Science Intent

A high-quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Science has changed our lives and is vital to the world's future prosperity, and all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational knowledge and skills, pupils at Breachwood Green School are encouraged to develop a sense of excitement and curiosity about the world around them. They are encouraged to understand how science can be used to explain what is occurring, predict how things will behave and analyse causes. At Breachwood Green School children will build on the essential aspects of scientific knowledge and working scientifically. Learning through enquiry will enable children to ask more questions and develop their own explanations, as well as being able to draw conclusions from data. The documents below highlight the working scientific skills and scientific knowledge children will gain at each stage of the curriculum.

Progression of Skills in Science - EYFS

Early Years pre-requisite skills for Science within the national curriculum. The EYFS framework is structured very differently to the national curriculum as it is organised across seven areas of learning rather than subject areas. The aim of this table is to show how the skills taught across EYFS feed into national curriculum subjects. This document demonstrates which early year's outcomes are prerequisite skills for science within the national curriculum. The table below outlines the most relevant early year's outcomes from 30-50 months to ELG, brought together from different areas of the Early Years Foundation Stage, to match the programme of study for science. The most relevant early year's outcomes for science are taken from the following areas of learning: Physical Development, Understanding the World, Expressive Arts and Design.

	Age band: 30-50 months	Age band: 40-60 months	ELG
Physical Development - Health and Self Care	• To observe the effects of physical activity on their bodies.	• To eat a healthy range of food stuffs and understand a need for variety in food. • To show some understanding that good practices with regard to exercise, eating, sleeping and hygiene can contribute to good health.	• To look closely at similarities, differences, patterns and change.
Knowledge and Understanding of the World	• To comment and ask questions about aspects of their familiar world, such as the place where they live or the natural world. • To talk about some of the things they have observed, such as plants, animals, natural and found objects. • To talk about why things happen and how things work. • To develop an understanding of growth, decay and changes over time. • To show care and concern for living things	• To look closely at similarities, differences, patterns and change.	• To know about similarities and differences in relation to places, objects, materials and living things. • Talk about the features of their own immediate environment and how environments might vary from one another.
Expressive Arts and Design		• To begin to be interested in and describe the texture of living things.	

Progression in Science – KS1, Lower KS2 and Upper KS2

EYFS children study science in a variety of exciting topics which put science into context, including themes such as All about me, where children learn all about parts of the body, their senses and about keeping healthy. In KS1 and KS2 biology related topics include living things and their habitats, evolution and inheritance and animals including humans. Chemistry related topics include properties and changes in materials. Physics oriented topics include forces, light, electricity, Earth and space. Throughout their science topics, our children are encouraged to understand how science can be used to explain what is happening, predict how things will behave, and analyse causes. Practical enquires enable children to share their findings, working to become effective communicators of scientific ideas, facts and data. The following show the progression of working scientifically skills and scientific knowledge taught during KS1 and KS2. By the end of their primary education, our children will be able to use different types of science enquiries that help them answer scientific questions about the world around them. They will be equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future.

Progression in Working Scientifically Skills

	KS1	Lower KS2	Upper KS2
Asking Questions	• Ask simple questions and recognise that they can be answered in different ways	• Ask relevant questions and use different types of scientific enquiries to answer them • Set up simple practical enquiries, comparative and fair tests	• Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
Measuring and Recording	• Observe closely, using simple equipment • Perform simple tests • Gather and record data to help in answering questions	• Make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers • Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables • Gather, record, classify and present data in a variety of ways to help in answering questions	• Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings where appropriate • Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, and bar and line graphs
Concluding	• Identify and classify • Observe closely using equipment • Use their observations and ideas to suggest answers to questions	• Identify differences, similarities or changes related to simple scientific ideas and processes □ • Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions • Use straightforward scientific evidence to answer questions or to support their findings	• Identify scientific evidence that has been used to support or refute ideas or arguments • Report and present findings from enquiries, including conclusions, causal relationships and explanations of results, in oral and written forms such as displays and other presentations
Evaluating		• Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions	• Use test results to make predictions to set up further comparative and fair tests

