Abbey Road Primary School – Progression in Working Scientifically

NB - The National Curriculum statements in italics indicate that they feature more than once.

EYFS	Year 1 & 2	Year 3 & 4	Year 5 & 6
Asking questions and recognising they can be answered in different ways			
Asking questions about what they have observed • While exploring the world, the children develop their ability to ask questions (such as what something is, how things are similar and different, the ways things work, which alternative is better, how things change and how they happen). Where appropriate, they answer these questions. • The children answer questions developed with the teacher often through modelling.	**Asking simple questions and recognising that they can be answered in different ways** • While exploring the world, the children develop their ability to ask questions (such as what something is, how things are similar and different, the ways things work, which alternative is better, how things change and how they happen). Where appropriate, they answer these questions. • The children answer questions developed with the teacher often through a scenario. • The children are involved in planning how to use resources provided to answer the questions using different types of enquiry, helping them to recognise that there are different ways in which questions can be answered.	**Asking relevant questions and using different types of scientific enquiries to answer them** • The children consider their prior knowledge when asking questions. They independently use a range of question stems. Where appropriate, they answer these questions. • The children answer questions posed by the teacher. • Given a range of resources, the children decide for themselves how to gather evidence to answer the question. They recognise when secondary sources can be used to answer questions that cannot be answered through practical work. They identify the type of enquiry that they have chosen to answer their question.	**Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary** • Children independently ask scientific questions. This may be stimulated by a scientific experience or involve asking further questions based on their developed understanding following an enquiry. • Given a wide range of resources the children decide for themselves how to gather evidence to answer a scientific question. They choose a type of enquiry to carry out and justify their choice. They recognise how secondary sources can be used to answer questions that cannot be answered through practical work.
Application in related substantive context			
Why is it important to keep healthy? Do penguins and polar bears ever meet? How does our clothing change in the seasons? Are all minibeast insects?	How are seeds different? How does the oak tree change during the year? What makes animals look different? How are plants and leaves the same and different?	Ask questions about how plants disperse their seeds; Ask questions about the nutritional content of a range of food items (including fast food); Investigate patterns by asking questions such as: Can people with longer legs jump further? Ask questions to test the properties of rocks and soils;	How do our bodies change as we grow older? How are the Sun, Earth and Moon related? Do all lifecycles look the same? Can we change materials?

Why do we need to look after our world?	Why don't animals all eat the same food? What are the seasons and what changes do you notice? What do living things need to survive? How do habitats help living things to thrive and survive? How do seeds and bulbs grow into healthy plants? What are things made of and why?	Ask questions about the size of shadows and how they change; Ask questions about how objects move on different surfaces; How do rocks differ? How do plants reproduce? What can magnets do? How do plants live and grow? How do fossils form? What allows your body to move and stay healthy? What helps animals to move? What do you need in order to see? What happens to the food we eat? How does my digestive system work? Why are teeth different shapes and sizes? Electricity – can we control it? How? What is sound and how do we hear it? Ask questions about evaporation rates for different liquids Ask questions about how we hear sound over distance/ through different materials	Plan to investigate properties of different materials in order to recommend materials for particular functions depending on these properties Plan to investigate forces (friction, water resistance, air resistance) How and why do living things change over time? How do circuits work? How do we see? How does light travel? Why does our heart beat? What is the same and different about living things? Plan a pulse rate investigation, e.g. effect of exercise; Explore different ways to demonstrate that light travels in straight lines; Plan to make a circuit to solve particular problems

