene (a type of plastic) is light and that iron (a type of metal) is heavy - Know that things are composed of a matter commonly in one of three states of matter: solid, liquid or gas - Know that things are made of particles (tiny building blocks) and that these are organized differently in each state - Know that materials can change state when temperature changes - Know that there are bonds between the particles (building blocks) in a solid; as temperature increases, these bonds are somewhat overcome as the particles absorb energy and solids can change into liquids; with a further increase in temperature, the particles become even more energetic and the bonds are overcome entirely so the liquid changes into a gas - Know that when solids turn into liquids, this is called melting and that the reverse process is called freezing - Know that when liquids turn into gases, this is called evaporation and that the reverse process is called condensation - Know that when a solid turns into a gas without passing through the liquid state, this is called sublimation - Know that the melting point of water is 0° C and that the boiling point of water is 100° C - Know that some materials are magnetic, meaning that they are attracted to a magnet, while other materials are non-magnetic		
Objectives:		- Know that materials can be sorted in a variety of ways based on their properties - Know that in some solid materials the bonds between particles break when surrounded by a liquid; this allows the liquid to absorb the solid; when this happens, the solid is called a solute, the liquid is called a solvent and the result is a solution; when a solid does dissolve in a liquid it is described as being soluble in that solvent (e.g. sugar in water); when it cannot it is insoluble (e.g. sand in water)		
Enquiry Question:		What happens to salt in water? Stir a small amount of salt, sugar, small stones and sand into water and to observe what happens with each and to determine which is soluble in water and which is insoluble		

	in water
Assessment criteria for Materials:	• Compare and group together everyday materials by their properties, (hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets) • Explain how some materials dissolve in liquid to form a solution • Use their knowledge of solids, liquids and gases to decide how mixtures might be separated (through filtering, sieving, evaporating) • Give reasons, based on evidence for comparative and fair tests for the particular uses of everyday materials, including metals wood and plastic • Use the terms 'reversible' and 'irreversible'

Year	Module	Topic	Big Idea	Enquiry Type
5	5	Materials	C3: Matter can change if the arrangement of these building blocks changes.	
Vocabulary:		Retrieval: absorption, bond, condensation, conductor, evaporation, matter, melting, particle, property, reversible, freezing, wood, plastic, glass, metal, water, rock, suitability, surface, waterproof, flexible, rigid, boiling point, melting point, solid, liquid, gas, sublimation, magnetic New: irreversible, dissolve, soluble, insoluble, solvent, solute, solution, filter, sieve, saturation, crystallisation, thermal, chemistry		
Retrieval:		Continuation from previous unit		
Objectives:		- Know that a given amount of solvent can only absorb a certain amount of solid before no more will dissolve; when this happens the liquid is said to be saturated Know that when a solvent is evaporated from a solution, the original solute is left behind; the remaining solid will often form crystals – the slower the solvent evaporates, the larger the crystals that will be formed Know how to dissolve a solute in a solvent and then how to evaporate the solvent to recover the solute Know that a reversible change is one that can be reversed and that examples of this are mixing, dissolving and changes of state where no chemical reaction takes place Know that an irreversible change is one that cannot be reversed and that examples of this often involve a chemical change where a new material is made, often a gas (e.g. burning, boiling an egg, the reaction of bicarbonate of soda and acid) Know that filtering allows solids and liquids to be separated and that sieving allows solids made up of different sizes parts to be separated		
Enquiry Question:		Can I make a gas using a solid and a liquid? Add vinegar (ethanoic acid) to bicarbonate of soda and observe the reaction, specifically the bubbles of carbon dioxide given off.		
Assessment criteria for Materials:		- Compare and group together everyday materials by their properties, (hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets) - Explain how some materials dissolve in liquid to form a solution - Use their knowledge of solids, liquids and gases to decide how mixtures might be separated (through filtering, sieving, evaporating) - Give reasons, based on evidence for comparative and fair tests for the particular uses of everyday materials, including metals wood and plastic - Use the terms 'reversible' and 'irreversible'		