Progression in Scientific Knowledge				
	EYFS	**KS1**	**Lower KS2**	**Upper KS2**
Plants	• Identify something as a plant • Name some common plants, • Identify leaf, root, stem and flower • Recognise that plants need water to grow • Identify the seeds in a fruit	• 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 • Observe how plants change over time • Observe and describe how seeds and bulbs grow into mature plants • Compare the lifecycle for a plant from a seed with that from a bulb • Know that a seed and bulb both contain everything a plant needs to grow • Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy	• 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 • Know that plants make their own food • Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal	
Living things and their habitats	• Identify something as an animal and name some places animals live • Talk about the features of their own immediate environment and how environments might vary from one another. • Make observations of animals and plants and explain why some things occur, and talk about changes • Use their observations to describe humans and animals	• Explore and compare the difference between things that are living, dad, and things that have never been alive • Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other • Identify and name a variety of plants and animals in their habitats, including micro-habitats • Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food	• 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	• 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 • 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
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 year 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.

	EYFS	KS1	Lower KS2	Upper KS2
Seasonal Changes	• To name the seasons	• Observe changes across the four seasons • Observe and describe weather associated with the seasons and how day length varies		
Animals including Humans	• Identify something as an animal and name some places animals live • Identify and locate parts of the body (eye, ear, knee, finger, foot, mouth, nose, stomach, eyebrow, arm, tongue, toe, forehead, chest, hand, leg) and parts of animal bodies. • Use their observations to describe humans and animals • Name a very limited range of food • Identify types of exercise • Changes as they grow from a baby to an adult and name baby, child, adult and the young of some other animals.	• 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) • 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. Start to understand the lifecycles of animals and humans. • Compare how they are now to when they were a baby and explain some of the changes that will happen as they get older. Use correct names for penis, testicles, anus, vagina, vulva, and give reasons why they are private. • 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	• 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 • 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 Y3 - understand that in animals and human lots of changes happen between conception and growing up, and that it is usually the female who has the baby. Explain how boys' and girls' bodies change on the outside during the growing up process. Understand how babies grow and develop in the mother's uterus and understand what a baby needs to live and grow. Y4 - understand that boys' and girls' bodies need to change so that when they grow up their bodies can make babies. Identify how boys' and girls' bodies change on the outside and inside during this growing up process (puberty) and conception in simple term.s Correctly label the internal and external parts of male and female bodies that are necessary for making a baby (testicles, sperm, penis, ovaries, egg, ovum/ova, womb/uterus, vagina/vulva).	• Describe the changes as humans develop to old age. • Describe how boys and girls change during puberty and why looking after myself physically and emotionally is important. • Y5 - Describe how a girl's body changes in order for her to be able to have babies when she is an adult, and that menstruation (having periods) is a natural part of this and understand the importance of looking after themselves physically (sanitary towels, sanitary pads, tampons, oestrogen) • Understand that sexual intercourse can lead to conception and that is how babies are usually made. To understand that sometimes people need IVF to help them have a baby. • Y6 - Describe how a baby develops from conception (including IVF) through the nine months of pregnancy and how it is born. Understanding conception (including IVF) to birth of a baby. • Identify and name the 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.

	EYFS	KS1	Lower KS2	Upper KS2
Materials/Rocks/States of Matter	• Make observations of common objects • Make very simplistic observations of materials • Arrange materials into groups • Identify when changes occur e.g. when food is cooked	• 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 (both visible and nonvisible) • Identify and compare the uses 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	• 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 • 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	• 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 • Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic • 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 • 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
Electricity	• Know electricity can be dangerous • Explore a range of battery powered devices		• 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	• Use recognised symbols when representing a simple circuit in a diagram • 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
Light and Sound	• Know that it is dangerous to look at the sun • Relate their sense of sight to their eyes • Relate their sense of hearing to their ears		• Recognise that light from the sun can be dangerous and that there are ways to protect their 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 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 • 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	• Recognise that light appears to travel in straight lines • 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 that objects are seen because they give out or reflect light into the eye • Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them

