Science Curriculum and Progression of Skills

The National Curriculum for Science aims to ensure that all pupils:

- **develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics**
- **develop understanding of the nature, processes and methods of science through different types of science enquiries 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.**

At BHJS the aim of the science curriculum is to provide appropriate and stimulating scientific experiences that enable the children to investigate and make sense of the world around them through the specific disciplines of biology, chemistry and physics. Science is constantly changing our lives and is vital to the world's future prosperity and so the aim is also to create an enthusiasm for science that will continue into KS3 and beyond.

The principal focus of science teaching in Years 3 & 4 is to enable pupils to broaden their scientific view of the world around them. In Years 5 & 6, they are introduced to a wider a wider range and more abstract scientific ideas and develop a deeper understanding of each area of study. They also begin to recognise that scientific ideas change and develop over time.

In each area of study, the children gain knowledge and ask science questions which they then answer by 'working scientifically' using different types of science enquiry. To enable them to successfully carry out enquires, the children are taught to use various practical scientific methods, processes and skills through the teaching of the programme of study content.

Progression in knowledge			
Area of Study	**Year 3**	**Year 4**	**Year 5**
Biology	**Animals, including humans** Pupils should be taught to: • identify that humans and some other animals have skeletons and muscles for support, protection and movement.	**Animals, including humans** Pupils should be taught to: • 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 • 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.	**Animals, including humans** Pupils should be taught to: • 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. **Animals, including humans** • describe the changes as humans develop to old age.

<table>
<tr><td></td><td>Year 3</td><td>Year 4</td><td>Year 5</td><td>Year 6</td></tr>
<tr><td></td><td>Plants
Pupils should be taught to:
• 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 seed dispersal, pollination and seed formation.</td><td>Living things and their habitats
Pupils should be taught to:
• 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.
• construct and interpret a variety of food chains, identifying producers, predators and prey.
(Moved from ‘Animals, including humans’)</td><td>Living things and their habitats
Pupils should be taught to:
• 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.</td><td>Living things and their habitats
Pupils should be taught to:
• 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.</td></tr>
<tr><td></td><td colspan="4">Year 6
Evolution and inheritance
Pupils should be taught to:
• 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.</td></tr>
<tr><td>Physics</td><td>Year 3</td><td colspan="3">Year 5</td></tr>
<tr><td></td><td>Light
Pupils should be taught to:
• 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</td><td colspan="3">Light
Pupils should be taught 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</td></tr>
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	• 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.	• 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.
	Year 3	**Year 5**
	Electricity Pupils should be taught to: • 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.	**Electricity** • Pupils should be taught to: • 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.
	Year 3	**Year 6**
	Forces and magnets Pupils should be taught to: • 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 • describe magnets as having two poles • 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 • predict whether two magnets will attract or repel each other, depending on which poles are facing.	**Forces** Pupils should be taught to: • 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.

	Year 4 **Sound** Pupils should be taught to: • 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 5 **Earth and space** Pupils should be taught to: • 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.
Chemistry	**Year 4** **States of matter** Pupils should be taught to: • 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 **Rocks** Pupils should be taught to: • 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.
	Year 6 **Properties and changes of materials** Pupils should be taught to: • 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.

Progression in skills – Working Scientifically		
Working scientifically	**Year 3 and Year 4**	**Year 5 and Year 6**
	During years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:	During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:
Asking questions and planning practical enquiry to answer questions	• asking relevant questions and using different types of scientific enquiries to answer them • setting up simple practical enquiries, comparative and fair tests	• planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
Making observations and taking measurements	• making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers	• taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
Recording and presenting evidence	• gathering, recording, classifying and presenting data in a variety of ways to help in answering questions • recording findings using drawings, labelled diagrams, keys, bar charts, and tables	• recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
Answering questions and concluding	• using results to draw simple conclusions • identifying differences, similarities or changes related to simple scientific ideas and processes • using straightforward scientific evidence to answer questions or to support their findings.	• drawing conclusions and identify causal relationships and patterns • explaining results using scientific knowledge and understanding • identifying scientific evidence that has been used to support or refute ideas or arguments

Evaluating and raising further questions and predictions.	• using results make predictions for new values, suggest improvements and raise further questions		• evaluating degree of trust in results • using test results to make predictions to set up further comparative and fair tests	
Communicating their findings	• reporting on findings from enquiries, in simple scientific language, using oral and written explanations, displays or presentations of results and conclusions.		• reporting and presenting findings from enquiries, using relevant scientific language and conventions, in oral and written forms such as displays and other presentations.	
Key Vocabulary	**Year 3**	**Year 4**	**Year 5**	**Year 6**
	Animals including humans: skeleton bones muscles joints support protect move skull ribs spine internal skeleton exoskeleton contract relax **Plants:** roots leaf/ leaves stem/ trunk flower fruit air nutrients minerals soil	**Animals, including humans:** digestive system digestion mouth teeth incisor canine molar premolar saliva oesophagus stomach small intestine large intestine rectum balanced diet nutrients carbohydrates protein fats vitamins minerals fibre water	**Animals, including humans** circulatory system heart pulse pulse rate beats pumps blood blood vessels arteries veins lungs oxygen carbon dioxide nutrients drugs medicines healthy diet lifestyle **Living things and their habitats:** life cycle egg embryo live young larvae	**Living things and their habitats:** classification kingdom vertebrates fish mammals birds amphibians reptiles warm-blooded cold blooded invertebrates insects spiders snails worms flowering non-flowering micro-organism bacteria fungi yeast virus