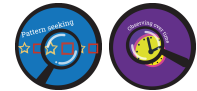
Year	Module	Topic	Big Idea	Enquiry Type
5	6	Materials	C2: Matter can change if the arrangement of these building blocks changes. (In this case, dissolving, breaks the bonds between building blocks.)	
Vocabulary:		Retrieval: absorption, bond, condensation, conductor, evaporation, matter, melting, particle, property, reversible, freezing, wood, plastic, glass, metal, water, rock, suitability, surface, waterproof, flexible, rigid, boiling point, melting point, solid, liquid, gas, sublimation, magnetic New: irreversible, dissolve, soluble, insoluble, solvent, solute, solution, filter, sieve, saturation, crystallisation, thermal, chemistry		
Retrieval:		Continuation from previous module		
Objectives:		- Know how to separate a mixture of sand, salt and small stones by sieving (to remove the small stones), followed by dissolving in water (so the salt is absorbed), followed by filtering to remove the sand from the mixture, followed finally by evaporation of the water to recover the salt. Know that materials' different properties can be tested through acting upon them, including testing to find whether materials are magnetic, thermally conductive and electrically conductive; know that the various properties of different materials make them suitable for a given function Know how to explain orally and in writing the reasons why various materials are suited or unsuited to a function - Know that Marie Curie was a genius physicist, earning two Nobel Prizes - She discovered two new elements (the building blocks of everything) and made discoveries that suggested that atoms - which were thought to be the smallest building blocks - could be divided into smaller building blocks still		
Enquiry Question:		Is it possible to separate even very small things like sand, salt and stones? Use filtering and evaporation to separate a mixture of sand, salt and stones.		
Assessment criteria for Materials:		- Compare and group together everyday materials by their properties, (hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets) - Explain how some materials dissolve in liquid to form a solution - Use their knowledge of solids, liquids and gases to decide how mixtures might be separated (through filtering, sieving, evaporating) - Give reasons, based on evidence for comparative and fair tests for the particular uses of everyday materials, including metals wood and plastic - Use the terms 'reversible' and 'irreversible'		

Module	Topic	Big Idea	Key Vocabulary	Enquiry Questions	Type of Enquiry
1	Animals Including Humans	B1: Living things are special collections of matter that make copies of themselves, use energy and grow. (The faster heartbeat is to get oxygen round the body so that energy can be used in the muscles.)	Retrieval: component, energy, growth, survival, nutrients, consumption, skeleton, ribcage, protein, carbohydrate, fat, digestion, skeleton, organ, digestion, excretion, peristalsis, anus, duodenum, small intestine, large intestine, stomach, rectum, oesophagus, tongue, saliva, acid, bile, enzymes, incisors, canines, molars New: artery, aorta, atrium, blood vessels capillary, circulatory system, vein, pulse, ventricle, replenished, resting heart rate, body, cranium, mandible, sternum, vertebrae, femur, tibia, fibula, patella, humerus, radius, ulna	Is our heart rate always the same? Investigate the effect of exercise on heart rate and how long it takes for their pulse to return to the resting rate after exercising for a minute. How long does it take to get fitter? Over the course of a month, investigate whether some volunteers (who do consistent exercise at break time) can lower their resting heart rate.	 
2	Light	P3: Energy, which cannot be created or destroyed, comes in many different forms and tends to move away from objects that have lots of it.	Retrieval: absorption, energy, particle, property, reflection, wave, mirror, incident ray, image, beam, photons, solid, opaque, transparent, object, source, vibration, percussion instrument, wind instrument, string instrument, frequency, volume, pitch, transverse wave, longitudinal wave, medium, vacuum New: angle of incidence, angle of reflection, refraction, spectrum, translucent, medium, periscope	Why can I hear round corners but not see round corners? Use mirrors and torches to investigate how light travels in straight lines and reflects off mirrors.	
3 & 4	Living Things and their Habitats	B3: The different kinds of life, animals, plants and microorganisms, have evolved over millions of generations into different forms in order to survive in the environments in which they live.	Retrieval: component, habitat, plant, structure, fish, bird, amphibian, reptile, mammal, kingdom, classification key, species, fungi, bacteria, characteristics, offspring, vertebrate, invertebrate, insect New: microorganism, virus, thorax, arthropod, abdomen, arachnid, antenna, jointed limbs	What make bread rise? Show how yeast, sugar and warm water causes a reaction; then investigate what happens to this reaction when they change particular variables of their choice (sugar/no sugar, water temperature, adding chemicals, etc)	 
5	Electricity	P3: Energy, which cannot be created or destroyed, comes in many different forms and tends to move away from objects that have lots of it.	Retrieval: circuit, component, conductor, energy, insulator, particle, property, material, appliance, charge, electron, battery, cell, bulb, buzzer, switch, wire, current electricity, static electricity, negative terminal, positive terminal, voltage, chemical reaction, emit New: series circuit, parallel circuit, resistance, voltage	Is it possible to change how bright a bulb is or how loud a buzzer is? Create circuits to investigate the effect of different voltages on different components.	

