



Substantive Knowledge - Progression



Biology

When is it taught?	National Curriculum Aims	What is taught?
Plants		
EYFS (Cycle A/B, Term 5)	<ul style="list-style-type: none">- Make observations of plants.- Know some names of plants, trees, and flowers.- May be able to name and describe different plants, trees, and flowers.- Explore how objects can move in water.- Show some care for the world around them.- Explore the natural world around them, observing and drawing pictures of plants.	<ul style="list-style-type: none">- I can name a sunflower, a rose, a daisy, an oak tree, a horse chestnut tree, and an ash tree.- I know that flowers have leaves, flowers, petals and roots.- I know that trees have trunks and branches.- I know that plants start as bulbs or seeds.- I know we have to take care of plants for them to grow.
KS1 (Cycle A, Term 6)	<ul style="list-style-type: none">- Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees:- Identify and describe the basic structure of a variety of common flowering plants.- Identify and name the roots, trunk, branches, and leaves of trees.	<ul style="list-style-type: none">- I know plants have leaves, flowers, petals, and roots.- I know that trees have trunks and branches.- I know that deciduous trees lose their leaves in Autumn.- I know that evergreen trees keep their leaves all year round.- I know the names of different deciduous trees including Oak, Birch, and Willow- I know the names of different evergreen trees including Conifer, Yew, and Holly.- I know the names of different trees within our school.- I know that Agnes Arber was a Botanist who researched the structure of flowers.
KS1 (Cycle B, Term 6)	<ul style="list-style-type: none">- Observe and describe how seeds and bulbs grow into mature plants.- Find out and describe how plants need water, light, and warmth to grow and stay healthy.	<ul style="list-style-type: none">- I know that plants have a life cycle.- I know that plants start as bulbs or seeds.- I know that seeds grow roots and shoots. Roots and shoots then grow leaves above ground.- I know many plants make flowers, which turn into fruits. Flowers and fruits make their own seeds.- I know that we must take care of plants for them to grow.- I know that plants need water, light and heat to survive.- I know why plants grow better in spring and summer than in winter.- I know that plants change and grow over time.- I know that Beatrice Potter studied mushrooms under a microscope to investigate how they reproduced.



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Lower KS2 (Cycle A, Term 4)	<ul style="list-style-type: none">- Identify and describe the functions of different parts of the flowering plant: roots, stem/trunk/leaves, and flowers.- Explore the part flowers play in a flowering plant's life cycle, including pollination, seed formation, and seed dispersal.- Explain the requirements of plants for life and growth (air, light, water, nutrients from soil, room to grow) and how they vary between plants.- Know how water is transported between plants.	<ul style="list-style-type: none">- I know that flowering plants have roots, stem/trunk leaves and flowers and the role they play in supporting the plant.- I know where plants obtain the different things they need to survive.- I know the impact of taking away one of the things plants need to survive.- I know that water is moved through plants using transportation.- I know the plants reproduce for themselves using seed dispersal.- I know that pollination involves pollen being taken to the female part of the plant to help create seeds.- I know that germination is the growth of a seed into a plant.- I know that Jan Ingenhousz was a physician and scientist who discovered the role of light in photosynthesis.
Living Things and their habitats		
EYFS (Cycle A / B, Term 1)	<ul style="list-style-type: none">- Explore animals in the natural environment.- Name and describe animals that live in different habitats.- Describe different habitats.- Can talk about things they have observed, including animals.-	<ul style="list-style-type: none">- I know that a habitat is the home of an animal.- I know that the following are examples of habitats: desert, forest, pond, polar regions, and the sea.- I know what a given habitat (desert, forest, pond, polar regions, and the sea) looks like.- I know animals that live in the following habitats: desert, forest, pond, polar regions, and the sea.
KS1 (Cycle B, Term 5)	<ul style="list-style-type: none">- Explore and compare the difference between things that are living, are dead and things that have never been alive.- Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other.- Identify and name a variety of plants and animals in their habitats, including micro-habitats.- Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name the different sources of food.	<ul style="list-style-type: none">- I understand the terms living, dead and things that have never been alive.- I can identify examples of things that are dead and things that have never been alive within the local area.- I understand the term habitat is where living things find the things they need to survive.- I know that different animals are suited to different habitats.- I know a microhabitat is a very small habitat where minibeasts live.- I know some habitats are very large, such as oceans, forests, woodlands and rivers.- I know some habitats are very small, such as under logs or rocks.- I know we have different habitats in our local area.- I know that animals can obtain their food from other animals or plants.- I know this is called a food chain.- I know that Liz Bonnin combines her scientific knowledge with her presentation skills to educate and entertain people around the world about animal welfare.



