Science Skills Progression – Working scientifically

Asking questions	Observing and taking measurements	Practical enquiry	Identifying and classifying
KS1 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). Answer questions developed with the teacher often through a scenario. Plan 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. **Lower KS2** Consider their prior knowledge when asking questions. Independently use a range of question stems. Answer questions posed by the teacher. Given a range of resources, decide for themselves how to gather evidence to answer the question. Recognise when secondary sources can be used to answer questions that cannot be answered through practical work. Identify the type of enquiry that they have chosen to answer their question. **Upper KS2** 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 decide for themselves how to gather evidence to answer a scientific question. Choose a type of enquiry to carry out and justify their choice. Recognise how secondary sources can be used to answer questions that cannot be answered through practical work.	**KS1** Make careful observations to support identification, comparison and noticing change. Use appropriate senses, aided by equipment such as magnifying glasses or digital microscopes, to make their observations. Begin to take measurements, initially by comparisons, then using non-standard units. **Lower KS2** Make systematic and careful observations. Use a range of equipment for measuring length, time, temperature and capacity. Use standard units for their measurements. **Upper KS2** 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, 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).	**KS1** Use practical resources provided to gather evidence to answer questions generated by themselves or the teacher. Carry out: tests to classify; comparative tests; pattern seeking enquiries; and make observations over time. **Lower KS2** Select from a range of practical resources to gather evidence to answer questions generated by themselves or the teacher. Follow their plan to carry out: observations and tests to classify; comparative (results can be ranked) and simple fair tests (cause and effect can be established); observations over time; and pattern seeking. **Upper KS2** Select from a range of practical resources to gather evidence to answer their questions. Carry out fair tests, recognising and controlling variables. Decide what observations or measurements to make over time and for how long. They look for patterns and relationships using a suitable sample.	**KS1** Use their observations and testing to compare objects, materials and living things. Sort and group these things, identifying their own criteria for sorting. Use simple secondary sources (such as identification sheets) to name living things. Describe the characteristics they used to identify a living thing.

Answering questions and concluding	Recording and presenting evidence	Evaluating data	Communicating their findings
KS1 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. Recognise 'biggest and smallest', 'best and worst' etc. from their data. **Lower KS2** Answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. Use straight forward scientific evidence to answer question or support their findings. Interpret their data to generate simple comparative statements based on their evidence. Begin to identify naturally occurring patterns and causal relationships. Draw conclusions based on their evidence and current subject knowledge. **Upper KS2** Answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. Discuss whether other evidence e.g. from other groups, secondary sources and their scientific understanding, supports or refutes their answer. Talk about how their scientific ideas change due to new evidence that they have gathered. Talk about how new discoveries change scientific understanding. In their conclusions, identify causal relationships and patterns in the natural world from their evidence 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.	**KS1** Record their observations e.g. using photographs, videos, drawings, labelled diagrams or in writing. Record their measurements e.g. using prepared tables, pictograms, tally charts and block graphs. Classify using simple prepared tables and sorting rings. **Lower KS2** Decide how to record and present evidence. Record their observations e.g. using photographs, videos, pictures, labelled diagrams or writing. Record their measurements e.g. using tables, tally charts and bar charts (given templates, if required, to which they can add headings). Record classifications e.g. using tables, Venn diagrams, Carroll diagrams. With support present the same data in different ways in order to help with answering the question. **Upper KS2** 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. Record measurements e.g. using tables, tally charts, bar charts, line graphs and scatter graphs. Record classifications e.g. using tables, Venn diagrams, Carroll diagrams and classification keys. Present the same data in different ways in order to help with answering the question.	**KS1** **Lower KS2** Identify ways in which they adapted their method as they progressed or how they would do it differently if they repeated the enquiry. Use their evidence to suggest predictions for new 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, ask further questions which can be answered by extending the same enquiry. **Upper KS2** 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. Identify any limitations that reduce the trust they have in their data. Use the scientific knowledge gained from enquiry work to make predictions they can investigate using comparative and fair tests.	**Lower KS2** Communicate their findings to an audience both orally and in writing, using appropriate scientific vocabulary. **Upper KS2** Communicate their findings to an audience using relevant scientific language and illustrations.

