How we teach Science at Belmont School

Intent:

Our Science curriculum provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Science is forever changing our lives and is vital to the world's future prosperity therefore our intent is that all pupils should be taught essential aspects of the knowledge, methods, processes and use of science. Through building up a body of key foundational knowledge and concepts, pupils will be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. Pupils will understand how science can be used to explain what is occurring, predict how things will behave and analyse causes.

Implementation:

As a school and in line with the National Curriculum's expectations, we aim to ensure that all pupils:

- Develop scientific knowledge and conceptual understanding through specific disciplines of biology, chemistry and physics.
- Develop an understanding of the nature, processes and methods of science through different types of science enquires that help them to answer scientific questions about the world around them
- Are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future.

The Science curriculum is arranged into discrete topics aimed at specific year groups (Sound, Electricity, and Plants etc.). However, during the planning process links across other subject areas are sought which are cross curricular and branch out termly. This is achieved by exploring wider scientific issues in other subject areas as well as using scientific skills and knowledge to support conceptual understanding in other areas of the curriculum.

Impact:

We believe at Belmont that Science will enable pupils to experience and observe phenomena; looking more closely at the natural and humanly-constructed world around them. They will become curious and ask questions about what they notice. Pupils will be able to talk about their ideas, ask their own questions and encounter abstract ideas and begin to recognise that scientific ideas change and develop over time. As a result, pupils will be able to draw conclusions based on their data and observations, using evidence to justify their ideas, and use their scientific knowledge and understanding to explain their findings.

SLT and subject leaders monitor the impact of our Science provision through completing regular monitoring, which includes listening to the voice of our pupils.

Working Scientifically Progression Document

		EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Working Scientifically	**Asking Questions**	Look at objects and pictures and discuss what they can see Asks questions about aspects of their familiar world Generate a variety of ideas for testing, not always realistic/ appropriate Prediction - Simple guess - what might happen?	Ask simple questions (modelled by teacher) To begin to read and spell scientific vocabulary when asking and answering questions Form predictions about what they think the outcomes of an investigation will be	Ask simple questions and recognise that they can be answered in different ways, e.g. do all living things have the same life-cycle?	Make decisions, asking relevant questions	Make decisions, asking relevant questions and using different types of scientific enquiries to answer them	Plan different types of scientific enquiries to answer questions Recognise and control variables where necessary Explore and talk about their ideas Analyse functions, relationships and interactions	Independently plan different types of scientific enquiries to answer questions Independently recognise and control variables where necessary Explore and talk about their ideas using scientific vocabulary Ask their own questions about scientific phenomena Analyse functions, relationships and interactions systematically
	Observing	General sensory observations of animals and plants Simple descriptions of the world around them	Observe changes over time and be able to notice patterns in their observations Understand that we can use observations to help with answering questions	Closely observe changes over time using simple equipment to measure To recognise patterns and explain their thinking	Set up simple practical enquiries, and begin to understand comparative and fair tests To begin (in groups or with support) to make systematic and	Set up simple practical enquiries, comparative and fair tests Make systematic and careful observations using notes and simple tables	Take measurements, using a range of scientific equipment Take measurements with increasing accuracy Understand why it may be important to take repeat readings	Take measurements, independently, using a range of scientific equipment To take measurements accurately and with precision Take repeat readings when needed, begin to

