SCIENCE

ESSENTIAL CHARACTERISTICS

• The ability to think independently and raise questions about working scientifically and the knowledge and skills that it brings.

• Confidence and competence in the full range of practical skills, taking the initiative in, for example, planning and carrying out scientific investigations.

• Excellent scientific knowledge and understanding which is demonstrated in written and verbal explanations, solving challenging problems and reporting scientific findings.

• High levels of originality, imagination or innovation in the application of skills.

• The ability to undertake practical work in a variety of contexts, including fieldwork.

• A passion for science and its application in past, present and future technologies.

THRESHOLD CONCEPTS

Work scientifically	**Biology**	**Chemistry**	**Physics**
This concept involves learning the methodologies of the discipline of science.	**Understand plants** This concept involves becoming familiar with different types of plants, their structure and reproduction. **Understand animals and humans** This concept involves becoming familiar with different types of animals, humans and the life processes they share. **Investigate living things** This concept involves becoming familiar with a wider range of living things, including insects and understanding life processes. **Understand evolution and inheritance**	**Investigate materials** This concept involves becoming familiar with a range of materials, their properties, uses and how they may be altered or changed.	**Understand movement, forces and magnets** This concept involves understanding what causes motion. **Understand the Earth's movement in space** This concept involves understanding what causes seasonal changes, day and night. **Investigate light and seeing** This concept involves understanding how light and reflection affect sight. **Investigate sound and hearing** This concept involves understanding how sound is produced, how it travels and how it is heard.

	This concept involves understanding that organisms come into existence, adapt, change and evolve and become extinct.		**Understand electrical circuits** This concept involves understanding circuits and their role in electrical applications.

Threshold Concept	Foundation	Milestone 1	Milestone 2
Work scientifically This concept involves learning the methodologies of the discipline of science.	● **The world:** Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter. Listening, attention and understanding: Make comments about what they have heard and ask questions to clarify their understanding.	• Ask simple questions. • Observe closely, using simple equipment. • Perform simple tests. • Identify and classify. • Use observations and ideas to suggest answers to questions. • Gather and record data to help in answering questions.	• Ask relevant questions. • Set up simple, practical enquiries and comparative and fair tests. • Make accurate measurements using standard units, using a range of equipment, e.g. thermometers and data loggers. • Gather, record, classify and present data in a variety of ways to help in answering questions. • Record findings using simple scientific language, drawings, labelled diagrams, bar charts and tables. • Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions. • Use results to draw simple conclusions and suggest improvements, new questions and predictions for setting up further tests. • Identify differences, similarities or changes related to simple, scientific ideas and processes. • Use straightforward, scientific evidence to answer questions or to support their findings.
BIOLOGY		**BIOLOGY**	**BIOLOGY**
Understand plants This concept involves becoming familiar with different types of plants, their structure and reproduction.	• 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	• Identify and name a variety of common plants, including garden plants, wild plants and trees and those classified as deciduous and evergreen. • Identify and describe the basic structure of a variety of common flowering plants, including roots, stem/trunk, leaves and flowers. • Observe and describe how seeds and bulbs grow into mature plants.	• Identify and describe the functions of different parts of flowering plants: roots, stem, 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 role of flowers in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.

	their experiences and what has been read in class.	• Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.	
Understand animals and humans This concept involves becoming familiar with different types of animals, humans and the life processes they share.	• 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.	• Identify and name a variety of common animals that are birds, fish, amphibians, reptiles, mammals and invertebrates. • 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 (birds, fish, amphibians, reptiles, mammals and invertebrates, including pets). • Identify name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. • Notice that animals, including humans, have offspring which grow into adults. • Investigate 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.	• Identify that animals, including humans, need the right types and amounts of nutrition, that they cannot make their own food and they get nutrition from what they eat. • Construct and interpret a variety of food chains, identifying producers, predators and prey. • Identify that humans and some animals have skeletons and muscles for support, protection and movement. • 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.
Investigate living things This concept involves becoming familiar with a wider range of living things, including insects and understanding life processes.	The Natural world: • 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	• Explore and compare the differences between things that are living, that are dead and 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	• Recognise that living things can be grouped in a variety of ways. • Explore and use classification keys. • Recognise that environments can change and that this can sometimes pose dangers to specific habitats.