6	Evolution and Inheritance	B3: The different kinds of life, animals, plants and microorganisms, have evolved over millions of generations into different forms in order to survive in the environments in which they live.	Retrieval: birth, decay, energy, habitat, irreversible, extinction, microhabitat, dead, life cycle, food chain, source, nutrients, reproduction, consumption, environment, extinction, species, characteristic, adaptation New: evolution, natural selection, variation, advantageous	Why do different species of animals look different? Research and sort various species of animals into the environments to which they are adapted based on their physical attributes and listed behaviours.	
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Working Scientifically Assessment Criteria

Planning	Obtaining and Presenting Evidence	Considering Evidence and Evaluating
• Can they explore different ways to test an idea, choose the best way, and give reasons? • Can they vary one factor whilst keeping the others the same in an experiment? Can they explain why they do this? • Can they plan and carry out an investigation by controlling variables fairly and accurately? • Can they make a prediction with reasons? • Can they use information to help make a prediction? • Can they use test results to make further predictions and set up further comparative tests? • Can they explain, in simple terms, a scientific idea and what evidence supports it? • Can they use information from different sources to answer a question and plan an investigation? • Can they identify the key factors when planning a fair test?	• Can they explain why they have chosen specific equipment? (incl ICT based equipment) • Can they decide which units of measurement they need to use? • Can they take measurements using a range of scientific equipment with increasing accuracy and precision? • Can they explain why a measurement needs to be repeated? • Can they record their measurements in different ways? (incl bar charts, tables and line graphs) • Can they plan in advance which equipment they will need and use it well? • Can they collect information in different ways? • Can they record their measurements and observations systematically?	• Can they find a pattern from their data and explain what it shows? • Can they use a graph to answer scientific questions? • Can they link what they have found out to other science? • Can they suggest how to improve their work and say why they think this? • Can they record more complex data and results using scientific diagrams, classification keys, tables, bar charts, line graphs and models? • Can they report findings from investigations through written explanations and conclusions? • Can they identify scientific evidence that has been used to support to refute ideas or arguments? • Can they 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? • Can they draw conclusions from their work? • Can they link their conclusions to other scientific knowledge?

