Science Curriculum

Science Curriculum Intent

"The way a child discovers the world constantly replicates the way science began. You start to notice what's around you, and you get very curious about how things work. How things interrelate. It's as simple as seeing a bug that intrigues you." – David Cronenberg.

Science stimulates pupil's curiosity, develops their sense of enquiry and their understanding of the world around them. Children learn to work as scientists, planning and undertaking practical investigations on their own and with others. They combine their personal experiences with the scientific knowledge they learn which enable them to develop an understanding of key scientific ideas and how the world works and develop a sense of curiosity about natural phenomena.

Science Curriculum Implementation

Pupils begin their formal science education in our Early Years Foundation Stage (EYFS). This involves learning foundational knowledge primarily through the 'understanding the world: the natural world' area of learning. This provides a number of rich contexts for pupils to learn a wide range of vocabulary. These words form the beginnings of scientific concepts that will be built on in Year 1 and beyond. Children find out about objects, materials and living things using all their senses looking at similarities, differences, patterns and change. Both the environment and skilled practitioners foster curiosity and encourage explorative play, children are motivated to ask questions about why things happen and how things work. Our children are encouraged to use their natural environment around them to explore. Children enjoy spending time outdoors exploring mini-beasts and their habitats, observing the changing seasons, plants, and animals. Children start to explore cookery and baking sessions which allows them to experience changes in state as ingredients are mixed, heated and cooled. Across both key stages, the scientific context can be taught either discreetly or as part of a topic where appropriate. At Sileby Redlands, we follow the National Curriculum Programme of Study for science which is set out year-by-year for key stages 1 and 2. Schools are, however, only required to teach the relevant programme of study by the end of the key stage. 'Working scientifically' specifies the understanding of the nature, processes, and methods of science for each year group and should not be taught as a separate strand. This element should be embedded throughout the delivery of the Science curriculum. Sileby Redlands teach subjects through a topic based connected curriculum and sometimes, Science is the main driver. However,

when this is not the case, Science will be taught as a stand-alone subject through this term. Cross-curricular links are also made where possible to enhance the learning of science. Teachers identify the most appropriate teaching strategies to best suit the learning situation and ensure that they identify the most appropriate, engaging and safe method for the learning to be conducted. Learning is encouraged through investigations, first-hand experiences, discussions, and recordings. Pupil voice also plays an essential role in measuring the impact of our Science curriculum across the school. Through pupil interviews, children can reflect on what they have learnt and its impact on our world today. These work together cohesively to evaluate standards in

Science EYFS

	Topic Title	Biology	Chemistry	Physics/ Earth Science
EYFS	Marvellous me	ELG: The Natural World Children at the expected level of development will: • Explore the natural world around them, making observations and drawing pictures of animals and plants. • Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class .		ELG: The Natural World Children at the expected level of development will: • Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.
	Into the woods			
	Around the world			
	Tales as old as time			
	Moo, Baa, Quack			
	Commotion in the ocean			

Science KS1- National Curriculum

	Topic Title	Biology	Chemistry	Physics/ Earth Science
Year 1	Jurassic Planet The Enchanted Forest Rio de Janerio Lively London Out of this world Superheroes	Animals including Humans •identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. •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) Plants •identify and name a variety of common wild and garden plants, including deciduous and evergreen trees •identify and describe the basic structure of a variety of common flowering plants, including trees.	• distinguish between an object and the material from which it is made • identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock • describe the simple physical properties of a variety of everyday materials • compare and group together a variety of everyday materials on the basis of their simple physical properties	• observe changes across the 4 seasons • observe and describe weather associated with the seasons and how day length varies

	Topic Title	Biology	Chemistry
Year 2	Marvellous Mixtures Coastline Land of the Pirates World Shakers Creatures Great and Small Beside the sea	Living things and their habitats • explore and compare the differences between things that are living, dead, and things that have never been alive • identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other • identify and name a variety of plants and animals in their habitats, including microhabitats • describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food Animals, including humans • notice that animals, including humans, have offspring which grow into adults • find out about and describe the basic needs of animals, including humans, for survival (water, food and air) • describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene Plants • observe and describe how seeds and bulbs grow into mature plants	Use of everyday materials identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching