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Lower KS2 (Cycle A, Term 1)	<ul style="list-style-type: none">- Recognise that living things can be grouped in a variety of ways.- Explore and use classification keys to help group, identify, and name a variety of living things in their local and wider environment.- Recognise that environments can change and that this can sometimes pose a danger to living things.	<ul style="list-style-type: none">- I know that there are different styles of habitat.- I can talk about different habitats in my local environment.- I know that classification involves grouping animals based on similar characteristics.- I know that vertebrates are animals with a backbone.- I know that invertebrates are animals without a backbone.- I can name different habitats around the world.- I know that habitats change depending on the environment and climate.- I know that humans pose a danger to different habitats.- I know that habitats are changing, and animals are having to adapt to this.- I know that Cindy Looy is a plant ecologist who investigates the response of Palaeozoic plants and plant communities to environmental change.
Upper KS2 (Cycle A, Term 2)	<ul style="list-style-type: none">- Describe the differences in the life cycles of a mammal, an amphibian, an insect, and a bird.- Describe the life process of reproduction in some plants and animals.	<ul style="list-style-type: none">- I can describe the life cycle of a mammal (elephant).- I can describe the life cycle of an amphibian (newt).- I can describe the life cycle of an insect (butterfly).- I can describe the life cycle of a bird (robin).- I know how to describe the differences in the life cycles of different animals.- I know the meaning of sexual and asexual reproduction.- I know how plants reproduce asexually.- I know that different animals and plants have different periods for reproduction.- I know that David Attenborough is an English broadcaster, writer, and naturalist who has introduced millions of people to a variety of animals from around the world.
Upper KS2 (Cycle B, Term 2)	<ul style="list-style-type: none">- Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals.- Give reasons for classifying plants and animals based on specific characteristics.	<ul style="list-style-type: none">- I know what microorganisms are.- I know which animals are vertebrates and invertebrates.- I know what classification means.- I know what a classification web is.- I know how to classify people in my classroom.- I know how to apply classification questions to unfamiliar and familiar animals.- I know how to explain how a classification system works.- I know that Carl Linnaeus was a Botanist and Zoologist who developed a taxonomy for classifying organisms.
Animals including humans		
EYFS (Cycle A / B, Term 2)	<ul style="list-style-type: none">- Describe how people are familiar to them.- Learn how to take care of themselves.	<ul style="list-style-type: none">- I know and can identify body parts, including the head, arm, leg, knee, feet, back, stomach, shoulders and elbows.