Year	Module	Topic	Big Idea	Enquiry Type
6	1	Animals Including Humans	B1: Living things are special collections of matter that make copies of themselves, use energy and grow. (The faster heartbeat is to get oxygen round the body so that energy can be used in the muscles.)	
Vocabulary:		Retrieval: component, energy, growth, survival, nutrients, consumption, skeleton, ribcage, protein, carbohydrate, fat, digestion, skeleton, organ, digestion, excretion, peristalsis, anus, duodenum, small intestine, large intestine, stomach, rectum, oesophagus, tongue, saliva, acid, bile, enzymes, incisors, canines, molars New: artery, aorta, atrium, blood vessels capillary, circulatory system, vein, pulse, ventricle, replenished, resting heart rate, body, cranium, mandible, sternum, vertebrae, femur, tibia, fibula, patella, humerus, radius, ulna		
Retrieval:		- Know that science is a way to understand our world by carefully thinking about it and testing our guesses with observations and experiments - Know that living things move, grow, consume nutrients and reproduce; that dead things use to do these things, but no longer do; and that things that never lived have never done these things - Know that animals, including humans, need food, water and air to survive - Know that people need to exercise often to help their body stay strong and fit - Know that keeping clean, including washing and brushing teeth, is an important part of staying healthy - Know that there are food groups: fruit and vegetables, carbohydrates, protein, dairy, fat and sugary foods - Know that proteins are good for growth, carbohydrates for energy and fruit and vegetables provide vitamins and minerals which help keep us healthy (e.g. calcium for healthy bones and teeth) - Know that more than half of our diet should be made up of carbohydrates, fruit and vegetables - Know that fats and sugary foods should be eaten rarely and in small amounts - Know that getting the right amount of each food group (including over half of the diet made up of fruit, vegetables and carbohydrates) is called a balanced diet - Know that a lack of a nutrient can cause ill health; for example, a lack of vitamin D leads to a disease called rickets - Know that excess of a food group can cause ill health, such as tooth decay due to excess sugar <i>NB – some food groups are difficult to afford for some families so sensitivity is required in teaching this area</i> - Food passes through the body with the nutrients being extracted and the waste products excreted, and this process is called digestion - The process of digestion involves breaking complex foodstuffs into simpler building blocks that can be absorbed by the body - Know that the process of digestion begins with food being chewed in the mouth by the teeth and saliva added - Know that a human has three types of teeth – incisors, canines and molars – and that these each perform different functions - Know that incisors slice food, canines tear food (especially meat) and that molars grind food - Know that children develop an initial set of teeth which are gradually replaced between the ages of 6 and 12 - Know that food is squeezed down the oesophagus towards the stomach in a wave-like action called peristalsis - Know that the stomach releases acid and enzymes to continue breaking down the food; the stomach is an organ; an organ is a part of living thing that is self-contained and has a specific important job - Know that further enzymes and bile break down the food further as it moves through the duodenum towards the small intestine - Know that the small intestine adds more enzymes and then absorbs the nutrients		

	- Know that the large intestine absorbs water from the undigested food - Know that undigested food is stored in the rectum before being excreted through a muscle called the anus Know that skeletons provide support for muscles and protect the body; for example, the rib cage protects the vital organs in the human body
Objectives:	- Know the names of key bones in the body, including the rib cage, cranium, mandible, sternum, vertebrae, femur, tibia, fibula, patella, humerus, radius and ulna; know how to label these on a diagram of the human body - Know that an adult human body has 206 bones, the longest of which is the femur Know that the heart and lungs are organs protected by the ribcage and understand this as a part of the skeleton Know that the heart beats, pumping blood around the body and that blood vessels carry the blood; arteries carry blood away from the heart; veins carry blood towards the heart; capillaries are tiny blood vessels that connect arteries and veins - Know that the heart is composed of four chambers: two atria and two ventricles; the aorta is the largest artery in the body and most major arteries branch off from it Know that blood travels around the body transporting nutrients that have been absorbed into the bloodstream from digestion; blood also absorbs oxygen from the lungs and carries it around the body which is used to power the body; this use of oxygen to create energy is called respiration Know that when we exercise, our heart beats more frequently so that the oxygen that is used around the body can be replenished; it returns to a resting heart rate afterwards; fitter people tend to have lower resting heart rates Know that drugs are chemicals that have an impact on the natural chemicals in a person's body; know that drugs can be harmful or helpful, depending on what they are and how they are used; know that all drugs can be harmful if overused Know that paracetamol and aspirin are examples of drugs that can be helpful as a painkiller Know that cannabis and cocaine are examples of illegal drugs that can have serious negative effects Know that alcohol and tobacco are examples of drugs that are legal to adults but that can have serious negative effects, such as liver disease and lung disease, respectively - Know that there are many kinds of jobs as a scientist that fall into these categories: communicator scientist, developer scientist, entrepreneur scientist, explorer scientist, investigator scientist, regulator scientist, teacher scientist, technician scientist, policy scientist and business scientist https://sciencecouncil.org/about-science/10-types-of-scientist/ - Know that policy scientists use their science and technical knowledge, as well as their understanding of government and policy making, to ensure that legislation and policy have a sound evidence base. Some policy scientists describe themselves as 75% scientist and 25% politician. - Know that a business scientist helps businesses to make evidence-informed decisions
Enquiry Question:	Is our heart rate always the same? - Investigate the effect of exercise on heart rate and how long it takes for their pulse to return to the resting rate after exercising for a minute. How long does it take to get fitter? - Over the course of a month, investigate whether some volunteers (who do consistent exercise at break time) can lower their resting heart rate.
Assessment criteria for Animals Including Humans:	- Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood - Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function - Describe the ways in which nutrients and water are transported within animals, including humans - Name the major organs in the human body - Locate the major organs in the human body

