Primary Phase Long Term Plan

Science

Overview

Science at William Hulme's is about developing children's ideas and ways of working that enable them to make sense of an ever-changing and developing world: we aim to give all pupils memorable life and learning experiences through a broad and balanced curriculum. We also aim to ensure that all pupils see themselves in our curriculum, and our curriculum takes all pupils beyond their immediate experience of the world. Children who feel confident in their science knowledge and enquiry skills will be excited about science, show that they are actively curious to learn more and will see the relevance of what they learn in science lessons to real-life situations and the importance of science in the real world.

Our high-quality Science curriculum provides the foundations for understanding the world. Throughout the curriculum, children are made aware of how Science has changed our lives and understand how it is vital for the world's future success.

There are **six key principles** that shape our curriculum intent in science, these are:
Entitlement- every pupil has the right to learn all aspects of the curriculum.
Coherence- learning is built upon term by term, as well as year-on-year.
Adaptability- our curriculum is adapted, where necessary, to suit the needs or interests of our pupils.
Representation- a diverse and inclusive curriculum is provided, in which pupils see themselves.
Mastery- providing depth to learning.
Education with Character- opportunities to nurture pupils Spiritual, Moral, Social, Cultural (SMSC) needs are created- where possible.

All pupils, regardless of their starting point, are given equal opportunities to develop their knowledge and love for Science, and are taught the essential aspects of the knowledge, methods, processes and uses of Science. Children are immersed in Scientific vocabulary and they are encouraged to make connections between other topics, other subjects, their local area and the world around them, in order to ensure high retention of the knowledge they acquire. Teachers, equipped with a good knowledge of Rosenshine's Principles of Instruction, help to guide and excite pupils through their effective planning and teaching, while the growth mindset culture throughout school, which teaches children to be independent and curious, encourages pupils to take responsibility for their learning and follow their own lines of enquiry. Our Forest Schools programme also allows children to deepen their knowledge of the world and develop an excitement for natural phenomena through practical learning.

Vertical Concept Overview

Vertical Concept	Key Questions/Definition	Units
All material in the Universe is made of very small particles.	Atoms are the building blocks of all materials, living and non-living. The behaviour of the atoms explains the properties of different materials. Chemical reactions involve rearrangement of atoms in substances to form new substances. Each atom has a nucleus containing neutrons and protons, surrounded by electrons. The opposite electric charges of protons and electrons attract each other, keeping atoms together and accounting for the formation of some compounds.	**Year 1:** Uses of Everyday Materials **Year 2:** Uses of Everyday Materials **Year 4:** States of Matter **Year 4**: Electricity **Year 5:** Properties and Change of Everyday Materials **Year 6**: Physical and Chemical Changes

Objects can affect other objects at a distance.	Some objects have an effect on other objects at a distance. In some cases, such as sound and light, the effect is through radiation which travels out from the source to the receiver. In other cases action at a distance is explained in terms of the existence of a field of force between objects, such as a magnetic field or the universal gravitational field.	**Year 3:** Forces and Magnets **Year 3:** Light **Year 4:** Sound **Year 5:** Forces **Year 6:** Light
Changing the movement of an object requires a net force to be acting on it.	Objects change their velocity of motion only if there is a net force acting on them. Gravity is a universal force of attraction between all objects however large or small, keeping the planets in orbit round the Sun and causing terrestrial objects to fall towards the centre of the Earth.	**Year 3:** Forces and Magnets **Year 5:** Forces **Year 5:** Earth and Space
The total amount of energy in the Universe is always the same but energy can be transformed when things change or are made to happen.	Many processes or events involve changes and require energy to make them happen. Energy can be transferred from one body to another in various ways. In these processes some energy is changed to a form that is less easy to use. Energy cannot be created or destroyed. Energy obtained from fossil fuels is no longer available in a convenient form for use.	**Year 1:** Everyday Materials **Year 2:** Living things and their Habitats **Year 4:** Food and Digestion **Year 4:** Electricity **Year 5:** States of Matter **Year 6:** Electricity
The composition of the Earth and its atmosphere and the processes occurring within them shape the Earth's surface and its climate.	At the Earth's surface, radiation from the Sun heats the surface and causes convection currents in the air and oceans, creating climates. Below the surface heat from the Earth's interior causes movements in the molten rock. The solid surface is constantly changing through the formation and weathering of rock.	**Year 1:** Plants **Year 1:** Seasonal Changes **Year 2:** Animals **Year 3:** Rocks **Geography Year 3:** Mountains and Volcanoes **Geography Year 4:** Earthquakes **Year 5:** Earth and Space **Geography Year 5:** Investigating Water **Geography Year 5:** Climate across the world
Our solar system is a very small part of one of millions of galaxies in the Universe.	Our Sun and eight planets and other smaller objects orbiting it comprise the solar system. Day and night and the seasons are explained by the orientation and rotation of the Earth as it moves round the Sun. The solar system is part of a galaxy of stars, one of many millions in the Universe, enormous distances apart, many of the stars having planets.	**Year 1:** Seasonal Changes **Year 3:** Light **Year 5:** Earth and Space
Organisms are organised on a cellular basis.	All organisms are constituted of one or more cells. Multi---cellular organisms have cells that are differentiated according to their function. All the basic functions of life are the result of what happens inside the cells which make up an organism. Growth is the result of multiple cell divisions.	**Year 1:** Humans **Year 2:** Animals **Year 3:** Animals, including Humans **Year 3:** Plants **Year 4:** Animals including Humans **Year 6:** Animals including Humans **Year 6:** Classification
Organisms require a supply of energy and	Food provides materials and energy for organisms to carry out the basic functions of life and to grow. Some plants and bacteria	**Year 1:** Plants **Year 1:** Animals **Year 2:** Animals