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	<ul style="list-style-type: none">- Explore the natural world around them, making observations and drawing pictures of animals.- Children know about similarities and differences in relation to living things.- Be able to identify different parts of their body.- Be able to show care and concern for living things.	<ul style="list-style-type: none">- I know that a face is made up of eyes, nose, lips, cheeks, and ears.- I know that my body is similar to someone else's body, e.g., we both have hair.- I know that my body is different from someone else's body, e.g. I have blonde hair and they have brown hair.
KSI (Cycle A, Term 1)	<ul style="list-style-type: none">- Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.	<ul style="list-style-type: none">- I know that a human is an example of an animal and a mammal.- I know that we have 5 senses: touch, taste, smell, sight and hearing.- I can name different body parts linked to my head including eyes, ears, nose, and mouth.- I know which sense each of those body parts are associated with.- I know different parts of arms including elbows, wrists, and hands.- I can talk about different parts of my legs including knees, ankles, and feet.- I can compare and describe differences in my features (eye, hair, skin colour, etc.) to the features of others.- I know that humans have many similarities but also some differences.- I know that Linda Buck studied the answer to the question: How does our sense of smell work?
KSI (Cycle A, Term 2)	<ul style="list-style-type: none">- Identify and name a variety of common animals including fish, amphibians, reptiles, birds, and mammals.- Identify and name a variety of common animals that are carnivores, herbivores, and omnivores.- Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds, and mammals including pets).	<ul style="list-style-type: none">- I can name different fish, including goldfish and clownfish.- I can name different mammals, including dogs, tigers, whales, and humans.- I know that mammals can be found on land and in the ocean.- I can name reptiles including, lizards, crocodiles, tortoises, and turtles.- I can name different birds, including parrots, robins, and pigeons.- I can name different amphibians, including frogs and toads.- I know the structure of these animals and can compare similarities and differences using these.- I know what a herbivore, carnivore, and omnivore are and can name examples of herbivores (including cows, sheep, rabbits, and giraffes), carnivores (including polar bears, lions, eagles, and wolves) and omnivores (including foxes, hedgehogs, and humans).- I know that Chris Packham works as a conservationist and helps to support the rebuild of habitats and reintroduce extinct animals and plants.



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KS1 (Cycle B, Term 3)	<ul style="list-style-type: none">- Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.	<ul style="list-style-type: none">- I know that to support humans as they grow into healthy adults, we must eat the right types of food in the right amounts.- I know humans should eat a range of foods from the different sections of the Eat Well plate.- I know the names of the 5 food groups from the Eat Well plate.- I can name examples of foods for each of the five food groups.- I know that it is important to keep myself clean.- I know that exercise helps me stay healthy.- I know that Joe Wicks wants to encourage people to eat healthier and to encourage people to do more exercise.
KS1 (Cycle B, Term 4)	<ul style="list-style-type: none">- Know that animals, including humans, have offspring which grow into adults.- Know the basic stages in a life cycle for animals, including humans.- Find out and describe the basic needs of animals, including humans, for survival (water, food and air).	<ul style="list-style-type: none">- I know that a life cycle is the journey of a living thing from beginning to end.- I know the stages of a life cycle for a human.- I know the stages of a life cycle for a frog.- I can describe changes in an adult compared to a child.- I know that animals, including humans, need water, air and food to survive.- I know that Steve Irwin was an Australian zookeeper and conservationist who was best known as 'the crocodile hunter'.
Lower KS2 (Cycle A, Term 2)	<ul style="list-style-type: none">- Identify that animals, including humans, need the right types and amount of nutrition, and they cannot make their own food; they get their nutrition from what they eat.- Identify that humans and some other animals have skeletons and muscles for support, protection, and movement.	<ul style="list-style-type: none">- I know what a skeleton is.- I know that our skeleton is used for 3 main reasons: protection, movement, and support.- I know that tendons connect muscles to bones.- I know that ligaments connect bones to bones.- I know that our skeleton can be broken and needs care.- I know which organs our skeleton protects.- I know the roles that food, water, and air have in our survival.- I know what the word diet means.- I know that there are five different food groups and seven different nutrients.- I know that animals get nutrients from what they eat.- I know why a balanced diet is important.- I know whether different foods are considered healthy or unhealthy and why.- I know what will happen if I eat too many unhealthy foods.- I know that Marie Curie was a physicist who discovered the elements radium and polonium which are now used to allow for more accurate and stronger x-rays.
Lower KS2 (Cycle B, Term 5)	<ul style="list-style-type: none">- Describe the simple functions of the basic parts of the digestive system in humans.	<ul style="list-style-type: none">- I know that the digestive system helps give us energy to survive.- I know the different stages of the digestive system.