			Use simple equipment when observing: magnifying glasses, egg timers, sand timers Use mostly first-hand experiences (with support) to observe but also begin to use secondary sources: books, photographs, videos	Perform simple tests and record results from their observations, e.g. changes over time, from caterpillar to butterfly	careful observations using notes and simple tables Begin to look for naturally occurring patterns and relationships	Identify differences, patterns, similarities or changes related to simple scientific ideas and processes	when appropriate	account for anomalies
	Measuring and Recording	Measure by direct comparison Use non-standard units of measurement Use simple comparative language e.g. smaller/bigger Record ideas simply e.g. pictures/images	Know there are different ways to record changes over time Explore how to measure and record: whole class charts, bar graphs using multi-link cubes, survey, tables etc Begin to understand how science can be used to explain what is occurring Sort and group in different topics: animals, plants	Use measuring equipment and record findings on a chart or simple scale Gather and record data and present it in different ways including on charts, tables and simple graphs Sort and group in different ways e.g. materials	Take accurate measurements using standard units, using a range of equipment Gather, record, classify and present data to help in answering questions Record findings using simple scientific language, drawings, labelled diagrams, bar charts, and tables	Take accurate measurements using standard units, using a range of equipment, including thermometers Gather, record, classify and present data in a variety of ways to help in answering questions Show results using classification keys, tables, bar and line graphs	Understand how to take measurements, using a range of scientific equipment Take repeat readings when appropriate Record data and results using scientific diagrams and labels Record findings using scientific language, drawings, labelled diagrams, keys, classification keys bar charts, and tables	Take measurements, using a range of scientific equipment Take measurements with increasing accuracy and precision Take repeat readings when appropriate Record data and results of increasing complexity using scientific diagrams and labels Show results using classification keys, tables, scatter graphs, bar and line graphs

	Concluding	Simply talk about objects and events	Know that there are various ways to find answers (modelled by the teacher) Begin to use recording and observations to answer questions (modelled by teacher)	Use simple scientific language when recording findings Be able to present and analyse findings using increasingly sophisticated scientific vocabulary Use observations and ideas to suggest answers to questions To predict what might happen	Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions Use straightforward scientific evidence to answer questions or to support findings	Report on findings from enquiries, using relevant scientific language, including oral and written explanations, displays or presentations of results and conclusions Use straightforward scientific evidence to answer questions and to support findings	Report and present findings and make conclusions from enquiries Use evidence to justify ideas Use scientific knowledge and understanding to explain findings	Draw conclusions based on data and observations Use scientific knowledge and understanding to explain findings To identify causal relationships and explanations To recognise 'degree of trust' in result, for oral and written forms
	Evaluating		Begin to understand the reasons why changes happen Begin to analyse what has occurred and use scientific vocabulary to describe it	Use scientific vocabulary when writing a conclusion to a test	Reflect on results and begin to suggest improvements and raise further questions Begin to recognise when and how secondary sources might help to answer questions that cannot be answered	Make predictions for new values, suggest improvements and raise further questions Recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations	Use results to make predictions and make further comparative and fair tests Recognise that scientific ideas change and develop over time Identify scientific evidence that has been used to support or refute ideas or arguments	Use test results and scientific knowledge to make predictions Set up further comparative and fair tests independently Independently recognise that scientific ideas change and develop over time Independently identify scientific evidence that has been used to support or refute ideas

					through practical investigations			or arguments

Knowledge Progression Per Unit

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Animals including Humans	Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals and describe and compare structures of their bodies. Identify and name a variety of common animals that are carnivores, herbivores and omnivores. Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. Know how to take care of animals that are taken from the environment.	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.	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 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.	Describe the changes as humans develop to old age.	Identify and name the main parts of the human circulatory system and describe functions of heart, blood vessels and blood. Recognise the impact of diet, exercise, drugs and lifestyle on the way bodies function. Describe the ways in which nutrients and water are transported within animals, including humans and understand how the circulatory system helps the body function. Learn how to keep bodies healthy and how their bodies might be damaged – including how some substances may be harmful. Explore the work of scientists and scientific research about the relationship between diet, exercise, drugs, lifestyle and health.