	class.	simple food chain, and identify and name different sources of food.	
Understand evolution and inheritance This concept involves understanding that organisms come into existence, adapt, change and evolve and become extinct.		• *Identify how humans resemble their parents in many features.*	• *Identify how plants and animals, including humans, resemble their parents in many features.* • *Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.* • *Identify how animals and plants are suited to and adapt to their environment in different ways.*
CHEMISTRY		**CHEMISTRY**	**CHEMISTRY**
Investigate materials This concept involves becoming familiar with a range of materials, their properties, uses and how they may be altered or changed.		• 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. • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. • Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick/rock, and paper/cardboard for particular uses.	<u>Rocks and Soils</u> • Compare and group together different kinds of rocks on the basis of their simple, physical properties. • Relate the simple physical properties of some rocks to their formation (igneous or sedimentary). • Describe in simple terms how fossils are formed when things that have lived are trapped within sedimentary rock. • Recognise that soils are made from rocks and organic matter. <u>States of Matter</u> • 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 the temperature at which this happens in degrees Celsius (°C), building on their teaching in mathematics. • Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.
PHYSICS		**PHYSICS**	**PHYSICS**
Understand movement, forces and magnets This concept involves understanding what causes motion.	Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.	• Notice and describe how things move, using simple comparisons such as faster and slower. • Compare how different things move.	• 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.
Understand light and seeing This concept involves understanding how light and reflection affect sight.		• *Observe and name a variety of sources of light, including electric lights, flames and the Sun, explaining that we see things because light travels from them to our eyes.*	• 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.
Investigate sound and hearing This concept involves understanding how sound is produced, how it travels and how it is heard.		• *Observe and name a variety of sources of sound, noticing that we hear with our ears.*	• 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.
Understand electrical circuits This concept involves understanding circuits and their role in electrical applications.		• *Identify common appliances that run on electricity.* • *Construct a simple series electrical circuit*.	• 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.

Understand the Earth's movement in space This concept involves understanding what causes seasonal changes, day and night.		• *Observe the apparent movement of the Sun during the day*. • Observe changes across the four seasons. • Observe and describe weather associated with the seasons and how day length varies.	• *Describe the movement of the Earth relative to the Sun in the solar system.* • *Describe the movement of the Moon relative to the Earth.*

Items in italics are not statutory in the English National Curriculum.

BREADTH OF STUDY

EYFS	KEY STAGE 1	KEY STAGE 2
The Natural world: • Explore the natural world around them, making observations and drawing pictures of animals and plants. • Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class. • Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter. Managing Self: ● Manage their own basic hygiene and personal needs, including dressing, going to the toilet and understanding the importance of healthy food choices. Listening, Attention and understanding ● Make comments about what they have heard and ask questions to clarify their understanding.	Working Scientifically Across all year groups scientific knowledge and skills should be learned by working scientifically. (This is documented in the Essentials for progress section.) <u>Biology</u> Plants • Identify, classify and describe their basic structure. • Observe and describe growth and conditions for growth. Habitats • Look at the suitability of environments and at food chains. Animals and humans • Identify, classify and observe. • Look at growth, basic needs, exercise, food and hygiene. All living things* • Investigate differences. <u>Chemistry</u> Materials • Identify, name, describe, classify, compare properties and changes. • Look at the practical uses of everyday materials	Working Scientifically Across all year groups scientific knowledge and skills should be learned by working scientifically. (This is documented in the Essentials for progress section.) <u>Biology</u> Plants • Look at the function of parts of flowering plants, requirements of growth, water transportation in plants, life cycles and seed dispersal. Evolution and inheritance • Look at resemblance in offspring. • Look at changes in animals over time. • Look at adaptation to environments. • Look at differences in offspring. • Look at adaptation and evolution. • Look at changes to the human skeleton over time. Animals and humans • Look at nutrition, transportation of water and nutrients in the body, and the muscle and skeleton system of humans and animals. • Look at the digestive system in humans. • Look at teeth. • Look at the human circulatory system. All living things • Identify and name plants and animals • Look at classification keys. • Look at the life cycle of animals and plants.

	<u>Physics</u> Light* • Look at sources and reflections. Sound* • Look at sources. Electricity* • Look at appliances and circuits. Forces • Describe basic movements. Earth and space • Observe seasonal changes.	• Look at classification of plants, animals and micro-organisms. • Look at reproduction in plants and animals, and human growth and changes. • Look at the effect of diet, exercise and drugs. <u>Chemistry</u> Rocks and fossils • Compare and group rocks and describe the formation of fossils. States of matter • Look at solids, liquids and gases, changes of state, evaporation, condensation and the water cycle. Materials • Examine the properties of materials using various tests. • Look at solubility and recovering dissolved substances. • Separate mixtures. • Examine changes to materials that create new materials that are usually not reversible. <u>Physics</u> Light • Look at sources, seeing, reflections and shadows. • Explain how light appears to travel in straight lines and how this affects seeing and shadows. Sound • Look at sources, vibration, volume and pitch. Electricity • Look at appliances, circuits, lamps, switches, insulators and conductors. • Look at circuits, the effect of the voltage in cells and the resistance and conductivity of materials. Forces and magnets

		• Look at contact and distant forces, attraction and repulsion, comparing and grouping materials. • Look at poles, attraction and repulsion. • Look at the effect of gravity and drag forces. • Look at transference of forces in gears, pulleys, levers and springs. Earth and space • Look at the movement of the Earth and the Moon Explain day and night
Items marked are not statutory *		