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	<ul style="list-style-type: none">- Identify the different types of teeth in humans and their simple functions.- Construct and interpret a variety of food chains, identifying producers, predators and prey.	<ul style="list-style-type: none">- I know how to label the key parts of my body involved in the digestive system.- I can label the different teeth that I have using the correct names: canines, molars, and incisors.- I know the roles of the different types of teeth in my mouth.- I know that different animals have different teeth.- I know the difference between the teeth of a carnivore to those of a herbivore.- I know that producers start a food chain.- I know that producers produce their own food.- I know that predators eat other animals.- I know that when an animal is eaten by another it is known as prey.- I know that energy is being transferred through the food chain.- I know when drawing a food chain, the arrow points in the direction that the energy is moving.- I know that Paul Sharpe is a bioengineer who studies how to regrow teeth if they become damaged.
Upper KS2 (Cycle A, Term 3)	<ul style="list-style-type: none">- Describe the changes as humans develop to old age.	<ul style="list-style-type: none">- I know the different stages of the human life cycle.- I know how our body changes as we grow older.- I know how bodies change during puberty.- I know that boys and girls go through similar and different changes.- I know how to keep clean during puberty.- I know that a human baby takes 40 weeks to develop in the womb.- I know that different animals have different gestation periods than humans.- I know that Dr Steve Jones is a geneticist and a leading science communicator on evolution and genetics.- I know that Dr Steve Jones has examined the relationship between habitat and genetic traits such as variation in snail shell colour.
Seasonal Change		
EYFS (Cycle A / B, Term 4).	<ul style="list-style-type: none">- Play and explore outside in all seasons and in different weather.- Explore how wind can move objects.- Observe living things throughout the year.- Explore shadows.- Explore rainbows.- Listen to sounds outside and identify the source.- Explore the natural world around them.	<ul style="list-style-type: none">- I know the names of the 4 seasons.- I know the different types of weather we get in the 4 seasons.- I can make comparisons between winter and summer.- I know that people live differently in winter compared to summer.



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	<ul style="list-style-type: none">- Make comments and ask questions about the place they live in or the natural world.- Develop an understanding of seasonal change.- Observe and explain why certain things may occur (e.g., leaves falling off trees, weather changes).- Looked closely at similarities, differences, patterns, and change.	
KS1 (Cycle A, Term 5)	<ul style="list-style-type: none">- Observe changes across the four seasons.- Observe and describe weather associated with the seasons and how day length varies.	<ul style="list-style-type: none">- I know that we have 4 main seasons.- I can describe where these seasons come in our year.- I know that the daylight hours are longer in Spring and Summer.- I know that in Summer the temperature increases.- I know that in Summer it can still rain even though it is warm.- I can name the different types of weather we see in Spring and Summer.- I know that Holly Green is a meteorologist who collects and studies data from the atmosphere and oceans to make weather forecasts.
KS1 (Cycle B, Term 2)	<ul style="list-style-type: none">- Observe changes across the four seasons.- Observe and describe weather associated with the seasons and how day length varies.	<ul style="list-style-type: none">- I know that we have 4 main seasons.- I can describe where these seasons come in our year.- I know that the days are shorter in Autumn and Winter.- I know that in Winter the temperature decreases.- I know that in Winter the weather can still be sunny even though it is colder.- I can name the different types of weather we see in Autumn and Winter.- I know that Dr Steve Lyons is a meteorologist who studies extreme weather.
Evolution and Inheritance		
Upper KS2 (Cycle B, Term 1)	<ul style="list-style-type: none">- Know about evolution and can explain what it is.- Know how fossils can be used to find out about the past.- Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents.- Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution- recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.	<ul style="list-style-type: none">- I know that the Earth is millions of years old.- I know what the theory of evolution is.- I know that different types of animals were on the Earth millions of years ago.- I understand that adults pass on characteristics to their offspring.- I know that I have characteristics similar to my parents.- I know that there are inherited characteristics and environmental characteristics.- I know that inheritance takes place across all animals.- I know that we all have genes that are individual to us.- I know what adaptation is.- I know that all animals must adapt to the environment they are in.- I know that adaptations and habitats are linked together.