Science LKS2- National Curriculum

	Topic Title	Biology	Chemistry	Physics/ Earth Science
Year 3	Tales of the tribes Fighters, thinkers and throwers Quaking Earth Delicious delights Beasts of Prey Magnificent Metals	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) and how they vary from plant to plant • investigate the way in which water is transported within plants • explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal Animals, including humans • identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat • identify that humans and some other animals have skeletons and muscles for support, protection and movement	Rocks • compare and group together different kinds of rocks on the basis of their appearance and simple physical properties • describe in simple terms how fossils are formed when things that have lived are trapped within rock • recognise that soils are made from rocks and organic matter	Light • recognise that they need light in order to see things and that dark is the absence of light • notice that light is reflected from surfaces • recognise that light from the sun can be dangerous and that there are ways to protect their eyes • recognise that shadows are formed when the light from a light source is blocked by an opaque object • find patterns in the way that the size of shadows change Forces and magnets • compare how things move on different surfaces • notice that some forces need contact between 2 objects, but magnetic forces can act at a distance • observe how magnets attract or repel each other and attract some materials and not others • compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials • describe magnets as having 2 poles • predict whether 2 magnets will attract or repel each other, depending on which poles are facing
Year 4	Centurion Magical mixtures Everchanging landscapes Here come the Vikings! Deep Blue Sea	• recognise that living things can be grouped in a variety of ways • explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment • recognise that environments can change and that this can sometimes pose dangers to living things Animals, including humans • describe the simple functions of the basic parts of the digestive system in humans • identify the different types of teeth in humans and their simple functions • construct and interpret a variety of food chains, identifying producers, predators and prey	• compare and group materials together, according to whether they are solids, liquids or gases • observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C) • identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature	• identify how sounds are made, associating some of them with something vibrating • recognise that vibrations from sounds travel through a medium to the ear • find patterns between the pitch of a sound and features of the object that produced it • find patterns between the volume of a sound and the strength of the vibrations that produced it • recognise that sounds get fainter as the distance from the sound source increases Electricity • identify common appliances that run on electricity • construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers • identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a

Science UKS2- National Curriculum

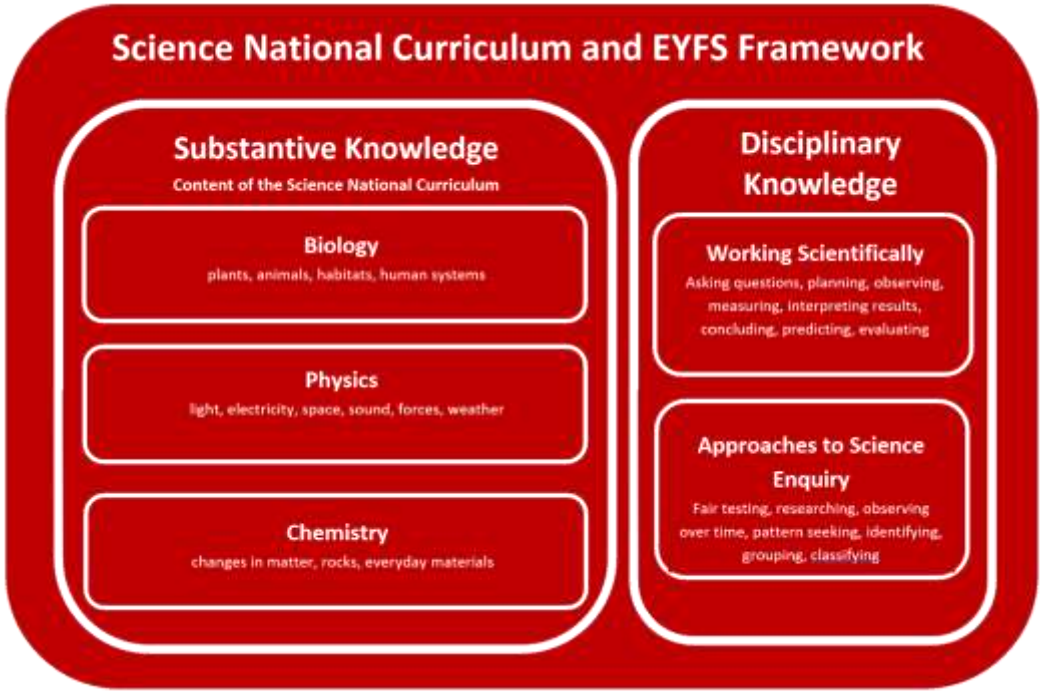
	Topic Title	Biology	Chemistry	Physics/ Earth Science
Year 5	Out of this world Tomb Raiders Spectacular Sorcery Terrible Tudors Animals and B Fabulous Forces	Living things and their habitats describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird describe the life process of reproduction in some plants and animals Animals, including humans describe the changes as humans develop to old age	Properties and changes of materials • compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets • know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution • use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating • give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic • demonstrate that dissolving, mixing and changes of state are reversible changes • explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda	Earth and space • describe the movement of the Earth and other planets relative to the sun in the solar system • describe the movement of the moon relative to the Earth • describe the sun, Earth and moon as approximately spherical bodies • use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky 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, water resistance and friction, that act between moving surfaces • recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect

	Topic Title	Biology	Physics/ Earth Science
Year 6	The Mayans and Mexico Britain at War Frozen Planet Evolution Blood heart	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 micro-organisms, plants and animals • give reasons for classifying plants and animals based on specific characteristics 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 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	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 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 • Electricity • associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit • compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches • use recognised symbols when representing a simple circuit in a

Science Disciplinary & Substantive Knowledge

Substantive concepts in Science

- Biology- animals inc humans, living things and their habitats, plants, evolution and inheritance.
- Physics- seasons, Earth and space, light, electricity, sound, forces and magnets
- Chemistry- materials, rocks, states of matter



Disciplinary concepts in Science

- questioning
- observation
- testing
- classifying hypothesising
- data analysis

Substantive knowledge

Substantive knowledge sets out the subject-specific content that is to be learned - i.e. the National Curriculum units that can be separated into the disciplines of biology, physics and chemistry. This is the knowledge of the products of science, such as concepts, laws, theories and models.

Disciplinary knowledge

Disciplinary knowledge tells us how we know what we know; it is through disciplinary knowledge that pupils learn the enquiry practices of science. It gives an insight into the ways that scientists think - how they ask questions, plan an enquiry, observe, measure, interpret, conclude, predict and evaluate. Disciplinary knowledge enables one to 'think like a scientist'. Disciplinary knowledge in science includes the Working Scientifically strand of the National Curriculum, and the key features of scientific enquiry as detailed in the 'aims' of the National Curriculum.

Science Disciplinary

Disciplinary knowledge considers how substantive knowledge originates, is debated and is revised - i.e. how we create, contest and evaluate substantive knowledge over time. Disciplinary knowledge tells us how we know what we know; it is through disciplinary knowledge that pupils learn the enquiry practices of science. It gives an insight into the ways that scientists think - how they ask questions, plan an enquiry, observe, measure, interpret, conclude, predict and evaluate. Disciplinary knowledge enables one to 'think like a scientist'. Disciplinary knowledge in science includes the Working Scientifically strand of the National Curriculum, and the key features of scientific enquiry as detailed in the 'aims' of the National Curriculum. Essentially, Working Scientifically skills and knowledge of approaches to science enquiry are distinct yet connected, and a particular lesson or sequence of learning is likely to incorporate elements of both.

	Questioning	**Observing**	**Testing**	**Classifying**	**Evaluating**	**Analysing**
EYFS	Asks simple questions.	Can say what they can see.	Can perform a simple test with assistance.	Can sort physical objects with assistance.		
KS1	Asks simple questions and recognises that they can be answered in different ways.	Observes closely, using simple equipment	Performs simple tests	Can identify and classify.	Uses their observations and ideas to suggest answers to questions.	Gathers and records data to help in answering questions.
LKS2	Asks relevant questions and use different types of scientific enquiries to answer them. Gathers, records, classifies and presents data in a variety of ways to help in answering questions.	Makes systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers.	Sets up simple practical enquiries, comparative and fair tests. Records findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.	*Use straightforward scientific evidence to answer questions or to support their findings*	Uses results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions. Identifies differences, similarities or changes related to simple scientific ideas and processes.	Reports on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.
UKS2	Plans different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.	Takes measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when	Uses test results to make predictions to set up further comparative and fair tests.	Records data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs	Reports and presents findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as	Identifies scientific evidence that has been used to support hypothesis