EYFS	Year 1 & 2	Year 3 & 4	Year 5 & 6
Making observations and taking measurements			
Explore and make observations of the natural world around them • Children explore the world around them and are encouraged to talk about what they see/notice. They make observations to support identification, comparison and noticing change. • Teachers model observational and investigational skills eg. asking aloud: "I wonder what will happen if ..."	**Observing closely, using simple equipment** • Children explore the world around them. They make careful observations to support identification, comparison and noticing change. They use appropriate senses, aided by equipment such as magnifying glasses or digital microscopes, to make their observations. • They begin to take measurements, initially by comparisons, then using non-standard units.	**Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers** • The children make systematic and careful observations. • They use a range of equipment for measuring length, time, temperature and capacity. They use standard units for their measurements.	**Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate** • The children select measuring equipment to give the most precise results e.g. ruler, tape measure or trundle wheel, force meter with a suitable scale. • During an enquiry, they make decisions e.g. whether they need to: take repeat readings (fair testing); increase the sample size (pattern seeking); adjust the observation period and frequency (observing over time); or check further secondary sources (researching); in order to get accurate data (closer to the true value).
Application in related substantive context			
Observe seasonal change; Observe properties of materials Observe changes to ice Observe minibeasts Observe items rotting	Careful observation of plants Observation of changes in oak tree across 4 seasons Observe and compare seeds Observe and compare leaves Compare birds Measure parts of the body Measure day length over the year and compare	Sort and categorise foods according to nutrients Sort different ways in which seeds disperse Observe differences between rocks and rocks and soils Compare contact and non-contact forces Observe how temperature can affect water transportation around a plant Observe and measure how conditions can affect a plant's growth	What changes take place as humans get to old age? Track changes in the Moon Compare lifecycles What is a reversible and irreversible change? Investigate rates of dissolving (salt or sugar) by carrying out comparative and fair test at a range of temperatures;

	Observe plants over time Compare humans and animals Compare uses and properties of materials and suitability Observe changes to body with exercise Classify and compare living and non-living Observe and measure plants growing in different conditions Compare bear types Measure how many physical activities can be completed in a minute.	Measure the length of shadows depending on closeness of object Sort transparent, translucent and opaque items Measure how far a car travels on different surfaces Explore how hard rocks are Why do animals have different kinds of teeth? What happens when we eat a cracker? Local survey of habitats Classify living things Leaf hunt and classification Sort vertebrate and invertebrate Classify solids and liquids Observe own teeth and those of different animals (herbivore, carnivore, omnivore); Investigate the melting point of different materials e.g. ice, margarine, butter and chocolate (use thermometer – Celsius); Measure volume of sounds (data logger – dB); Measure rate of evaporation of liquids (time – seconds, minutes). Use standard units of time, length, capacity and temperature to measure	How can parents be similar to their offspring? How does light travel? How do we see non-light sources? What causes the size of shadows to change? What body parts are impacted most by exercise? How can we measure our heart rate? Yeast enquiry Select measuring equipment to suit purpose and use standard units of measure (Celsius, milliseconds/seconds/minutes, ml/l, mm, cm, m)

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Engaging in practical enquiry to answer questions			
Exploring and enquiring • The children use practical resources provided to explore and enquire (sand, water, construction, cooking, outdoor play, garden, small world). • Safely use and explore a variety of materials, tools and techniques, experimenting with colour, design, texture, form and function. • Children use observations to group together similar objects and consider differences, patterns and change.	**Performing simple tests** • The children use practical resources provided to gather evidence to answer questions generated by themselves or the teacher. They carry out: tests to classify; comparative tests; pattern seeking enquiries; and make observations over time. **Identifying and classifying** • Children use their observations and testing to compare objects, materials and living things. They sort and group these things, identifying their own criteria for sorting. • They use simple secondary sources (such as identification sheets) to name living things. They describe the characteristics they used to identify a living thing.	**Setting up simple practical enquiries, comparative and fair tests** • The children select from a range of practical resources to gather evidence to answer questions generated by themselves or the teacher. • They follow their plan to carry out: observations and tests to classify; comparative and simple fair tests; observations over time; and pattern seeking ***Explanatory note*** *A comparative test is performed by changing a variable that is qualitative e.g. the type of material, shape of the parachute. This leads to a ranked outcome.* *A fair test is performed by changing a variable that is quantitative e.g. the thickness of the material or the area of the canopy. This leads to establishing a causative relationship.*	**Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary** • The children select from a range of practical resources to gather evidence to answer their questions. They carry out fair tests, recognising and controlling variables. They decide what observations or measurements to make over time and for how long. They look for patterns and relationships using a suitable sample.
Application in related substantive context			
Regular consideration of seasonal changes; Mix sand, water and other liquids/ solids to see what happens;	Match plants to images Describe main features of trees and plants Plant a bean / sunflower and watch it grow	How do bones move in different ways? Can the person with the longest legs jump furthest? How do magnets behave? Which magnet is strongest? Are all rocks hard?	What is a reversible and irreversible change? What is friction? What is air resistance? What is water resistance? How can a soluble material be recovered from a solution?

