

Science Curriculum Knowledge Progression - Working Scientifically for Mixed aged classes

Factual Knowledge <i>'The basic elements/facts, pupils must know'</i>	Conceptual Knowledge <i>'The interrelationship amongst basic elements'</i>	Procedural Knowledge <i>'How to do something'</i>
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Skills Progression	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Five types of experimental skills 1. Observe over time 2. Pattern seeking 3. Identifying, classifying and grouping 4. Comparative and Fair test 5. Research using secondary sources	1. I can observe changes over time 2. I can observe changes and patterns 3. I can identify and classify 4. I can perform simple tests 4. I can perform a fair test with adult support	1. I can observe changes over time 2. I can observe changes and patterns 3. I can identify and classify 4. I can perform simple tests 4. I can perform a fair test with adult support	1. I can use simple equipment to observe closely including changes over time 2. I can use observations and ideas to suggest answers to questions noticing similarities, differences and patterns 3. I can identify, group and classify 4. I can perform simple comparative tests 5. I can gather and record data to help in answering questions including from secondary sources of information	1. I can make systematic and careful observations over time 2. I can ask questions surrounding patterns I have found in data. 3. I can gather, record, classify and present data in a variety of ways 4. I can set up simple practical enquiries, comparative and fair tests 5. I can use secondary sources with adult support to help clarify results seen.	1. I can make systematic and careful observations over time, looking at similarities and differences. 2. I can ask questions surrounding patterns I have found in data. 3. I can gather, record, classify and present data in a variety of ways to help in answering questions 4. I can set up simple practical enquiries, comparative and fair tests 5. I can use secondary sources with adult support to help clarify results seen.	1. I can observe over time, asking pertinent questions about similarities and differences. 2. I can ask questions surrounding patterns I have found in data as to why something I have observed has happened. 3. I can classify, group and present data in a series of ways to help in answering questions 4. I can take measurements, using a range of scientific equipment, with increasing accuracy and precision. 5. I can use secondary sources to help interpret results seen.	1. I can recognise things change over time, and can ask pertinent questions and suggest reasons for similarities and differences over time 2. I can ask questions surrounding patterns I have found in data as to why something I have observed has happened. 3. I can develop and use keys and other information to classify and describe objects in ways to help answer questions 4. I can take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate 5. I can use secondary sources to help interpret results seen.
Questions	I can ask simple questions	I can ask simple questions and recognise that they can be answered in different ways I can use my observations and ideas to suggest answers to questions I can communicate my ideas, what I can do and what I can find out in different ways	I can ask simple questions and recognise that they can be answered in different ways including use of scientific language from the national curriculum I can communicate my ideas, what I can do and what I can find out in different ways	I can ask relevant questions to answer my questions in different ways using scientific language from the national curriculum. I can ask questions surrounding patterns I have found in data.	I can ask relevant questions and use different types of scientific enquiries to answer them using scientific language from the national curriculum I can ask questions surrounding patterns I have found in data. I can develop a deeper understanding through talk, asking questions about scientific phenomena, analysing functions and interactions more systematically.	I can plan different types of scientific enquiries to answer questions, including recognising variables where necessary I can ask questions surrounding patterns I have found in data as to why something I have observed has happened. I can observe over time, asking pertinent questions about similarities and differences.	I can plan different types of scientific enquiries to answer my own or others' questions, including recognising and controlling variables where necessary I can recognise things change over time, and can ask pertinent questions and suggest reasons for similarities and differences over time
Using scientific equipment	I can use magnifying glasses to look at objects in more detail I can measure out ingredients using scientific and mathematic equipment	I can use simple equipment to observe closely I can use hand lenses and egg timers	I can use simple equipment to observe closely including changes over time I can ask my own questions about what I notice I can use hand lenses and egg timers	I can set up simple practical enquiries, comparative and fair tests I can make systematic and careful observations over time I can take measurements using standard units, using a range of equipment. I can set up simple practical enquiries, comparative and fair tests	I can set up simple practical enquiries, comparative and fair tests I can take measurements, using a range of scientific equipment, with increasing accuracy and precision.	I can make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers	I can take measurements, using a range of scientific equipment, including thermometers and data loggers, with increasing accuracy and precision, taking repeat readings when appropriate I can make my own decisions and select the most appropriate type of scientific enquiry to use and recognise how to set up a comparative and fair test.
Recording data	I can record observations in ways that are important and meaningful to me.	I can gather and record data to help in answering questions I can use simple scientific language such as: with help	I can gather and record data to help in answering questions including from secondary sources of information	I can gather, record, classify and present data in a variety of ways. I can record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables	I can gather, record, classify and present data in a variety of ways to help in answering questions I can record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables	I can record data and results using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs I can use test results to set up further comparative and fair tests	I can record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs I can use test results to make predictions to set up further comparative and fair tests
Reporting on findings				I can report on findings from enquiries, using presentations of results and conclusions I can use results to draw simple conclusions. I can use secondary sources with adult support to help clarify results seen.	I can report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions I can use results to draw simple conclusions, make predictions for new values and suggest improvements. I can use secondary sources with adult support to help clarify results seen. I can classify, group and present data in a series of ways to help in answering questions	I can report and present findings from enquiries in oral and written forms such as displays and other presentations. I can use results to draw more complex conclusions, make predictions for new values and suggest improvements. I can use secondary sources to help interpret results seen. I can classify, group and present data in a series of ways to help in answering questions	I can report and present 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 I can use results to draw more complex conclusions, make predictions for new values and suggest improvements and raise further questions. I can use secondary sources to help interpret results seen. I can develop and use keys and other information to classify and describe objects in ways to help answer questions
Using scientific evidence				I can identify differences, similarities or changes related to simple scientific ideas and processes I can use straightforward scientific evidence to answer questions or to support my findings	I can identify differences, similarities or changes related to simple scientific ideas and processes I can use straightforward scientific evidence to answer questions or to support my findings	I can identify scientific evidence that has been used to support or refute ideas or arguments	I can justify and evaluate my own and other people's scientific ideas related to topics in the national curriculum (including ideas that have changed over time), using evidence from a range of sources