Science Skills Progression – Biology

EYFS
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.
Make observations of plants and explain why some things occur and talk about changes.

Plants	Living things and their habitats	Animals including humans
Year 1 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. Year 2 Observe and describe how seeds and bulbs grow into mature plants. • Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. • Identify and name a variety of plants in their habitats, including microhabitats. Year 3 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 pollination, seed formation and seed dispersal. Year 4 • Explore and use classification keys to help group, identify and name a variety of plants in their local and wider environment. Year 5 Describe the life process of reproduction in some plants. Year 6	Year 1 • 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 Year 2 Explore and compare the differences between things that are living, dead, 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 microhabitats. • 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. • Notice that animals, including humans, have offspring which grow into adults. Year 3 Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. Year 4 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. Year 5 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 animals. Year 6 Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals.	Year 1 • 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. Year 2 • 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. • 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. Year 3 • 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. Year 4 • 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. Year 5 • Describe the changes as humans develop to old age. • 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. Year 6 • 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 how living things are classified into broad groups according to common observable characteristics and based on similarities and differences • Give reasons for classifying plants based on specific characteristics.	• Give reasons for classifying plants and animals based on specific characteristics. • 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	• Describe the ways in which nutrients and water are transported within animals, including humans. • 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

Year 2
• 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.
• Notice that animals, including humans, have offspring which grow into adults.
Year 3
Describe in simple terms how fossils are formed when things that have lived are trapped within rock.
• Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.
Year 4
Recognise that environments can change and that this can sometimes pose dangers to living things.
Year 5 •
Describe the life process of reproduction in some plants and animals.
Year 6
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.

National Curriculum statements in blue are from other linked topics.

Science Skills Progression – Chemistry

EYFS

Children know about similarities and differences in relation to places, objects, materials and living things.
They talk about the features of their own immediate environment and how environments might vary from one another.
They make observations of animals and plants and explain why some things occur and talk about changes.

Materials	Rocks
Year 1 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. Year 2 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. Year 3 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. • 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. Year 4 •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. • Recognise some common conductors and insulators, and associate metals with being good conductors. Year 5 • 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.	Year 1 • 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. Year 2 • Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. Year 3 • 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 • Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.

National Curriculum statements in blue are from other linked topics.

Science Skills Progression – Physics

EYFS

Children know about similarities and differences in relation to places, objects, materials and living things.
They talk about the features of their own immediate environment and how environments might vary from one another.
They make observations of animals and plants and explain why some things occur and talk about changes.

Light	Sound	Earth and Space
Year 1 • Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. • Describe the simple physical properties of a variety of everyday materials. Year 3 • Recognise that they need light in order to see things and that dark is the absence of light. • Notice that light is reflected from surfaces • Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. • Recognise that shadows are formed when the light from a light source is blocked by an opaque object. • Find patterns in the way that the size of shadows change. Year 5 • 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. Year 6 • 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 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 1 • Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. Year 4 • 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 1 • Observe changes across the four seasons. • Observe and describe weather associated with the seasons and how day length varies Year 5 • 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.

Forces	Electricity	Seasonal changes
Year 2 • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. Year 3 • Compare how things move on different surfaces. • Notice that some forces need contact between two objects, but magnetic forces can act at a distance. • Observe how magnets attract or repel each other and attract some materials and not others. • Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials. • Describe magnets as having two poles. • Predict whether two magnets will attract or repel each other, depending on which poles are facing. Year 5 • 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 • 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. Year 6 • 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 1 • Observe changes across the four seasons. • Observe and describe weather associated with the seasons and how day length varies. Year 3 • Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. Year 5 • Use the idea of the Earth's rotation to explain day and night and the apparent movement of the Sun across the sky.

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