materials for which they are often dependent on or in competition with other organisms.	are able to use energy from the Sun to generate complex food molecules. Animals obtain energy by breaking down complex food molecules and are ultimately dependent on green plants for energy. In any ecosystem there is competition among species for the energy and materials they need to live and reproduce.	**Year 2:** Living Things and their Habitats **Year 3:** Plants **Year 3:** Animals, including humans **Year 4:** Animals, including Humans **Year 4:** Living things and their Habitats **Year 6:** Evolution
Genetic information is passed down from one generation of organisms to another.	Genetic information in a cell is held in the chemical DNA in the form of a four-letter code. Genes determine the development and structure of organisms. In asexual reproduction all the genes in the offspring come from one parent. In sexual reproduction half of the genes come from each parent.	**Year 2:** Plant Growth **Year 3:** Plants **Year 5:** Lifecycles **Year 5:** Living things and their Habitats
The diversity of organisms, living and extinct, is the result of evolution.	All life today is directly descended from a universal common ancestor that was a simple one---celled organism. Over countless generations changes resulted from natural diversity within a species which makes possible the selection of those individuals best suited to survive under certain conditions. Organisms not able to respond sufficiently to changes in their environment become extinct.	**Year 1:** Plants **Year 2:** Living things and their habitats **Year 3:** Rocks **Year 3:** Plants **Year 5:** Living things and their habitats **Year 6:** Living things and their habitats **Year 6:** Evolution and inheritance

Early Years

	Nursery	Reception	Assessment
Autumn Term 1	**Unit: Seasonal changes** **Vertical Concepts:** 1. **Describing the natural things in our local area.** 2. **Types of weather include sunny, rainy, windy, and snowy.** 3. **Naming Sun, Earth and Moon.** 4. **There is a wide variety of living things on Earth, including plants and animals.** **Overview:** • identify appropriate clothes to go outside in different types of weather • we see puddles when it's rainy, shadows during the day and rainbows when there is sunshine and rain • some animals, like hedgehogs, hibernate in the winter Types of weather include sunny, rainy, windy, snowy • habitats are the places that living things live • different animals live in different habitats	**Unit: Everyday materials** **Overview:** • explore natural and man-made materials • some materials are hard whilst others are soft, some can be described as rough whilst others are smooth, and some are dull whilst others are shiny • comparing things that float and sink	Formative assessment through observations and follow-up activities
Autumn Term 2	**Unit: Everyday materials** **Vertical Concept:** 1. **The same thing (water) can look different when it is hot or cold (ice).** **Overview:** • explore natural and man-made materials • some materials are hard whilst others are soft, some can be described as rough whilst others are smooth, and some are dull whilst others are shiny	**Unit: Light** **Overview:** • sources of light/light and dark	