Year	Module	Topic	Big Idea	Enquiry Type
6	2	Light	P3: Energy, which cannot be created or destroyed, comes in many different forms and tends to move away from objects that have lots of it.	
Vocabulary:		Retrieval: absorption, energy, particle, property, reflection, wave, mirror, incident ray, image, beam, photons, solid, opaque, transparent, object, source, vibration, percussion instrument, wind instrument, string instrument, frequency, volume, pitch, transverse wave, longitudinal wave, medium, vacuum New: angle of incidence, angle of reflection, refraction, spectrum, translucent, medium, periscope		
Retrieval:		- Know that science is a way to understand our world by carefully thinking about it and testing our guesses with observations and experiments. - Know that sound is generated when an object vibrates; some of the energy from the vibrating object is transferred to the air, making the air particles move - Know that sound is a form of energy that transfers in a longitudinal wave - like that seen in a slinky - <u>not</u> a transverse wave - like that seen in water ripples - Know that sound travels through a medium (e.g. particles in the air) and thus sounds does <u>not</u> travel through a vacuum which has no particles in it at all - Know that longitudinal sound waves are detected in the ear by humans and that the brain interprets this as the sounds we hear - Know that sound travels at different speeds through different objects; it travels at around 340 metres per second in air, much slower than light travels; this is why we often hear thunder <u>after</u> we see lightning as the light reaches our eye before the sound reaches our ears - Know that pitch is how high or low a sound is and that this is determined by how many vibrations per second are being made by the vibrating object; the number of vibrations per second is called frequency - Know that volume is how loud or quiet a sound is and that this is determined by the amount of energy in the wave (e.g. from how hard or soft a percussion instrument is hit) - Know that the volume of a sound is quieter if the listener is further away from the object - Know that light is a form of energy - Know that energy comes in different forms and can be neither created nor destroyed, only changed from one form to another - Know that we need light to see things and that darkness is the absence of light - Know that light travels in straight lines - Know that light is reflected when it travels from a light source and then 'bounces' off an object - Know that everything that we can see is either a light source or something that is reflecting light from a light source into our eyes - Know that the Sun is a light source, but that the Moon is not and is merely reflecting light from the Sun - Know that many light sources give off light and heat - Know that the Sun gives off light and heat when hydrogen turns into helium - Know that filaments in traditional bulbs heat up until they glow, giving off light and heat - Know that fluorescent bulbs glow when electricity adds energy to a gas within the bulb - Know that sunglasses can protect eyes from sunlight but looking at the Sun directly – even with sunglasses – can damage the eyes - Know that opaque objects block light creating shadows and light passes easily through transparent objects - Know that opacity/transparency and reflectiveness are properties of a material - Know that as objects move towards a light source, the size of the shadow increases		