Experiment with floating and sinking objects; Observe ice melting and see what speeds this up How to clean teeth Push and pull vehicles and objects; Explore the natural environment. How exercise makes us feel	Investigate are human feet all the same size? Why? Which material will protect Humpty Dumpty the best as he falls? Which material would be best for the 3 pigs shelter? How can we group these items of food? Categorise How does the cleanliness of our hands affect our food? How could I fix my bucket? What do seeds need in order to grow?	What does a plant need in order to grow healthily? What are the parts of a flower? Why is it important to look after our teeth? Tooth decay What happens when you eat a cracker? How does a simple circuit work? What speeds up evaporation? Leaf hunt How do instruments make sound? Rice and vibrations How is pitch created? What is the best way to muffle sound? How do liquids change state? Explore eating different types of food to identify which teeth are being used for cutting, tearing and grinding (chewing); Investigate how to melt ice more quickly; Explore altering the pitch or volume of objects, such as distance, the length of a guitar string, amount of water in bottles, size of tuning forks; Explore which materials can be used instead of wires to make a circuit.	Rates of dissolving Separating by filtering Thermal insulation Give reasons for choice of equipment and methods to separate a given solution or mixture such as salt and sand in water; Carry out comparative and fair tests involving non-reversible changes Explore how levers, pulleys and gears work to understand what purpose each has in a machine What did Darwin discover about finch adaptation? Yeast enquiry What is the heart and what does it do? What makes a circuit complete? What is the effect of adding more wires / batteries to the brightness of a bulb? How can we turn a buzzer on and off? What affects our heart rate? What causes the size of shadows to change? Investigate how long does it take my pulse rate to return to my resting pulse rate (recovery rate); Explore the uses of the behaviour of light, through reflection and shadows, such as in periscope design, rear view mirrors and shadow puppets. Make first-hand observations of how shadows caused by the Sun change through the day;

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Recording and presenting evidence			
Sorting and recording data to help in answering questions • The children record their observations and learning e.g. draw pictures of animals and plants. • They group together similar objects (for example, sorting rings)	**Gathering and recording data to help in answering questions** • The children record their observations e.g. using photographs, videos, drawings, labelled diagrams or in writing. • They record their measurements e.g. using prepared tables, pictograms, tally charts and block graphs. They classify using simple prepared tables and sorting rings.	**Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions.** **Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.** • The children sometimes decide how to record and present evidence. They record their observation e.g. using photographs, videos, pictures, labelled diagrams or writing. They record their measurements e.g. using tables, tally charts and bar charts (given templates, if required, to which they can add headings). They record classifications eg. using tables, Venn diagrams, Carroll diagrams. • Children are supported to present the same data in different ways in order to help with answering the question.	**Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs** • The children decide how to record and present evidence. They record observations e.g. using annotated photographs, videos, labelled diagrams, observational drawings, labelled scientific diagrams or writing. They record measurements e.g. using tables, tally charts, bar charts, line graphs and scatter graphs. They record classifications e.g. using tables, Venn diagrams, Carroll diagrams and classification keys. • Children present the same data in different ways in order to help with answering the question.
Application in related substantive context			
Draw minibeasts and label features Sort insects and materials and classify Match clothing to seasons	Record how plants and trees change over a period of time pictorially Labelled drawings and comparisons of birds, the body and plants Record how the oak tree changes over the seasons Design a well balanced meal	Compare, contrast skeletons of different animals; Classify rocks in a range of ways, based on their appearance Show the change in shadow size over distance Table of how far objects move on different surfaces; Labelled diagrams of skeletons Lifecycle diagrams	What is the human lifecycle? Show Eratostehenes theory Diagram to show the size and distance of Earth, Sun and Moon How does the Moon move? Group and classify materials How do levers, gears and pulleys work?