	EYFS	KS1	Lower KS2	Upper KS2
Forces and magnets	• Observe and describe movements they and objects make		• Compare how things move on different surfaces • 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 • Notice that some forces need contact between two objects, but magnetic forces can act at a distance • Describe magnets as having two poles • Predict whether two magnets will attract or repel each other, depending on which poles are facing	• Identify the effects of air resistance, water resistance and friction, that act between moving surfaces • Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object • Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect
Earth and space	• Know that we live on the planet called Earth			• 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

Science 2 Year Long Term Planning – adapted for lockdown to include scientific knowledge not taught in cycle B; working scientifically skills to be incorporated into all topics to fill gaps			
Cycle A	**Autumn Term**	**Spring Term**	**Summer Term**
KS1	**Everyday Materials (Y1 unit); Seasonal Changes (Y1 unit)**	**Plants in the Garden (Y1 unit); Seasonal Changes (Y1 unit)** Observe and describe how plants grow from bulbs and seeds; compare life cycle of a plant grown from a bulb and seed; know that a seed and bulb contains everything the plant needs to grow; investigate plants needs water, light and a suitable temperature to grow. Identify and name different plants in a habitat or microhabitat. Describe how different habitats provide for the basic needs of different plants; describe how plants in the desert survive with little water and plants in the rainforest survive with little light.	**Growth and Survival (Y2 unit); Seasonal Changes (Y1 unit)** Identify and name different animals in their habitat or microhabitat. Describe how animals obtain their food from plants and animals; create a simple food chain and identify and name different sources of food. Describe how different habitats provide for the basic needs of animals; compare animals found in familiar and unfamiliar habitats e.g. how are animals adapted to live in the desert?
LKS2	**Light &Shadows (Y3 unit); Circuits & Components (Y4 unit); Rocks, Fossils and Soil (Y3 unit)** Compare and group together different kinds of rocks on the basis of 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; 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	**Investigating Plants (Y3 unit)** Observe and describe how plants grow from bulbs and seeds; compare life cycle of a plant grown from a bulb and seed; know that a seed and bulb contains everything the plant needs to grow; investigate plants needs water, light and a suitable temperature to grow. Identify and name different plants in a habitat or microhabitat. Describe how different habitats provide for the basic needs of different plants; describe how plants in the desert survive with little water and plants in the rainforest survive with little light.	**Sound and Vibrations (Y4 unit); Classification and interdependence including food chains (Y4 unit)** Describe how animals obtain their food from plants and animals; create a simple food chain and identify and name different sources of food. Describe how different habitats provide for the basic needs of animals; compare animals found in familiar and unfamiliar habitats e.g. how are animals adapted to live in the desert?
UKS2	**Forces (Y5 unit); Electricity (Y6 unit)** 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	**Life Cycles (Y5 unit); Humans and Health (Y6 unit)** Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of year 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.	**Earth and Space (Y5 unit); Life Cycles continued (Y5 unit)** 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; 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

Science 2 Year Long Term Planning – areas of scientific knowledge not covered; working scientifically skills to be continued in cy			
Cycle B	**Autumn Term**	**Spring Term**	**Summer Term**
KS1	Uses of Everyday Materials (Y2 unit) Seasonal Changes (Y1 unit)	Growing Plants (Y2 unit) Habitats of plants (Y2 unit)	Different Animals (Y1 unit) Habitats of animals (Y2 unit)
LKS 2	Healthy Eating and Healthy Bodies (Y3 unit) Teeth and Digestion (Y4 unit)	Forces and Magnets (Y3 unit) Circuits and Components (Y4 unit)	Rocks, Fossils and Soil (Y3 unit) Solids, Liquids and Gases (Y4 unit)
UKS 2	Earth and Space (Y5 unit) Life Cycles (Y5 unit)	Changes of Materials (Y5 unit)	Classification, Evolution and Inheritance (Y6 unit)

Hfl Primary Science Scheme of Work – knowledge for each unit detailed; working scientifically skills should be embedded in each unit of work; assessment resources including assessment tasks