EYFS Substantive Knowledge

Topic Title	Marvellous Me	Into the Woods	Around the World
Substantive Concepts	Biology/Physics- The Natural World	Biology/Physics- The Natural World	Biology/Physics- The Natural World
Substantive Knowledge	• I can explore the human life cycle. • I can discuss body parts and different bones. • I can investigate healthy lifestyles. • I can explore and discuss different textures. • I can investigate whether objects float or sink.	• I can name different insects and woodland animals. • I can discuss different seasons and the changes that happen throughout the year. • I can investigate natural materials- inside and outside. • I can investigate insect habitats and observe them.	• I can explore different building materials. • I can recognise the difference between different animals. • I can explore the taste of different foods from around the world. • I can discuss different animal habitats.

Topic Title	Tales as Old as Time	Moo, Baa, Quack!	Commotion in the Ocean
Substantive Concepts	Biology/Physics- The Natural World	Biology- The Natural World	Biology- The Natural World
Substantive Knowledge	• I can investigate whether objects float or sink- building on my previous knowledge. • I can discuss where fruits and vegetables grow.	• I can explore different animal lifecycles. • I can explore where food comes from. • I can discuss the parts of a plant. • I can learn about different crops, seeds, plants, flowers.	• I can compare features of sea creatures. • I can discuss which animals can live in the ocean and which cannot. • I can explore underwater habitats.

I can discuss different seasons and the changes that happen throughout the year- we cover this continually throughout the year as the seasons change.

Year 1 Substantive Knowledge

Topic Title	Jurassic Planet	The Enchanted Forest	Lively London	Out of this world.
Substantive Concepts	Biology- animals including humans.	Biology- plants Physics- seasonal changes	Biology- animals including humans.	Chemistry
Substantive Knowledge	I can name the parts of the human body that I can see •I can discuss what I can see, touch, smell, hear or taste, •I can identify what parts of the body I use for each sense. •I can sort living and non-living things. •I can classify animals by what they eat. •I know that herbivorous animals eat plants; •I know that carnivorous animals eat other animals; •I know that omnivorous animals eat both animals and plants.	• I can name a variety of common plants. • I can name and identify some common trees. • I know that evergreen trees maintain their leaves throughout the year and that deciduous trees shed their leaves in autumn • I can label the parts of a tree • I can label the parts of a plant. • I know what the weather is • I can name the type of weather in each season • I can name and order the seasons • I know how day length varies across the seasons. • I know that the Earth orbits the Sun with one orbit constituting a year of roughly 365 days	•I can name a variety of animals including fish, amphibians, reptiles birds and mammals •I can name and compare the bodies of different animals. •I know that different types of animals have different features, such as skin, wings, skeleton. •I can sort animals into categories (including fish, amphibians, reptiles, birds and mammals)	•I know what a material is •I can describe the properties of everyday materials •I can name wood, plastic, glass, metal, water and rock •I can explain the materials that an object is made from •I know that an object is made from/of a material and know some examples of materials in the real world •I can distinguish between materials made of wood, plastic, glass, metal, water, rock from my observations. •Compare and group together materials based on their properties.

Year 2 Substantive Knowledge

Topic Title	Marvellous Mixtures	Creatures Great and Small	Creatures Great and Small
Substantive Concepts	Chemistry – Everyday Materials	Animals, Including Humans	Living Things and their habitats
Substantive Knowledge	• I know and can identify the name a range of materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard. • I 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. • I can use properties of a range of materials to sort them. • I know that applying forces to objects can change their shape, by squeezing, stretching, bending and twisting. • I can explore how the shapes of solid objects can be changed by squashing, bending, twisting and stretching.	• I can order the basic stages in a life cycle for animals, including humans • I can explain the basic stages in a life cycle for animals, including humans • I can describe what animals and humans need to survive • I know what a balanced diet is • I know that animals, including humans, need food, water and air to survive	• I can identify and name plants and animals in a range of habitats • I can match living things to their habitat • I know what the word habitat means • I can describe how a specific habitat provides for the basic needs of things living there (plants and animals) • I can identify things that are living, dead and never lived • I 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. • I can name some different sources of food for animals • I know that plants absorb energy from the Sun; that this energy is consumed by herbivorous animals; and that carnivorous animals eat other animals • I can describe how animals find their food • I can explain a simple food chain is