	Lifecycles of plants Diagrams of food chains Tally charts of physical exercise Explain what makes best habitat	Diagrams of flower parts Table of measurements of plant in different conditions Label digestive system Label teeth and functions Diagram of food chains How can we stay safe around electricity? Labelled diagrams of a circuit Table of sounds heard Diagrams of volume and distance What is the water cycle diagram Use diagrams or a model to describe the journey of food through the body; Record freezing points of liquids and melting points of solids using a bar chart; Identify good electrical conductors versus insulators.	Table of asexual reproduction Lifecycle of a bird and butterfly Create a chart or table grouping/comparing everyday materials by different properties; Use secondary sources to help create a model e.g. role play or using balls to show the movement of the Earth around the Sun and the Moon around the Earth; Classify plants and animals, presenting this in a range of ways e.g. Venn diagrams, Carroll diagrams and classification keys; Draw circuits and explain components How do we know living things have changed over time? How do plants adapt to the environment? Record light sources Classify animals and characteristics. How do animals adapt to their environment? What is the circulatory system? Present information e.g. in a health leaflet describing impact of drugs and lifestyle on the body (link to DARE); Labelled diagram of a plant/animal suited to a particular habitat; Use light ray diagrams to show the reflection of light (in a straight line); Communicate structures of circuits using circuit diagrams with recognised symbols.

EYFS	Year 1 & 2	Year 3 & 4	Year 5 & 6
Answering questions and concluding			
Using their experiences to suggest answers to questions • Children draw upon their experiences of the natural world around them, along with what has been read in class, to suggest possible answers to questions.	**Using their observations and ideas to suggest answers to questions** • Children use their experiences of the world around them to suggest appropriate answers to questions. They are supported to relate these to their evidence e.g. observations they have made, measurements they have taken or information they have gained from secondary sources. **Using their observations and ideas to suggest answers to questions** • The children recognise 'biggest and smallest', 'best and worst' etc. from their data.	**Using straightforward scientific evidence to answer questions or to support their findings.** • Children answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. The answers are consistent with the evidence. **Identifying differences, similarities or changes related to simple scientific ideas and processes** • Children interpret their data to generate simple comparative statements based on their evidence. They begin to identify naturally occurring patterns and causal relationships. **Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions** • They draw conclusions based on their evidence and current subject knowledge.	**Identifying scientific evidence that has been used to support or refute ideas or arguments** • Children answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. When doing this, they discuss whether other evidence e.g. from other groups, secondary sources and their scientific understanding, supports or refutes their answer. • They talk about how their scientific ideas change due to new evidence that they have gathered. • They talk about how new discoveries change scientific understanding. **Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations** • In their conclusions, children: identify causal relationships and patterns in the natural world from their evidence; identify results that do not fit the overall pattern; and explain their findings using their subject knowledge.