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Knowledge Progression	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Animals including humans	<p>Touch, smell and hear the natural world during hands on experiences.</p> <p>Talk about how we care for the natural world around us.</p> <p>Name and describe some plants animals they can see.</p> <p>Explain how animals behave differently as the seasons change.</p>	<p>I know how to describe and compare observable features of animals from a range of groups</p> <p>I know how to group animals according to what they eat</p> <p>I know how to identify and name a variety of common animals including fish, amphibians, reptiles, mammals and birds</p> <p>I know how to identify and name a variety of common animals that are carnivores, herbivores and omnivores</p> <p>I know how to name and locate parts of the human body, including those related to the senses</p> <p>I know how to describe and compare observable features of animals from a range of groups</p> <p>I know how to describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets)</p> <p>I know how to identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense</p> <p>I know how to take care of animals taken from their habitat and understand the need to return them safely to their homes</p> <p>I know how to use the vocabulary and identify: head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth and teeth</p>	<p>I know how to name and locate parts of the human body, including those related to the senses and describe them</p> <p>I know how to describe the basic needs of animals for survival and the main changes as offspring from young animals, including humans, grow into adults</p> <p>I know how to group animals according to what they eat, describe how animals get their food from other animals and/or plants, and use simple food chains to describe these relationships</p> <p>I know how to describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene</p> <p>I know how to describe the basic needs of animals, including humans, for survival (water, food and air)</p> <p>I know how to describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene</p>	<p>I know how to 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</p> <p>I know how to identify that humans and some other animals have skeletons and muscles for support, protection and movement</p>	<p>I know how to describe the simple functions of the basic parts of the digestive system in humans</p> <p>I know how to identify the different types of teeth in humans and their simple functions</p> <p>I know how to construct and interpret a variety of food chains, identifying producers, predators and prey</p>	<p>I know how to describe the changes as humans develop to old age</p>	<p>I know how to identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood</p> <p>I know how to recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function</p> <p>I know how to describe the ways in which nutrients and water are transported within animals, including humans</p>
Everyday Materials		<p>I know how to distinguish objects from materials, describe their properties, identify and group everyday materials</p> <p>I know how to distinguish between an object and the material from which it is made</p> <p>I know how to identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock</p> <p>I know how to describe the simple physical properties of a variety of everyday materials</p> <p>I know how to compare and group together a variety of everyday materials on the basis of their simple physical properties</p>	<p>I know how to distinguish objects from materials, describe their properties, identify and group everyday materials and compare their suitability for different uses</p> <p>I know how to identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses</p> <p>I know how to describe how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching</p>			<p>I know how 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</p> <p>I know how to recognise that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution</p> <p>I know how to use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating</p> <p>I know how to give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic</p> <p>I know how to demonstrate that dissolving, mixing and changes of state are reversible changes</p> <p>I know how to 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</p>	

Light				<p>I know how to recognise that he/she needs light in order to see things and that dark is the absence of light</p> <p>I know how to notice that light is reflected from surfaces</p> <p>I know how to recognise that light from the sun can be dangerous and that there are ways to protect eyes</p> <p>I know how to find patterns in the way that the size of shadows change</p> <p>I know that it is not safe to look directly at the sun, even when wearing dark glasses</p>			<p>I know how to recognise that light appears to travel in straight lines</p> <p>I know how to 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</p> <p>I know how to 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</p> <p>I know how to use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them</p>
Magnets				<p>I know how to compare how things move on different surfaces</p> <p>I know how to notice that some forces need contact between two objects, but magnetic forces can act at a distance</p> <p>I know how to 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</p> <p>I know how to describe magnets as having two poles</p>			
Electricity					<p>I know how to identify common appliances that run on electricity</p> <p>I know how to construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers</p> <p>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</p> <p>I know how to recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit</p> <p>I know how to recognise some common conductors and insulators, and associate metals with being good conductors</p>		<p>I know how to associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit</p> <p>I know how to 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</p> <p>I know how to use recognised symbols when representing a simple circuit in a diagram</p>
Seasonal changes	<p>To observe the season of Autumn.</p> <p>To observe and explain the weather associated with Autumn and how this effects the world around them.</p> <p>To explain and talk using correct vocabulary about the changing seasons.</p> <p>Describe what they see, hear and feel outside.</p> <p>Understand the effects of changing seasons on the natural world around them.</p>	<p>I know how to observe and describe changes across the four seasons</p> <p>I know how to observe and describe weather associated with the seasons and how day length varies</p> <p>I know that it is not safe to look directly at the sun, even when wearing dark glasses</p>					
Plants	<p>Name and describe some plants and animals that they can see.</p>	<p>I know how to identify and name a variety of common wild and garden plants, including deciduous and evergreen trees</p> <p>I know how to identify and describe the basic structure of a variety of common flowering plants, including trees</p>	<p>I know how to describe the basic needs of plants for survival and the impact of changing these and the main changes as seeds and bulbs grow into mature plants</p> <p>I know how to observe and describe how seeds and bulbs grow into mature plants</p> <p>I know how to find out and describe how plants need water, light and a suitable temperature to grow and stay healthy</p>	<p>I know how to identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers</p> <p>I know how to 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</p> <p>I know how to investigate the way in which water is transported within plants</p> <p>I know how to explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal</p>			