Year 3 Substantive Knowledge

Topic Title	**Tales of the Tribes**	**Fighters, thinkers and throwers**	**Quaking Earth**
Substantive Concepts	Physics- light	Biology - Plants	Chemistry - Rocks
Substantive Knowledge	• I can explain that light is needed in order to see. • I know that the sun is a light source. • I know that opaque objects block light to create shadows. • I can explain that light is reflected from a surface. • I can explain how a shadow is formed. • I can explain that dark is the absence of light. • I can explain why the sun is dangerous to the eyes. • I can tell you how shadows are formed. • I can explain how light is reflected. • I can explain why shadows are sometimes long and sometimes short.	• I can identify the different parts of the plant. • I can describe the functions of each part of a plant. • I can describe how a plant can grow and stay healthy. • I can explain how requirement for grow and health may vary between different plants. • I can investigate how water is transported in plants. • I can describe the life cycle of a plant.	• I can sort and classify rocks based on their appearance and properties. • I can describe how fossils are formed. • I can explain how soil is made. • I sort rocks into the classifications: igneous, sedimentary and metamorphic. • I can explain that soil is made from tiny pieces of rock, air and organic matter.
Topic Title	Delicious Delights	Beasts of Prey	Magnificent Metals
Substantive Concepts	Biology – Animals, including Humans	Biology – Animals, including Humans	Physics – Forces and Magnets
Substantive Knowledge	• I know it is important to have a balanced diet made up of the main food groups, including proteins, carbohydrates, fruit and vegetables, dairy products and alternatives, and fats and spreads. • I know humans need to stay hydrated by drinking water.	• I can explain how animals get nutrients. • I can explain why some animals have a skeleton. • I can name a range of important bones in the human body. • I can explain why animals have muscles. • I know the functions of various bones in the human body. • I know the functions of muscles. • I know how carnivores, herbivores and omnivores get their nutrition.	• I can explore how magnets are used in everyday life. • I can explain what friction is • I know that applying forces to objects can change their shape. • I know that a force can be thought of as a push or a pull. • I can explain the difference between impact forces, frictional forces and strain forces. • I can explore and describe how objects

Year 4 Substantive

Topic Title	Magical mixtures	Magical mixtures	Deep Blue Sea
Substantive Concepts	Chemistry – States of Matter	Physics- electricity	Biology- Living things and their habitats
Substantive Knowledge	• I can group materials as solid, liquid, or gas. • I know how to measure temperature. • I can measure the temperature at which materials change state. • I know materials change state when temperature changes. • Solids have bonds between particles. • As temperature increases, bonds weaken, and solids turn into liquids. • With more heat, liquids turn into gases. • Melting: solid to liquid. • Freezing: liquid to solid. • Evaporation: liquid to gas. • Condensation: gas to liquid. • Sublimation: solid to gas without becoming liquid. • Water melts at 0°C and boils at 100°C. • I can classify materials based on temperature effects.	• I know that current electricity is the flow of electrons around a circuit • I know that metals are good electrical conductors • I know what a circuit is • Cells, batteries and the mains are all sources of electrical energy • I know that electrical current can flow if there is a complete circuit • I know that wires – which contain a conductor inside them, usually made of metal – can allow electrical current to flow around a circuit • I know how to construct a simple circuit using components • I can identify and name the components in a series circuit I can identify and name appliances that require electricity to function • I know that exposure to high levels of electrical current can be dangerous	•I can group living things in different ways •I can create classification keys to group, identify and name living things (for others to use) •I can construct food chains to identify producers, predators and prey •I can use food chains to identify producers, predators and prey •I can describe how changes to an environment could endanger living things •I 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) •I know that living things are divided into kingdoms: the animal kingdom, plants, fungi, bacteria, and single-celled organisms •I know that a species is a group of living things have many similarities that can reproduce together produce offspring