	absorb transport pollen pollination seed formation seed dispersal germination **Light:** light light source dark absence of light opaque transparent translucent reflect surface shiny reflective surface reflection mirror shadow block Sun sunlight **Forces and magnets:** force push pull twist friction magnet magnetic force strength attract	**Living things and their habitats:** classify classification keys vertebrate invertebrate environment habitat human impact herbivore omnivore carnivore producer predator prey **Sound:** sound vibrate vibration travel pitch volume quiet loud insulation **Solids, liquids and gases:** solid liquid gas state change heating cooling melting freezing freezing point melting point	reproduction sexual asexual sperm fertilisation metamorphosis pollination seed dispersal stamen pollen anther filament carpel stigma style ovary ovule plantlets runners cuttings bulbs tubers newborn infant child teenager puberty adult motor skills physical strength grey hair wrinkles **Light:** transparent translucent opaque	**Evolution and inheritance:** evolution evolve reproduction offspring vary variation species competition characteristics adapt adaptation inheritance fossil record **Forces**: force gravity gravitational attraction air resistance water resistance weight newton force meter Newton meter upthrust friction simple machines levers pulleys gears **Properties and changes of materials:** hardness soluble insoluble

	repel magnetic material metal iron steel poles north pole south pole **Electricity:** electricity electrical appliance mains electricity plug socket electrical circuit complete circuit component cell battery crocodile clip wire bulb switch buzzer motor metal non-metal positive negative conductor insulator	boiling point evaporation condensation temperature degrees Celsius water cycle **Rocks:** rock pebble soil igneous sedimentary metamorphic granite basalt sandstone limestone chalk marble slate permeable impermeable absorbs texture soft hard crystals grains fossil organic matter	reflect reflection absorb scatter transmit straight lines light rays **Electricity:** electricity voltage (V) electrical conductor electrical insulator current (A) component cell/ battery complete circuit switch buzzer motor bulb positive terminal (+) negative terminal (-) **Earth and Space:** Solar System Sun Earth Moon sphere spherical rotate rotation orbit star planet moon	dissolve mixture solution separation reversible non-reversible change of state evaporation evaporating melting freezing filter sieve thermal insulator thermal conductor burning rusting new material

			Mercury Jupiter Saturn Venus Mars Uranus Neptune	
Impact Statements Science enquiry	**Year 3 and Year 4**		**Year 5 and Year 6**	
	The opportunities for working scientifically should be provided across years 3 and 4 so that expectations in the programme of study can be met by the end of year 4. Pupils are not expected to cover each aspect for every area of study.		The opportunities for working scientifically should be provided across years 5 and 6 so that expectations in the programme of study can be met by the end of year 6. Pupils are not expected to cover each aspect for every area of study.	
Asking questions and planning practical enquiry to answer questions	I can: • use prior knowledge to help with asking relevant questions • with support suggest the type of enquiry that should be used to answer a question (fair/ comparative test; observing over time; looking for patterns; identifying, grouping and classifying; research from secondary sources) • set up simple practical enquires, comparative and fair tests.		I can: • ask scientific questions – possibly stimulated by a scientific experience or involving asking further questions based on developed understanding following an enquiry • select and plan a type of enquiry to carry out (fair/ comparative test; observing over time; looking for patterns; identifying, grouping and classifying; research from secondary sources) • recognise and control variables where necessary.	
Making observations and taking measurements	I can: • make systematic and careful observations. • make accurate measurements using standard units (e.g.: cm, m, ˚C, g, kg, ml, dB) using a range of equipment, including thermometers and data loggers.		I can: • take measurements, in standard units, using a range of scientific equipment, with increasing accuracy and precision. • take repeat readings when appropriate.	
Recording and presenting evidence	I can: • gather and record data in a variety of ways to help in answering questions • record and present findings using photographs, drawings, labelled diagrams, keys, tally charts, Venn diagrams, bar charts and tables.		I can: • record data and results of increasing complexity • record and present findings using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.	

Answering questions and concluding	I can: • with help, use results to draw simple conclusions • identify differences, similarities or changes related to simple scientific ideas and processes • use straightforward scientific evidence to answer questions or to support findings.	I can: • draw conclusions and identify causal relationships and patterns • explain results using scientific knowledge and understanding • identify scientific evidence that has been used to support or refute ideas
Evaluating and raising further questions and predictions.	I can: • with support, use results to suggest improvements to what has been done • with support, raise further questions arising from the data • with support, make predictions for new values within or beyond the data collected.	I can: • make practical suggestion about how an enquiry could be improved (e.g., the effect of sample size on reliability) • evaluate degree of trust in results (e.g., the variability of the results, whether repeat readings were taken) • use test results to make predictions and to set up further comparative and fair tests
Communicating their findings	I can: • reporting on findings from enquiries, in simple scientific language, using oral and written explanations, displays or presentations of results and conclusions.	I can: • reporting and presenting findings from enquiries, using relevant scientific language and conventions**,** in oral and written forms such as displays and other presentations.