Application in related substantive context			
Why is it important to keep clean? Why do we need to exercise? How do polar bears keep warm? How do we care for different animals? Why is it important to recycle? Do we wear the same clothes all year round?	Answer questions about leaves? Sort animals in different ways What does each sense help us to do? Which is your favourite season ? Why? Investigate are human feet all the same size? Why? Which material will protect Humpty Dumpty the best as he falls? Which material would be best for the 3 pigs shelter? How can living things stay healthy? What are the effects of physical exercise on our body? What is the best habitat for…? Why? Do all seeds and bulbs need the same conditions?	Explain what a balanced meal should contain What happens if I don't have a balanced diet? Why are some coins magnetic? How are shadows formed? Is all fast food bad for you? How are rocks and soils related? Link rocks changing over time with their properties e.g. soft rocks get worn away more easily; Explain, giving examples, that objects are not visible in complete darkness and that shadows are formed by blocking light; Identify that some metals, but not all, are magnetic; What can we do to protect our teeth? What is a food chain? What is electricity? How and why do we use it? What is volume? Explain how the teeth in animal skulls show they are carnivores, herbivores or omnivores; Explain what affects how quickly a solid melts; Explain what happens when you strike a drum or pluck a string and use a diagram to show how sounds travel from an object to the ear; Give reasons for choice of materials for making different parts of a switch in a circuit	What causes differences in gestation periods of mammals? How did ideas about the Earth change over time? What reasons can I give for particular uses of everyday materials? Explain the results from their investigations; Use secondary sources and, where possible, first-hand observations to find out about the life cycle of a range of animals; Use test evidence gathered about different properties to suggest an appropriate material for a particular purpose; Consider the views of scientists in the past and evidence used to deduce shapes and movements of the Earth, Moon and planets before space travel; Why are Charles Darwin and Alfred Wallace famous? How can we make a bulb brighter? Why are shadows the shape they are? How does exercise, diet and lifestyle affect our body? How can we change the direction of light? How do plants adapt to their environment?

EYFS	Year 1 & 2	Year 3 & 4	Year 5 & 6
Evaluating and raising further questions and predictions			
Using experiences of natural change to make predictions • Children understand the predictability of seasonal change (weather, clothing, trees etc.)	**Using experiences of natural change and processes to make predictions** • Children describe the predictability of seasonal change (weather, clothing, trees etc.) • They understand basic changes of state (ice, water, steam)	**Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions** • They identify ways in which they adapted their method as they progressed or how they would do it differently if they repeated the enquiry. **Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions** • Children use their evidence to suggest values for different items tested using the same method e.g. the distance travelled by a car on an additional surface. • Following a scientific experience, the children ask further questions which can be answered by extending the same enquiry.	**Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations** • They evaluate, for example, the choice of method used, the control of variables, the precision and accuracy of measurements and the credibility of secondary sources used. • They identify any limitations that reduce the trust they have in their data. **Using test results to make predictions to set up further comparative and fair tests** • Children use the scientific knowledge gained from enquiry work to make predictions they can investigate using comparative and fair tests.
Application in related substantive context			
Predict clothing/weather/ for different seasons.	Predict what will happen to the seeds as they grow	Rank magnets How do shadows differ? What does each part of a plant do?	What reasons can you give for the particular uses of everyday materials?

Predict which is quickest way to melt ice. Predict which item will rot first	Predict which material will be best for Humpty to fall on Predict which material will be best for the 3 pigs Are all human feet the same size? Why? Predict which bread will rot first Can all materials be changed? Why do we need a habitat? What is a micro-habitat?	How do skeletons differ? Why do weeds grow everywhere? Order rocks in terms of how hard they are What happens if you change a component in a circuit? Predict which tooth will degrade most How can we help our habitats? Predict which material will muffle sound the best What will evaporate first? Predict which circuit will work Create food chains based on research; Present their learning about the water cycle in a range of ways e.g. diagrams, explanation text	What would happen if the Earth stopped moving? How could a soluble material be recovered from a solution? Predict results and answer questions by drawing on evidence gathered; Compare two or more life cycles they have studied; Predict complete and incomplete circuits How does battery affect a bulb's brightness? Evaluate both the positive and negative effects of diet, exercise, drugs and lifestyle on the body; Identify characteristics that will make a plant or animal suited or not suited to a particular habitat; Predict and explain, with diagrams or models as appropriate, how the shape of shadows can be varied; Make circuits that can be controlled as part of a DT project.