	Insides out!	Insides out!
Substantive Concepts	Biology- animals including humans	Physics- Sound
Substantive Knowledge	•I know that food passes through the body with the nutrients being extracted and the waste products excreted, and that this process is called digestion •I know that the process of digestion involves breaking complex foodstuffs into simpler building blocks that can be absorbed by the body •I know that a human has three types of teeth - these each perform different functions •I know that food is squeezed down the oesphagus towards the stomach in a wave-like action called peristalsis •I know that the stomach releases acid and enzymes to break down the food •I know that the small intestine adds more enzymes and then absorbs the nutrients •I know that the large intestine absorbs water from the undigested	•I know that sound is generated when an object vibrates •I know that sound is a form of energy that transfers in a longitudinal wave •I know that sound travels through a medium •I know that sound travels at different speeds through different objects •I know the terms pitch & volume •I 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 (frequency) •I know that volume is how loud or quiet a sound is and that this is determined by the amount of energy in the wave •I know that the volume of a sound is quieter if the listener is further away from the object •I can explain how sound travels from a source to our ears

Year 5 Substantive Knowledge

Topic Title	Out of this World	Spectacular Sorcery
Substantive Concepts	Physics- Earth and Space	Chemistry- Properties and changes of materials
Substantive Knowledge	• I know the names and shapes of the planets • I 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 • I know that Earth spins on its axis and this affects day/night and the seasons. • I know that the Moon orbits the Earth and the Sun, and this creates the phases of the Moon • I 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	• I know and can demonstrate that some changes are reversible and some are not • I can compare and group materials based on their properties • I can describe how a material dissolves to form a solution; explaining the process of dissolving • I can describe and show how to recover a substance from a solution • I can describe and demonstrate how some materials can be separated • I can give evidenced reasons why materials should be used for specific purposes • I can explain how some changes result in the formation of a new material and that this is usually irreversible • I 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

Topic Title	Animals and Botanicals	Fabulous Forces
Substantive Concepts	Biology - Living things and their habitats Biology - Animals including humans- changes in humans	Physics- Forces
Substantive Knowledge	• I can describe the life cycle of different living things, e.g. mammal, amphibian, insect bird, and the differences between different life cycles • I can describe the process of reproduction • I understand the reproductive cycles of birds, mammals, insects and reptiles. • I can identify different species and suggests which stage of the lifecycle they are in (e.g. frog spawn) • I can create a timeline to indicate stages of growth in humans	• I can identify and explain the effect of gravity, air resistance, friction, air resistance. • I 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 mov • I know that pull forces can be measured using a device called a force meter • I know that the amount of matter (stuff) in an object is its mass • I know that water resistance is a force felt by an object as it moves through water

Year 6 Substantive Knowledge

Topic Title	The Mayans and Mexico	Britain at War	Frozen Planet
Substantive Concepts	Physics – Light	Physics – Light and Electricity	Biology – Living Things and their Habitats
Substantive Knowledge	• I know why there are shadows • I can explain why shadows have the same shape as the object that casts them • I know that light travels in straight lines • I know how to draw a diagram to show why the shape of a shadow will match the shape of an object	• I know that light travels in straight lines • I can explain and demonstrate how we see objects • I know the different components that make up an electric circuit • I can draw circuit diagrams using correct symbols • I know the recognized symbols for a battery, bulb, motor, buzzer and wire • I can compare and give reasons for why components work and do not work in a circuit • I 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 • I 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.	• I can classify living things into broad groups according to observable characteristics and based on similarities & differences • I can give reasons for classifying plants and animals in a specific way • I know what vertebrates and invertebrates are • I can group animals into vertebrates (reptiles, fish, amphibians, birds and mammals) and common invertebrates (e.g. insects, spiders, snails, worms) • I can explain why classification is important • I can explain how animals and plants are adapted to suit their environment • I know that there are three types of micro-organism: viruses, fungi and bacteria • I know that germs are disease-causing micro-organisms

Topic Title	Evolution	Blood Heart
Substantive Concepts	Biology – Evolution and Inheritance Living Things and their Habitats	Biology – Animals including Humans
Substantive Knowledge	• I can describe how the earth and living things have changed over time • I can explain how fossils can be used to find out about the past • I know that living things change over time and that this gradual change is called evolution • I know that natural selection is the cause of evolution • I know that offspring that result from sexual reproduction (i.e. two parents) vary and are not identical to their parents	• I know and can name the main parts of the human circulatory system • I know that the heart and lungs are organs protected by the ribcage and understand this as a part of the skeleton • I 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 • I know that the heart is composed of four chambers: two atria and two ventricles • I 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