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	<ul style="list-style-type: none"> - Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution. 	<ul style="list-style-type: none"> - I know that Charles Darwin and Alfred Russel Wallace were Natural Historians who developed the theory of evolution by natural selection.
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Chemistry

When is it taught?	National Curriculum Aims	What is taught?
Materials		
EYFS (Cycle A / B, Term 3)	<ul style="list-style-type: none"> - Explore a range of materials, including natural materials. - Make objects from different materials, including natural materials. - Observe, measure and record how materials change when heated and cooled. - Compare how materials change over time and in different materials. - Understand some important processes and changes, including the changing states of matter. - Know about similarities and differences in relation to objects. - Talk about the features of their immediate environment and how environments might vary from one another in relation to the objects within them. - Ask questions about the objects they use. - Manipulates materials to achieve a planned effect. 	<ul style="list-style-type: none"> - I know the names of materials including wood, plastic, metal, brick, rock, paper and cardboard. - I know objects that are made out of the materials: wood, plastic, metal, brick, rock, paper and cardboard. - I can say materials in the classroom that are used for different roles. - I can explain why I would use material for a specific purpose.
KSI (Cycle A, Term 3 and 4)	<ul style="list-style-type: none"> - Distinguish between an object and the material from which it is made. - Identify and name a variety of everyday materials, including wood, metal, plastic, glass, water and rock. - Describe the simple physical properties of a variety of everyday materials. - Compare and group together a variety of everyday materials based on their simple properties. 	<ul style="list-style-type: none"> - I know what is meant by the term material. - I know what is meant by the term object. - I can name objects that are made of glass, wood, plastic, metal and rock. - I know how to describe the characteristics of different materials. - I can say which material would best suit different needs. - I know that Charles Macintosh was a Scottish chemist and the inventor of the modern waterproof raincoat. - I know that John Macadam was a Scottish civil engineer and road builder in the 18th century who invented a revolutionary new road-building technique.



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KS1 (Cycle B, Term 1)	<ul style="list-style-type: none">- Distinguish between an object and the material from which it is made.- Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock.- Describe the simple physical properties of a variety of everyday materials.- Compare and group together a variety of everyday materials based on their simple physical properties.	<ul style="list-style-type: none">- I know the names of different materials including wood, plastic, metal, glass, brick, rock, paper and cardboard.- I can name items that are made out of all of the above.- I know that materials can be used for more than one purpose.- I know that different materials have different properties.- I know that the properties of a material make it best suited for a particular job.- I know how to explain what material I would use for an object based on its properties.- I know that Julie Brusaw invented solar roads that are strong enough to hold vehicles, but also can be used to turn sun energy into electricity.
Lower KS2 (Cycle B, Term 6)	<ul style="list-style-type: none">- Compare and group materials together, according to whether they are solids, liquids or gases.- Observe that some materials change state when heated or cooled, and measure and research the temperature at which this happens in degrees Celsius.- Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.	<ul style="list-style-type: none">- I know the 3 states of matter are solids, liquids and gases.- I know that solids hold their shape.- I know that liquids take the form of the object they are in.- I know that gases will escape from a container.- I know how to label objects as solids, liquids or gases based on their properties.- I know that when a gas turns into a liquid it is called condensation.- I know when a liquid turns into a gas it is called evaporation.- I know when a liquid turns into a solid it is called freezing.- I know that the water cycle involves evaporation and condensation.- I know the temperature at which water changes to solid is 0 degrees.- I know that the temperature at which water changes to gas is 100 degrees.- I know that different materials change state at different temperatures.- I know that Anders Celsius was an Astronomer who invented the degrees Celsius temperature scale.
Upper KS2 (Cycle A, Term 4)	<ul style="list-style-type: none">- Compare and group together everyday materials based on their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets.- Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic.- Demonstrate that dissolving, mixing and changes of state are reversible changes.- Explain that some changes result in the formation of new materials, and this kind of change is usually not	<ul style="list-style-type: none">- I know that materials have different properties.- I know that electrical conductivity allows electricity to move through an object.- I know that different materials are suited to different needs.- I know how to explain properties of different materials.- I am able to suggest which materials should be used for different purposes.- I know that a reversible changes means I can get the original material back.- I know that an irreversible change means you cannot get the original material back.- I know that Spencer Silver was an American chemist and inventor who specialised in adhesives. He invented the adhesive that Arthur Fry used to create Post-it Notes.