	Nursery	Reception	Assessment
Spring Term 1	**Unit: States of Matter** **Vertical Concepts:** 1. **Magnets can attract or repel other magnets. Magnets attract magnetic objects.** 2. **We can push and pull objects to make them move.** 3. **We have to push or pull objects to make them move; they do not move on their own.** **Overview:** • melting and freezing can be observed in the world around us	**Unit: Seasonal Changes** **Overview:** • identify appropriate clothes to go outside in different types of weather • different animals live in different habitats • observing the changes of the seasons and the effects of wind • observing the properties of water and ice	Formative assessment through observations and follow-up activities
	Unit: Forces **Vertical Concepts:** 1. **Magnets can attract or repel other magnets. Magnets attract magnetic objects.** 2. **We can push and pull objects to make them move.** 3. **We have to push or pull objects to make them move; they do not move on their own.** **Overview:** • how slow/fast a vehicle moves along a track depends on how hard/gently it is pushed/pulled, how steep the slope is, or whether there is an obstacle in its way.	**Unit: Lifecycles** **Overview:** • animals look different when they age • parents and their young animals look similar and different. • life cycle of a Frog	
	Unit: Lifecycles **Vertical Concepts:** 1. **Magnets can attract or repel other magnets. Magnets attract magnetic objects.** 2. **We can push and pull objects to make them move.** 3. **We have to push or pull objects to make them move; they do not move on their own.** **Overview:** • animals look different when they age • parents and their young animals look similar and different.	**Unit: Plants** **Overview:** • plants need water and light to grow • growing Sunflowers	

Spring Term 2	**Unit: Plant Growth** **Vertical Concept:** 1. **Young animals grow into adult animals. The young look similar, but not the same, as the adults.** **Overview:** • plants need water and light to grow	**Unit: Everyday Materials** **Vertical Concept:** 1. **We experience different types of weather in different seasons (focus on spring and winter).** **Overview:** • explore natural and man-made materials • some materials are hard whilst others are soft, some can be described as rough whilst others are smooth, and some are dull whilst others are shiny • comparing things that float and sink • making Pancakes – observing changes in materials	
	Unit: Living things and their habitats **Vertical Concept:** 1. **Young animals grow into adult animals. The young look similar, but not the same, as the adults.** **Overview:** • the Serengeti is a grassland, with habitats home to animals		
	Unit: Humans **Vertical Concept:** 1. **Young animals grow into adult animals. The young look similar, but not the same, as the adults.** **Overview:** • healthy eating		

	Nursery	Reception	Assessment
Summer Term 1	**Unit: Everyday materials** **Overview:** • some materials will dissolve in water – making playdough	**Unit: Humans** **Overview:** • healthy eating • our bodies – understanding why we have a skeleton	Formative assessment through observations and follow-up activities
Summer Term 2	**Unit: Lifecycles** **Vertical Concepts:** 1. **Geographical features include beach, hill, forest, sea and river.** 2. **There are many different kinds of plants and animals in the world today.** **Overview:** • planting seeds – observing the lifecycle of a plant from the seed/seedling/plant • life-cycle of butterfly • insects and their habitats	**Unit: Living things and their habitats** **Overview:** • many animals live in water, like turtles, orcas, dolphins, manta rays, sharks, seahorses and jellyfish	

Key Stage One

	Year 1	Year 2	Assessment
Autumn Term 1	**Unit: Plants** **Vertical Concepts:** 1. **The composition of the Earth and its atmosphere and the processes occurring within them shape the Earth's surface and its climate.** 2. **Organisms require a supply of energy and materials for which they are often dependent on or in competition with other organisms.** 3. **The diversity of organisms, living and extinct, is the result of evolution.** **Overview:** • 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	**Unit: Plant Growth** **Vertical Concept:** 1. **Genetic information is passed down from one generation of organisms to another.** **Overview:** • observe and describe how seeds and bulbs grow into mature plants • find out and describe how plants need water, light and a suitable temperature to grow and stay healthy	• Low stakes pre and post learning quiz via Microsoft Forms. • Formative assessments during every lesson include: a review, verbal feedback, a range of questioning techniques and mini whiteboard tasks. • Opportunities for practical lessons
Autumn Term 2	**Unit: Everyday Materials:** **Vertical Concept:** 1. **The total amount of energy in the Universe is always the same but energy can be transformed when things change or are made to happen.** **Overview:** • 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	**Unit: Needs of Animals** **Vertical Concepts:** 1. **The air is all around us on Earth.** 2. **Living things grow, need, water, air and food, react to their surroundings, move, get rid of their waste, reproduce.** 3. **All living things need energy for food, as well as air, water and certain temperature conditions.** **Overview:** • 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	