Key Vocab	*Head, body, eyes, ears, mouth, teeth, leg, tail, wing, claw, fin, scales, feathers, fur, beak, paws, hooves* *Plus, names of animals experienced first-hand from each vertebrate group*	*Offspring, Reproduction, Growth, Child, Young/Old stages (examples - chick/hen, baby/child/adult, caterpillar/butterfly), Exercise, Heartbeat, Pulse, Breathing, Hygiene, Germs, Disease, Nutrition, Food types (examples — meat, fish, vegetables, bread, rice, pasta)*	*Nutrition, nutrients, carbohydrates, sugars, protein, vitamins, minerals, fiber, fat, water, skeleton, bones, muscles, support, protect, skull, ribs, spine, muscles, joints*	*Digestive system, digestion, mouth, teeth, saliva, oesophagus, stomach, small intestine, nutrients, large intestine, rectum, anus, teeth, incisor, canine, molar, premolars, herbivore, carnivore, omnivore, producer, predator, prey, food chain*	*Baby, infant, child, teenager, adolescent, adult, puberty, changes, breasts, body hair, voice box, elderly.*	*Heart, pulse, rate, pumps, blood, blood vessels, transported, lungs, oxygen, carbon dioxide, nutrients, water, muscles, cycle, circulatory system, diet, exercise, drugs and lifestyle*
Living Things and Their Habitats		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. Explore and compare the differences between things that are living,		Recognise that living things (including those in the locality) 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.	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. Know that broad groupings, such as micro-organisms, plants and animals can be subdivided. Classify animals into commonly found invertebrates (such as insects, spiders, snails, worms) and vertebrates (fish, amphibians, reptiles, birds and mammals). Find out about significance of the work of scientists such as

		dead and things that have never been alive.				Carl Linnaeus, a pioneer of classification.
Key Vocab		*Living, dead, never been alive, suited, suitable, basic needs, food, food chain, shelter, move, feed, names of local habitats e.g. pond, woodland etc., names of micro-habitats e.g. under logs, in bushes etc.*		*Classification, classification keys, environment, habitat, human impact, positive, negative, migrate, hibernate*	*Life cycle, reproduce, sexual, sperm, fertilises, egg, live young, metamorphosis, asexual, plantlets, runners, bulbs, cuttings*	*Vertebrates, fish, amphibians, reptiles, birds, mammals, invertebrates, insects, spiders, snails, worms, flowering and non-flowering*
Materials and States of Matter	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.	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.		Explore a variety of everyday materials and develop simple descriptions of the states of 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	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	

				temperature.	materials, including metals, wood and plastic. Demonstrate that dissolving, mixing and changes of state are reversible changes as well as exploring, evaporating, filtering, sieving, melting and dissolving, recognising that melting and dissolving are different processes. Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible	
Key Vocab	*Object, material, wood, plastic, glass, metal, water, rock, brick, paper, fabric, elastic, foil, card/cardboard, rubber, wool, clay, hard, soft, stretchy, stiff, bendy, floppy, waterproof, absorbent, breaks/tears, rough, smooth, shiny, dull, see through, not see through*	*suitable/unsuitable, use/useful, hard/soft, stretchy/stiff, rigid/flexible, waterproof/absorbent, strong/weak, rough/smooth, transparent/opaque, shape, push/pushing, pull/pulling, twist/twisting, squash/squashing, bend/bending, stretch/stretching.*		*Solid, liquid, gas, state change, melting, freezing, melting point, boiling point, evaporation, temperature, water cycle*	*Thermal/electrical insulator/conductor, change of state, mixture, dissolve, solution, soluble, insoluble, filter, sieve reversible/non-reversible change, burning, rusting, new material*	
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	Observe and describe how seeds and bulbs grow into mature plants. Find out and describe how plants need water, light and a suitable	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,			

	of common flowering plants, including trees. Observe changes across the four seasons.	temperature to grow and stay healthy.	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.			
Key Vocab	*Leaf, flower, blossom, petal, fruit, berry, root, seed, trunk, bark, stem, branch, stalk, bud, evergreen, deciduous*	*As Year 1 plus, light, shade, sun, warm, cool, water, grow, healthy*	*Photosynthesis, pollen, insect/wind pollination, seed formation, seed dispersal — wind dispersal, animal dispersal, water dispersal*			
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			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