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	reversible, including changes associated with burning and the action of acid on bicarbonate of soda.	
Upper KS2 (Cycle A, Term 5)	<ul style="list-style-type: none">- Know that some materials will dissolve in liquid to form a solution and describe how to recover a substance from a solution.- Use knowledge of solids, liquids, and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.	<ul style="list-style-type: none">- I know that everything is made up of particles.- I know how particles are ordered differently in solids, liquids and gases.- I know how to experiment to separate materials.- I know that I can separate materials using filtering, sieving and evaporating.- I know that when a substance dissolves it is still there even though we can't see it.- I know that when two substances form together it is called a solution.- I know that new materials can be formed by mixing two substances. <p>I know that Ruth Benerito was an American chemist and is best known for developing wrinkle-free cotton fabric.</p>
Rocks		
Lower KS2 (Cycle B, Term 1)	<ul style="list-style-type: none">- Compare and group together different kinds of rocks based on their appearance and simple physical properties.- Describe in simple terms how fossils are formed when things that have lived are trapped within the rock.- Recognise that soils are made from rocks and organic matter.-	<ul style="list-style-type: none">- I know the names of the 3 different types of rock: metamorphic, sedimentary, and igneous.- I know the different characteristics of these rocks.- I know that a fossil is the preserved remains or traces of a dead organism.- I know the process by which a fossil is formed is called fossilisation.- I know that fossils are formed when a dead organism is buried under rock.- I know that fossils are formed over great lengths of time.- I know that soils are made from rocks or organic matter such as dead plants, animals and water.- I know there are different types of soil including: chalk soil, sandy soil, clay soil and peat.- I know how to compare the qualities of different soil types.- I know that Mary Anning was a palaeontologist and fossil collector.- I know that Mary Anning discovered a 5.2-metre-long skeleton which was named Ichthyosaurus.- I know that Mary Anning wasn't taken seriously as a scientist in her lifetime because of her gender and poor background. But today, Mary is recognised as a pioneer in the field of palaeontology (the study of fossils) and is celebrated as the greatest fossil hunter of all time.



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Physics

When is it taught?	National Curriculum Aims	What is taught?
Sound		
Lower KS2 (Cycle A, Term 3)	<ul style="list-style-type: none">- Know how sound is made associating some of them with vibrating.- Know what happens to a sound as it travels from its source to our ears.- Know the correlation between the volume of a sound and the strength of the vibrations that produced it.- Know how sound travels from a source to our ears.- Know the correlation between pitch and the object producing a sound.	<ul style="list-style-type: none">- I know that sounds are caused by vibrations.- I know that molecules in the air are vibrating and travel to my ears.- I know that this causes tiny hairs in my ears to vibrate.- I know these hairs are connected to nerves that send messages to the brain.- I know that these vibrations travel through the air into my ears.- I know that the pitch of a sound is how high or low the sound is.- I know that the volume of sound is how loud the sound is.- I know that the speed of sound is slower than the speed of light.- I know that sound travels at different speeds through solids, liquids, and gases.- I know that sounds will get fainter the further I am from the sound.- I know that Aristotle wrote that “everything that makes a sound does so by the impact of something against something else, across a space filled with air”.- I know that Aristotle pioneered the scientific method in ancient Greece.
Light		
Lower KS2 (Cycle B, Term	<ul style="list-style-type: none">- Recognise that they need light to see things and that dark is the absence of light.- Notice that light is reflected from surfaces.- Recognise that light from the sun can be dangerous and that there are ways to protect their eyes.- Recognise that shadows are formed when the light from a light source is blocked by a solid object.- Find patterns in the way that the sizes of shadows change.	<ul style="list-style-type: none">- I know that we see through reflections of different surfaces.- I know that light travels in straight lines.- I know that there are natural and artificial sources of light.- I know that light travels into the eyes.- I know transparent objects let light through.- I know translucent objects let some light through.- I know opaque objects do not let any light through.- I know that shadows are caused when an object blocks light.- I know that shadows will change in length throughout the day.- I know that I need to protect my eyes from the sun.- I know that James Clerk Maxwell was a physicist who made lots of discoveries about how we see light and colour.- I know that he worked out that any colour of light could be made by mixing different amounts of blue, green and red light and he made his colour wheel to experiment with mixing colours.