	Year 1	Year 2	Assessment
Spring Term 1	**Unit: Seasonal Changes (Autumn to Winter)** **Vertical Concepts:** **1. The composition of the Earth and its atmosphere and the processes occurring within them shape the Earth's surface and its climate.** **2. Our solar system is a very small part of one of millions of galaxies in the Universe.** **Overview:** • observe changes across the four seasons • observe and describe weather associated with the seasons and how day length varies	**Unit: Uses of Everyday Materials** **Vertical Concepts:** **1. All material in the Universe is made of very small particles.** **2. The total amount of energy in the Universe is always the same but energy can be transformed when things change or are made to happen.** **Overview:** • 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.	• Low stakes pre and post learning quiz via Microsoft Forms. • Formative assessments during every lesson include: a review, verbal feedback, a range of questioning techniques and mini whiteboard tasks. • Opportunities for practical lessons
Spring Term 2	**Unit: Seasonal Changes (Spring to Summer)** **Vertical Concepts:** **1. The composition of the Earth and its atmosphere and the processes occurring within them shape the Earth's surface and its climate.** **2. Our solar system is a very small part of one of millions of galaxies in the Universe.** **Overview:** • observe changes across the four seasons • observe and describe weather associated with the seasons and how day length varies	**Unit: Living things and their habitats** **Vertical Concepts:** **1. Organisms require a supply of energy and materials for which they are often dependent on or in competition with other organisms.** **2. The diversity of organisms, living and extinct, is the result of evolution.** **Overview:** • basic introduction to habitats and micro-habitats, and simple food chains • everything in the world can be categorised as either alive, used to be alive or has never been alive. • living things move, reproduce, are sensitive to their surroundings, grow, need oxygen, get rid of their waste, and need nutrition • animals and plants move	

	Year 1	Year 2	Assessment
Summer Term 1	**Unit: Animals** **Vertical Concepts:** **1. Organisms require a supply of energy and materials for which they are often dependent on or in competition with other organisms.** **Overview:** • Naming reptiles, fish, amphibians, birds and mammals; carnivores, herbivores, omnivores	**Unit: Solids, liquids and gases** **Vertical Concepts:** **1. All the 'stuff' encountered in everyday life, including air, water and different kinds of solid substances is called matter.** **Overview:** • All materials are made of a single substance or a mixture of substances • There are three states of matter • Substances can exist as solids, liquids and gases • The three states of matter have different properties	• Low stakes pre and post learning quiz via Microsoft Forms. • Formative assessments during every lesson include: a review, verbal feedback, a range of questioning techniques and mini whiteboard tasks. • Opportunities for practical lessons
Summer Term 2	**Unit: Humans** **Vertical Concept:** **1. Organisms are organised on a cellular basis.** **Overview:** • human body parts and senses	**Unit: Solids, liquids and gases** **Vertical Concept:** **1. All the 'stuff' encountered in everyday life, including air, water and different kinds of solid substances is called matter.** **Overview:** • we can decide if a substance is in its solid, liquid or gaseous state by looking at its properties • one substance can exist in the different states, when the substance is in a different state it is still the same substance	

Lower Key Stage Two

	Year 3	Year 4	Assessment
Autumn Term 1	**Unit: Rocks** **Vertical Concepts:** **1. The composition of the Earth and its atmosphere and the processes occurring within them shape the Earth's surface and its climate.** **2. The diversity of organisms, living and extinct, is the result of evolution.** **Overview:** • 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 • Understand who Inge Lehmann was.	**Unit: Classifying Organisms** **Vertical Concept:** **1. There is a wide variety of living things, including plants and animals** **Overview:** • 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.	• Low stakes pre and post learning quiz via Microsoft Forms. • Formative assessments during every lesson include: a review, verbal feedback, a range of questioning techniques and mini whiteboard tasks. • Opportunities for practical lessons
Autumn Term 2	**Unit: Light** **Vertical Concepts:** **1. Objects can affect other objects at a distance.** **2. Our solar system is a very small part of one of millions of galaxies in the Universe.** **Overview:** • 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 a solid object • find patterns in the way that the size of shadows change	**Unit: Food and Digestion** **Vertical Concepts:** **1. The total amount of energy in the Universe is always the same but energy can be transformed when things change or are made to happen.** **Overview:** • 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.	