			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 changes.			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.
Key vocab			*Light, Light source, Dark, Absence of light, Transparent, Translucent, Opaque, Shiny, Matt, Surface, Shadow, Reflect, Mirror, Sunlight, Dangerous.*			*Straight lines, Light rays.* *(Plus, Y3 vocabulary - Light, Light source, Dark, Absence of light, Transparent, Translucent, Opaque, Shiny, Matt, Surface, Shadow, Reflect, Mirror, Sunlight, Dangerous)*
Forces and Magnets			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		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,	

			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.		allow a smaller force to have a greater effect. Explore the effects of air resistance by observing how different objects such as parachutes and sycamore seeds fall. Explore the effects of friction on movement and find out how it slows or stops moving objects. Find out how scientists, for example, Galileo Galilei and Isaac Newton helped to develop the theory of gravitation.	
Key vocab			*Force, push, pull, twist, contact force, non-contact force, magnetic force, magnet, strength, bar magnet, ring magnet, button magnet, horseshoe magnet, attract, repel, magnetic material, metal, iron, steel, poles, north pole, south pole.*		*Force, gravity, Earth, air resistance, water resistance, friction, mechanisms, simple machines, levers, pulleys, gears.*	
Electricity				Identify common appliances that run on electricity. Construct a simple series circuit, identifying/naming its basic parts, including		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

				cell, wire, bulb, switch and buzzer and use these to make simple devices. Draw the circuit as a pictorial representation (not necessarily using conventional circuit symbols). Discuss precautions for working safely with electricity. Identify whether or not a lamp will light in a simple series circuit. 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.		function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches. Learn how to represent a simple circuit in a diagram using recognised symbols. Use recognised symbols when representing a simple circuit in a diagram. Construct simple series circuits, to help them to answer questions about what happens when they try different components, for example, switches, bulbs, buzzers and motors.
Key vocab				*Key vocabulary:* *Electricity, electrical appliance/device, mains, plug, electrical circuit, complete circuit, component, cell, battery, positive, negative, connect/connections, loose connection, short circuit,*		*Key vocabulary:* *Circuit, complete circuit, circuit diagram, circuit symbol, cell, battery, bulb, buzzer, motor, switch, voltage* *NB Children do not need to understand what voltage is but will use volts and voltage to describe*

				crocodile clip, bulb, switch, buzzer, motor, conductor, insulator, metal, non-metal, symbol		*different batteries. The words cells and batteries are now used interchangeably*
Seasonal Changes	Observe changes across the four seasons. Observe and describe weather associated with the seasons and how day length varies. Pupils should observe and talk about changes in the weather and the seasons.					
Key vocab	*Weather (sunny, rainy, windy, snowy etc.) , Seasons (winter, summer, spring, autumn), Sun, sunrise, sunset, day length*					
Rocks			Compare and group together different kinds of rocks (including those in the locality) 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.			
Key vocab			*Rock, stone, pebble, boulder, grain, crystals, layers, hard, soft, texture, absorb, water, soil, fossil, marble, chalk, granite, sandstone, slate, soil, peat, sandy/chalk/clay soil.*			
Sound				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 as well finding patterns between volume of sound and the vibrations that produced it. Recognise that sounds get fainter as the distance from the sound source increases.		
Key vocab				*Sound, source, vibrate, vibration, travel, pitch (high, low), volume, faint, loud, insulation.*		

Earth and Space					Describe the movement of the Earth, and other planets, relative to the Sun in the solar system as well as 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. Learn that the Sun is a star at the centre of our solar system and that it has eight planets: (Pluto was reclassified as a 'dwarf planet' in 2006). Understand that a moon is a celestial body that orbits a planet (Earth has one moon; Jupiter has four large moons and numerous smaller ones).	
Key vocab					*Earth, Sun, Moon, Mercury, Jupiter, Saturn, Venus, Mars, Uranus, Neptune, spherical, Solar system, rotates, star, orbits, planets, axis*	
						Recognise that living things have changed over time and

Evolution and Inheritance						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.
Key vocab						*Offspring, reproduction, vary, characteristics, suited, adapted, environment, inherited, species, fossils.*

Stronger together
Founded 2009