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Upper KS2 (Cycle B, Term 3 and 4)	<ul style="list-style-type: none">- Recognise that light appears to travel in straight lines.- Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye.- Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes.- Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.- Know how simple optical instruments work, e.g., periscope, telescope, binoculars, mirror, magnifying glass etc.	<ul style="list-style-type: none">- I know that light travels into my eye in a straight line.- I know that I can use reflection to see in different directions.- I know the different parts of the eye.- I know that when a light hits an object it reflects off the object at the same angle.- I can draw a diagram representing how light is reflected.- I know that smooth, shiny surfaces reflect light better than rough, dull surfaces.- I know that refraction involves the bending of light.- I know why we have different colours within a rainbow.- I know that Ibn Al-Haytham (Alhazen) was a Physicist and a Mathematician who developed a theory that light travels in a straight line and proved it by carrying out the first scientific experiment.
Electricity		
Lower KS2 (Cycle A, Term 5 and 6)	<ul style="list-style-type: none">- Identify common appliances.- that run on electricity.- Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers.- Identify whether 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 the circuit and associate this with whether or not a lamp lights in a simple series circuit. Recognise some common conductors and insulators, and associate metals with being good conductors.- Know the difference between a conductor and an insulator; giving examples of each.- Safety when using electricity.	<ul style="list-style-type: none">- I know that electricity runs in a circuit.- I know the circuit has to be complete for a component to light.- I can name different parts of a circuit including wires, bulbs, cells, switches, and buzzers.- I know that a battery/cell has a positive and negative side.- I know how to construct a simple circuit using different components.- I know that conductors let heat and electricity through them.- I know insulators do not let electricity through them.- I can name different materials that are conductors or insulators.- I know how to use a switch to turn a circuit on or off.- I know how to make bulbs brighter within a circuit.- I know that Thomas Edison was a famous American inventor who is best known for inventing 'domestic' lightbulbs to go in houses, and the electric power system that allows them to work.
Upper KS2 (Cycle B, Term 6)	<ul style="list-style-type: none">- Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit.	<ul style="list-style-type: none">- I know that electricity is measured in volts.- I know how to construct different circuits using components including; switches, bulbs, buzzers, cells and wires.- I can describe the direction that the current is travelling in.