	Year 3	Year 4	Assessment
Spring Term 1	**Unit: Animals including Humans** **Vertical Concepts:** **1. Organisms are organised on a cellular basis.** **2. Organisms require a supply of energy and materials for which they are often dependent on or in competition with other organisms.** **Overview:** • 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.	**Unit: Particle model and states of matter** **Vertical Concept:** **1. Objects can affect other objects at a distance.** **Overview:** • the different substances in their different forms (solids, liquids and gases) are all made of particles • the particles in the different states of matter are arranged differently • investigate the effect of temperature on the rate of evaporation • 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.	• Low stakes pre and post learning quiz via Microsoft Forms. • Formative assessments during every lesson include: a review, verbal feedback, a range of questioning techniques and mini whiteboard tasks. • Opportunities for practical lessons
Spring Term 2	**Unit: Plants** **Vertical Concepts:** **1. Genetic information is passed down from one generation of organisms to another.** **2. The diversity of organisms, living and extinct, is the result of evolution.** **Overview:** • 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	**Unit: Sound** **Vertical Concept:** **1. Sound comes from things that vibrate and can be detected at a distance from the source because the air or other material around is made to vibrate. Sounds are heard when the vibrations in the air reach our ears.** **Overview:** • 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.	

	Year 3	Year 4	Assessment
Summer Term 1	**Unit: Forces and Motions** **Vertical Concepts:** **1. Forces can push, pull or twist objects, making them change shape or motion.** **2. Things can only change their motion if there is a net force acting on them.** **3. When forces acting on an object are not equal and opposite in direction, they are unbalanced and will change an object's speed, direction or shape.** **Overview:** • ***introducing pushes and*** pulls***; opposing forces, and balanced forces*** • forces are pushes or pulls • forces arise when objects interact with each other • forces can cause a change in speed, direction or shape of an object • forces that act in opposite directions are called opposing forces. • we use arrows to show the size of the force and the direction it acts in. • forces that are equal and act in opposite directions are described as balanced forces, • when forces are balanced, an object will move at a constant speed in the same direction. • unbalanced forces can change the shape of an object.	**Unit: Electricity** **Vertical Concept:** **1. Things around us can be made to change or happen. We can turn on a light bulb and make it brighter or dimmer.** **Overview:** • 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 a 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.	• Low stakes pre and post learning quiz via Microsoft Forms. • Formative assessments during every lesson include: a review, verbal feedback, a range of questioning techniques and mini whiteboard tasks. • Opportunities for practical lessons

Summer Term 2	**Unit: Forces and Magnetism** **Vertical Concepts:** **1. Objects can affect other objects at a distance.** **2. Changing the movement of an object requires a net force to be acting on it.** **Overview:** • compare how things move on different surfaces • notice that some forces need contact between two 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 two poles • predict whether two magnets will attract or repel each other, depending on which poles are facing.	**Unit: Properties of Materials** **Vertical Concepts:** **1. All material in the Universe is made of very small particles.** **2. The total amount of energy in the Universe is always the same but energy can be transformed when things change or are made to happen.** **Overview:** • physical properties are properties that we can measure or observe in the classroom • physical properties include electrical conductivity; melting and boiling points; thermal conductivity; being malleable; windproof; hard/soft; and magnetic • energy will be transferred from places with a higher temperature to places with a lower temperature. • elasticity is a physical property. • elastic materials can stretch and then return to its original form. • chemical properties are properties that scientists need specialist equipment to measure • chemical properties include how easy a substance is to set on fire (flammability) or how poisonous something is (toxicity)	

Upper Key Stage Two

	Year 5	Year 6	Assessment
Autumn Term 1	**Unit: Separating Mixtures** **Vertical Concepts:** **1. When some materials combine, they do not change permanently and can be separated again.** **2. Materials can be changed by heating and cooling.** **Overview:** • 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.	**Unit: Electricity** **Vertical Concept:** **1. The total amount of energy in the Universe is always the same but energy can be transformed when things change or are made to happen.** **Overview:** • 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 diagram.	• Low stakes pre and post learning quiz via Microsoft Forms. • Formative assessments during every lesson include: a review, verbal feedback, a range of questioning techniques and mini whiteboard tasks. • Opportunities for practical lessons