	• Know that the changing of shadow size can be shown by drawing a diagram with straight lines representing light
Objectives:	• Know that translucent objects allow some light to pass through, but some of the light changes direction as it passes through the object; this means that an something seen through a translucent object is not clearly defined • Know that when light passes from one medium to another (e.g. from air to water), it changes direction; this is called refraction; this happens because light travels at different speeds in different media • Know that white light comprises all the colours of light • Know that white light refracted by two surfaces in a prism will spread out so that all of its constituent colours can be seen; this array of colours is called a spectrum; it happens because the different colours that constitute white light travel at different speeds • Know how to draw a diagram to show why the shape of a shadow will match the shape of an object • Know that when light reflects off an object, the angle of incidence is equal to the angle of reflection • Know that a periscope takes advantage of the predictable angles of incidence and reflection to allow an image to be shown to a viewer
Enquiry Question:	Why can I hear round corners but not see round corners? • Use mirrors and torches to investigate how light travels in straight lines and reflects off mirrors.
Assessment criteria for Light:	• Recognise that light appears to travel in straight lines • Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye • Explain that we see things because light travels from light sources to our eyes or from light sources to object s and then to our eyes • Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them • Explain how different colours of light can be created • Use and explain how simple optical instruments work (periscope, telescope, binoculars, mirror, magnifying glass,...)

Year	Module	Topic	Big Idea	Enquiry Type
6	3 & 4	Living Things and their Habitats	B3: The different kinds of life, animals, plants and microorganisms, have evolved over millions of generations into different forms in order to survive in the environments in which they live.	 
Vocabulary:		Retrieval: component, habitat, plant, structure, fish, bird, amphibian, reptile, mammal, kingdom, classification key, species, fungi, bacteria, characteristics, offspring, vertebrate, invertebrate, insect New: microorganism, virus, thorax, arthropod, abdomen, arachnid, antenna, jointed limbs		
Retrieval:		- Know that science is a way to understand our world by carefully thinking about it and testing our guesses with observations and experiments. - Know that animals can be grouped based on their physical characteristics (e.g. vertebrates and invertebrates) and based on their behaviour (e.g. herbivores, carnivores and omnivores) - Know that living things are divided into kingdoms: the animal kingdom, plants, fungi, bacteria, and single-celled organisms - Know that a species is a group of living things have many similarities that can reproduce together produce offspring - Know that a classification key uses questions to sort and identify different living things - Know that a classification key can be used to identify living things - Know that living things move, grow, consume nutrients and reproduce; that dead things use to do these things, but no longer do; and that things that never lived have never done these things - Know that a trout is an example of fish, a frog is an example of an amphibian; a lizard is an example of a reptile; a robin is an example of a bird; a rabbit and a human are examples of a mammal - Know that fish, amphibians, reptiles, birds and mammals are similar in that they have internal skeletons and organs; these are known as vertebrates, which means they are animals that have a backbone - Know that fish are different to other animals in having gills so that they can breathe underwater and have scaly skin - Know that amphibians are different to other animals in that they begin their lives with gills but then develop lungs and breath on land - Know that reptiles are different to other animals in that they breath air and have scaly skin - Know that birds are different to other animals in that they have feathers and wings - Know that mammals are different to other animals in that they have fur/hair and they feed milk to their young - Know that a food chain traces the path of energy through a habitat - Know that the arrows in a food chain show the direction that energy is travelling through a habitat - Know that all energy for a food chain initially comes from the Sun which is absorbed and turned into energy by plants which are called producers - Know that consumers take in energy by eating - Know that an animal that is eaten by another is called prey, and that an animal that eats other animals is called a predator - Know that the first consumer in a food chain is called a primary consumer, the second is called a secondary consumer and above it is called a tertiary consumer		
Objectives:		- Know that there are three types of micro-organism: viruses, fungi and bacteria; of these three, viruses are often not really considered to be alive by many scientists mainly because they don't have the 'machinery' to reproduce inside them - Know that germs are disease-causing microorganisms		