Substantive Knowledge - Progression



	<ul style="list-style-type: none">- Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches.- Use recognised symbols when representing a simple circuit in a diagram.	<ul style="list-style-type: none">- I know the difference between a series and a parallel circuit.- I know how to control when a bulb is turned on or off.- I recognise how the number of volts in a circuit will increase the brightness of the bulb.- I know when series or parallel circuits are used.- I can explain the benefits and downfalls of a series or parallel circuit.- I can draw circuits using the correct symbols for components.- I know which materials will make good conductors or insulators.- I know how to keep safe using electricity.- I know that Nicola Tesla was an Electrical and Mechanical Engineer who developed the AC electrical system and made important advances in technologies such as x-rays, neon lights and robotics.
Space		
EYFS (Cycle A / B, Term 6)	<ul style="list-style-type: none">- Explore how to change how things work.- Listen to sounds outside and identify the source.- Make sounds.- Learn about the Earth, Sun, Moon, planets and stars.- Learn about Space travel.- Explore the natural world around them.- Make comments and asked questions about the place they live in or the natural world.- Develop an understanding of seasonal change.- Looked closely at similarities, differences, patterns, and change.	<ul style="list-style-type: none">- I know the name of the planet I live on.- I know that some environments are different to the one in which I live.- I know that our solar system is made up of the Sun and all of the smaller objects including planets and moons that move around it.- I know the names of other planets, including Mercury, Venus, Mars, Jupiter, Saturn, Uranus and Neptune.- I know that space has no gravity.
Upper KS2 (Cycle A, Term 1)	<ul style="list-style-type: none">- Describe the movement of the Earth, and other planets, relative to the Sun in the solar system.- Describe the movement of the Moon relative to the Earth.- Describe the Sun, Earth, and Moon as approximately spherical bodies.- Use the idea of the Earth's rotation to explain day and night, and the apparent movement of the sun across the sky.	<ul style="list-style-type: none">- I know the 8 planets of the solar system.- I know that the Earth orbits the sun, and it takes 365 ¼ days.- I know why we have a leap year.- I know that the moon orbits the Earth taking 27 days.- I know that the Earth spins on its axis creating day and night.- I know that the Earth is tilted causing the seasons.- I know the Earth orbits the sun because of the sun's gravitational pull and the Earth's natural sideways movement.- I know that the scale of distance between the planets becomes greater the further away from the sun they are.



Substantive Knowledge - Progression



		<ul style="list-style-type: none">- I know that the length of my shadow will change throughout the day because of the sun's position in the sky.- I know the different phases of the Moon.- I know that Tim Peake was the first British ESA astronaut to visit the International Space Station and that during his 186 days in space, he conducted over 250 experiments.
Forces		
Lower KS2 (Cycle B, Term 3 and 4).	<ul style="list-style-type: none">- Compare how things move on different surfaces.- Know how a simple pulley works and use making lifting an object simpler.- Notice that some forces need contact between two objects, but magnetic forces can act at a distance.- Observe how magnets attract and repel each other and attract some materials and not others.- Compare and group together a variety of everyday materials based on whether they are attracted to a magnet and identify some magnetic materials.- Describe magnets as having two poles.- Predict whether two magnets will attract or repel each other, depending on which poles are facing.	<ul style="list-style-type: none">- I know that forces are the things that allow the movement of all objects around us.- I know that forces are pushes or pulls which can change an object's speed, its direction, and even its shape.- I know that a magnet has two poles called north and south.- I know that a north and south pole will attract whilst a south-south or north-north will repel.- I can recognise different materials that will be attracted to magnets.- I know how to categorise materials based on whether they are magnetic.- I know how different magnets have different strengths.- I know that William Gilbert was a physician who discovered that the Earth's core contained iron and is one big magnet.- I know that William Gilbert carried out lots of studies of magnets and electricity and wrote up his findings.
Upper KS2 (Cycle A, Term 6)	<ul style="list-style-type: none">- Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object and the impact of gravity on our lives.- Identify the effects of air resistance, water resistance and friction, which act between moving surfaces.- Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.	<ul style="list-style-type: none">- I know that gravity is always acting on us.- I know that gravity is a force pulling an object towards the centre of the Earth.- I know that force is measured in newtons.- I know that centripetal force acts on objects moving in a circular motion.- I know that air resistance works in the opposite direction to which an object is moving.- I understand that the greater the surface area the more air resistance there will be.- I know that friction prevents an object from moving across a surface.- I know that the smoother the surface the less friction there is.- I know that water resistance acts in the same way in water as air resistance in air.- I know there are 3 main types of lever and the differences between a first-, second- and third-class lever.



Substantive Knowledge - Progression



		<ul style="list-style-type: none">- I know how to move heavier objects using a lever.- I know that Isaac Newton was born at a time when the laws of nature were a mystery. He studied maths and physics and is perhaps best known for discovering gravity.
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