Autumn Term 2	**Unit: Energy** **Vertical concepts:** **1. Many processes and phenomena are explained in terms of energy exchanges. Energy cannot be created or destroyed. When energy is transferred from one object to others, the total amount of energy in the universe remains the same; the amount that one object loses is the same as the other objects gain. Two examples of energy stores are thermal stores and chemical stores of energy.** **2. Energy is transferred to the Earth by light. When making their own food, plants transfer some of this energy to their chemical store. As other organisms eat these producers, some energy in this chemical energy store is transferred.** **Overview:** • energy is needed by both living and non-living things. • energy can be transferred from one store to another store • fossil fuels and batteries are examples of chemical energy stores • energy resources such as oil, gas and coal can be depleted. • energy stores are needed for something to happen • when energy is removed from one store and is transferred to another store, the amount of energy in the first store goes down and the amount of energy in the second store goes up • energy is not used up it is just moved around from store to store. • energy can be stored thermally in the surroundings	**Unit: Evolution and Inheritance** **Vertical concepts:** **1. Organisms require a supply of energy and materials for which they are often dependent on or in competition with other organisms.** **2. The diversity of organisms, living and extinct, is the result of evolution.** **Overview:** • 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 animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.	

	Year 5	Year 6	Assessment
Spring Term 1	**Unit: Lifecycles** **Vertical Concept:** **1. Genetic information is passed down from one generation of organisms to another.** **Overview:** • 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	**Unit: Light** **Vertical Concept:** **1. Objects can affect other objects at a distance.** **Overview:** • 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.	• Low stakes pre and post learning quiz via Microsoft Forms. • Formative assessments during every lesson include: a review, verbal feedback, a range of questioning techniques and mini whiteboard tasks. • Opportunities for practical lessons

Spring Term 2	**Unit: Animals including humans** **Vertical concepts:** **1. Organisms produce offspring of the same kind, but in many cases offspring are not identical with each other or with their parents.** **2. Plants and animals, including humans, resemble their parents in many features because information is passed from one generation to the next.** **3. Not all information is passed on from one generation to the other in the same way; some skills and behaviour have to be learned.** **Overview:** • describe the changes as humans develop to old age. • the human life cycle goes through the same stages as those for other animals: fertilisation, gestation, growth • fertilisation in most humans is internal, but it can happen externally (in vitro fertilisation - IVF - which means 'in glass' fertilisation) • the human life cycle: embryo, foetus, infant, child, adolescent, adult, senior • human are viviparous and a foetus develops inside the mother (or surrogate mother) • the bigger the animal, the longer the gestation period • a foetus is considered a baby when it is born • cognitive, physical and social and emotional development takes place at the greatest rate during infancy	**Unit: Further Classification** **Vertical concept:** **1. Organisms are organised on a cellular basis.** **Overview:** • 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.	

	Year 5	Year 6	Assessment
Summer Term 1	**Unit: Forces** **Vertical Concepts:** **1. Objects can affect other objects at a distance.** **2. Changing the movement of an object requires a net force to be acting on it.** **Overview:** • 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.	**Unit: Functions of the human body** **Vertical Concepts:** **1. All organisms respire.** **2. Respiration takes place in cells.** **3. Living things move, reproduce, are sensitive to their surroundings, grow, respire, excrete, and need nutrition (MRS GREN).** **4. Being healthy means we are in a state of physical, mental and social well being and are free from disease. Some drugs can help us and some can harm us (particularly in the wrong quantities).** **Overview:** • 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.	• Low stakes pre and post learning quiz via Microsoft Forms. • Formative assessments during every lesson include: a review, verbal feedback, a range of questioning techniques and mini whiteboard tasks. • Opportunities for practical lessons

Summer Term 2	**Unit: Earth and Space** **Vertical Concepts:** **1. The composition of the Earth and its atmosphere and the processes occurring within them shape the Earth's surface and its climate.** **2. Our solar system is a very small part of one of millions of galaxies in the Universe.** **Overview:** • 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.	**Unit: Physical and chemical changes** **Vertical Concept:** **1. All material in the Universe is made of very small particles.** **Overview:** • identifying physical and chemical changes • a mixture is two or more substances that are mixed but not chemically joined together • distillation is a separating technique that can separate a solvent from a solution. It relies on evaporation and condensation. • chromatography is a separation technique in which a mixture is dissolved into a solvent, and the components of the mixture are carried by the solvents at different rates. • a chemical change is a change where a new substance is formed. • a physical change is where the substance changes its properties, but it does not become a different substance • some chemical changes are irreversible, but some can be reversed • most physical changes are reversible but some are not • chemical reactions can be summarized using word equations. • word equations show the names of the chemicals reacting and the names of the products formed.	

Useful Resources for Supporting Your Child at Home:	**Homework:**
• BBC Bitesize – Science • Explorify website • WOW Science website	• Link current science topic to everyday experiences and discussions • Make a poster or leaflet about your current topic