<p>Living things and their habitats</p>	<p>Explore the natural world around them. Observe the natural world. Focus on specific areas of the natural world when observing. Draw a picture of the natural world after close observation. Observe and interact with natural processes and explain what they think is happening using subject specific vocabulary.</p>		<p>I know how to identify whether things are alive, dead or have never lived I know how to explore and compare the differences between things that are living, dead, and things that have never been alive I know how to name different plants and animals and describe how they are suited to different habitats I know how to 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 I know how to identify and name a variety of plants and animals in their habitats, including micro-habitats I know how to 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</p>		<p>I know how to recognise that living things can be grouped in a variety of ways I know how to explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment I know how to recognise that environments can change and that this can sometimes pose dangers and have an impact on living things</p>	<p>I know how to describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird I know how to describe the life process of reproduction in some plants and animals</p>	<p>I know how 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 I know how to give reasons for classifying plants and animals based on specific characteristics</p>
<p>Rocks</p>				<p>I know how to compare and group together different kinds of rocks on the basis of their appearance and simple physical properties I know how to describe in simple terms how fossils are formed when things that have lived are trapped within rock I know how to recognise that soils are made from rocks and organic matter.</p>			
<p>Forces</p>				<p>I know how to compare how things move on different surfaces I know how to notice that some forces need contact between two objects, but magnetic forces can act at a distance I know how to 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 I know how to describe magnets as having two poles I know how to predict whether two magnets will attract or repel each other, depending on which poles are facing</p>		<p>I know how to explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object I know how to identify the effects of air resistance, water resistance and friction, that act between moving surfaces I know how to recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect</p>	
<p>Sound</p>					<p>I know how to identify how sounds are made, associating some of them with something vibrating I know how to recognise that vibrations from sounds travel through a medium to the ear I know how to find patterns between the pitch of a sound and features of the object that produced it I know how to find patterns between the volume of a sound and the strength of the vibrations that produced it I know how to recognise that sounds get fainter as the distance from the sound source increases</p>		
<p>States of matter</p>					<p>I know how to compare and group materials together, according to whether they are solids, liquids or gases I know how to 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) I know how to identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature</p>		

Earth and Space						<p>I know how to describe the movement of the Earth, and other planets, relative to the Sun in the solar system</p> <p>I know how to describe the movement of the Moon relative to the Earth</p> <p>I know how to describe the Sun, Earth and Moon as approximately spherical bodies</p> <p>I know how to use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky</p> <p>I know that the Sun is a star at the centre of our solar system and that it has eight planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune (Pluto was reclassified as a 'dwarf planet' in 2006).</p> <p>I know that a moon is a celestial body that orbits a planet (Earth has one moon; Jupiter has four large moons and numerous smaller ones).</p>	
Evolution and inheritance							<p>I know how 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</p> <p>I know how to recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents</p> <p>I know how to identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution</p>
Famous Scientists			<p>Pupils might find out about people who have developed useful new materials, for example John Dunlop, Charles Macintosh or John McAdam.</p>			<p>They should find out about the work of naturalists and animal behaviourists, for example, David Attenborough and Jane Goodall</p> <p>They should find out about how chemists create new materials, for example, Spencer Silver, who invented the glue for sticky notes or Ruth Benerito, who invented wrinkle-free cotton.</p> <p>Pupils should find out about the way that ideas about the solar system have developed, understanding how the geocentric model of the solar system gave way to the heliocentric model by considering the work of scientists such as Ptolemy, Alhazen and Copernicus.</p> <p>Pupils might find out how scientists, for example, Galileo Galilei and Isaac Newton helped to develop the theory of gravitation.</p>	<p>Pupils might find out about the significance of the work of scientists such as Carl Linnaeus, a pioneer of classification</p> <p>Pupils might find out about the work of palaeontologists such as Mary Anning and about how Charles Darwin and Alfred Wallace developed their ideas on evolution.</p>