	• Know that an arthropod is an invertebrate with a hard, external skeleton and jointed limbs • Know that insects are a type of arthropod; their bodies consist of six legs, a head, a thorax and an abdomen; most insects also have a pair of antennae and a pair of wings (e.g. wasp) • Know that an arachnid (e.g. spider) is a type of arthropod with eight legs and no antennae or wings • Know that a crustacean is a type of arthropod with two pairs of antennae (e.g. woodlouse) • Know that a myriapod is an arthropod with a flat and long or cylindrical body and many legs (e.g. centipede) • Know that Jane Goodall is an anthropologist, most famous for her study of chimpanzees, of which she is considered the world's foremost expert • Know that Goodall discovered that chimpanzees are much more intelligent than they had ever been thought to be • Know that Goodall is also a conservationist and environmentalist, which means she does important work to help protect the planet, in particular animal habitats
Enquiry Question:	What make bread rise? • Show how yeast, sugar and warm water causes a reaction; then investigate what happens to this reaction when they change particular variables of their choice (sugar/no sugar, water temperature, adding chemicals, etc)
Assessment criteria for Living Things and Their Habitats:	• Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences including microorganisms, plants and animals • Give reasons for classifying plants and animals based on specific characteristics • Group animals into vertebrates and invertebrates

Year	Module	Topic	Big Idea	Enquiry Type
6	5	Electricity	P3: Energy, which cannot be created or destroyed, comes in many different forms and tends to move away from objects that have lots of it.	
Vocabulary:		Retrieval: circuit, component, conductor, energy, insulator, particle, property, material, appliance, charge, electron, battery, cell, bulb, buzzer, switch, wire, current electricity, static electricity, negative terminal, positive terminal, voltage, chemical reaction, emit New: series circuit, parallel circuit, resistance, voltage		
Retrieval:		- Know that science is a way to understand our world by carefully thinking about it and testing our guesses with observations and experiments. - Know that an object is made from/of a material - Know that metal is a material from which objects can be made. - Know that matter (stuff) is made from tiny building blocks - Know that electrical energy is a form of energy - Know that energy comes in different forms and can be neither created nor destroyed, only changed from one form to another - Know that static electricity is an imbalance of charged particles on a material; it does <u>not</u> operate by flowing around a complete circuit - Know that current electricity is the flow of charged particles called electrons around a circuit - Know that current electricity is the form of electricity that we use in our lives in lights, computers, televisions, etc - Know that electrical current flows well through some materials, called electrical conductors, and poorly through other materials, called electrical insulators - Know that conductors have free electrons (tiny, negatively charged particles) and when electrical current flows through a conductor, the electrons move like people in a queue - Know that electrical conductivity (how well a material conducts electricity) is an example of a property - Know that metals are good electrical conductors - Know that a chemical reaction inside a cell produces the charged particles that can flow around a circuit - Know that more than one cell lined up to work together is called a battery - Know that cells, batteries and the mains are all sources of electrical energy - Know that electrical current can flow if there is a complete circuit - Know that wires – which contain a conductor inside them, usually made of metal – can allow electrical current to flow around a circuit - Know that when electrical current flows through a circuit components within that circuit – such as buzzers which make a noise and bulbs which emit light – begin to work - Know that a switch functions by completing or breaking a complete circuit - Know that a simple circuit can be constructed using components - Know that exposure to high levels of electrical current can be dangerous		
Objectives:		- Know how to draw simple circuit diagrams - Know the recognized symbols for a battery, bulb, motor, buzzer and wire		

	• Know how to predict whether components will function in a given circuit, depending on whether or not the circuit is complete; whether or not a switch is in an on or off position; and whether or not there is a cell to provide electrical current to the circuit • Know that voltage is a measure of the power of a cell to produce electricity; it is a measure of the 'push' of electric current, not the size of the electric current • Know that as the number and voltage of cells in a circuit increases, the brightness of a bulb or the volume of a buzzer will increase (though too high a voltage may 'blow' the bulb or buzzer) • Know that two bulbs in a circuit can be wired up to create a series circuit or a parallel circuit; if one bulb blows in a series circuit the other will not shine as the circuit has been broken; in contrast, if one bulb blows in a parallel circuit (see diagram below), there will still be a complete circuit for the other bulb so it will continue to shine; use this knowledge to explain the advantages of using parallel circuits (e.g. in the lighting in homes)
Enquiry Question:	Is it possible to change how bright a bulb is or how loud a buzzer is? • Create circuits to investigate the effect of different voltages on different components.
Assessment criteria for Electricity:	• Identify and name the basic parts of a simple electric series circuit (cells, wires, bulbs, switches, buzzers) • Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers, the on/off position of switches • Use recognised symbols when representing a simple circuit in a diagram • Explain the impact of changes in a circuit and explain the effect of changing the voltage of a battery

Year	Module	Topic	Big Idea	Enquiry Type
6	6	Evolution and Inheritance	B3: The different kinds of life, animals, plants and microorganisms, have evolved over millions of generations into different forms in order to survive in the environments in which they live.	 
Vocabulary:		Retrieval: birth, decay, energy, habitat, irreversible, extinction, microhabitat, dead, life cycle, food chain, source, nutrients, reproduction, consumption, environment, extinction, species, characteristic, adaptation New: evolution, natural selection, variation, advantageous		
Retrieval:		• Know that science is a way to understand our world by carefully thinking about it and testing our guesses with observations and experiments • Know that living things move, grow, consume nutrients and reproduce; that dead things use to do these things, but no longer do; and that things that never lived have never done these things • Know that polar bears are an example of an animal adapted to its environment – thick fur for warmth and oily paw pads to ensure that they don't freeze to the ice • Know that sharks are another example – smooth skin and streamlined shape for quick swimming; and gills for breathing underwater • Know that cacti are an example of a plant adapted to its environment – thick skin keeps a store of water safe; sharp spikes keep animals from stealing the water • Know that pine trees have thick bark and pine cones to protect against cold winters • Know that woodlice live under logs – an example of a microhabitat - as they need somewhere dark and damp so that they do not dry out • Know that frogs can live in ponds – an example of a microhabitat - as they water in which to lay their eggs (frogspawn) • Know that a species is a group of living things have many similarities that can reproduce together produce offspring • Know that changes to the environment can make it more difficult for animals to survive and reproduce; in extreme cases this leads to extinction, where an entire species dies • Know that human activity – such as climate change caused by pollution - can change the environment for many living things, endangering their existence • Know that the polar bear is a famous example of climate change endangering the existence of a species; as the climate changes and gets warmer, the sea ice on which polar bears live reduces in amount making it harder for them to survive and reproduce • Know that fossils form when a plant or animal dies and is quickly covered with silt or mud so that it cannot be rotted by microbes or eaten by scavenging animals; in time layers of sediment build, squashing the mud and turning it to stone around the dead plant or animal; the materials in the body are replaced by minerals that flow in water through the rock, leaving a rock in the shape of the animal or plant that was once there • Know that fossils can help us learn about things that lived long ago		
Objectives:		• Know that all life on Earth began from a single point around 3.7 billion years ago • Know that living things change over time and that this gradual change is called evolution • Know that natural selection is the cause of this change; natural selection works as there is natural variation within a species; there is also competition to survive and reproduce and that members of a species with advantageous characteristics survive and reproduce - these characteristics are passed down to their offspring; members of a species with less advantageous characteristics do not survive and reproduce – these characteristics are not passed down to offspring • Know that offspring that result from sexual reproduction (i.e. two parents) vary and are not identical to their parents • Know that the gradual change of species over millions of years can be observed by looking at examples of fossils • Know that Charles Darwin posited this theory of evolution by natural selection		

	• Know that Darwin was a naturalist whose theory of evolution by natural selection developed while travelling through the Amazon rainforest • Know that Darwin's theory is accepted as fact by the scientific community • Know that Darwin did not know similarities were passed between parents and their offspring; know DNA, a chemical discovered in the 20th century, is contains the "code" that passes on information between parents and their offspring in all living things
Enquiry Question:	Why do different species of animals look different? • Research and sort various species of animals into the environments to which they are adapted based on their physical attributes and listed behaviours.
Assessment criteria for Evolution and Inheritance:	• Recognise that living things have changed over time and that fossils provide information about living things that inhabited the earth millions of years ago • Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents • Identify how cross-breeding in plants and animals has been used to combine characteristics • Explain the process of evolution and describe the evidence for this • Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution • Explain how some living things adapt to survive in extreme conditions