

What will a Morpeth Partnership Scientist look like?

	At the end of Year 2 they will have the following skills:	At the end of Year 4 they will have the following skills:	By the end of Year 6 they will have the following skills:
Being a Scientist	<p>The principal focus of science teaching in key stage 1 is to enable pupils to experience and observe phenomena, looking more closely at the natural and humanly constructed world around them. They should be encouraged to be curious and ask questions about what they notice. They should be helped to develop their understanding of scientific ideas by using different types of scientific enquiry to answer their own questions, including observing changes over a period of time, noticing patterns, grouping and classifying things, carrying out simple comparative tests, and finding things out using secondary sources of information. They should begin to use simple scientific language to talk about what they have found out and communicate their ideas to a range of audiences in a variety of ways. Most of the learning about science should be done through the use of first-hand practical experiences, but there should also be some use of appropriate secondary sources, such as books, photographs and videos.</p> <p>Pupils should read and spell scientific vocabulary at a level consistent with their increasing word-reading and spelling knowledge at key stage 1.</p> <p><u>Working scientifically:</u> During years 1 and 2, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:</p> <ul style="list-style-type: none"> • asking simple questions and recognising that they can be answered in different ways • observing closely, using simple equipment 	<p>The principal focus of science teaching in lower key stage 2 is to enable pupils to broaden their scientific view of the world around them. They should do this through exploring, talking about, testing and developing ideas about everyday phenomena and the relationships between living things and familiar environments, and by beginning to develop their ideas about functions, relationships and interactions. They should ask their own questions about what they observe and make some decisions about which types of scientific enquiry are likely to be the best ways of answering them, including observing changes over time, noticing patterns, grouping and classifying things, carrying out simple comparative and fair tests and finding things out using secondary sources of information. They should draw simple conclusions and use some scientific language, first, to talk about and, later, to write about what they have found out.</p> <p>Pupils should read and spell scientific vocabulary correctly and with confidence, using their growing word-reading and spelling knowledge.</p> <p><u>Working scientifically:</u> 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:</p> <ul style="list-style-type: none"> • asking relevant questions and using different types of scientific enquiries to answer them • setting up simple practical enquiries, 	<p>The principal focus of science teaching in upper key stage 2 is to enable pupils to develop a deeper understanding of a wide range of scientific ideas. They should do this through exploring and talking about their ideas; asking their own questions about scientific phenomena; and analysing functions, relationships and interactions more systematically. At upper key stage 2, they should encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates. They should also begin to recognise that scientific ideas change and develop over time. They should select the most appropriate ways to answer science questions using different types of scientific enquiry, including observing changes over different periods of time, noticing patterns, grouping and classifying things, carrying out comparative and fair tests and finding things out using a wide range of secondary sources of information. Pupils should draw conclusions based on their data and observations, use evidence to justify their ideas, and use their scientific knowledge and understanding to explain their findings.</p> <p>Pupils should read, spell and pronounce scientific vocabulary correctly.</p> <p><u>Working scientifically:</u> 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:</p> <ul style="list-style-type: none"> • planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary

	<ul style="list-style-type: none"> performing simple tests identifying and classifying using their observations and ideas to suggest answers to questions gathering and recording data to help in answering questions 	<ul style="list-style-type: none"> comparative and fair tests making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers 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 reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions identifying differences, similarities or changes related to simple scientific ideas and processes using straightforward scientific evidence to answer questions or to support their findings. 	<ul style="list-style-type: none"> taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs using test results to make predictions to set up further comparative and fair tests reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations identifying scientific evidence that has been used to support or refute ideas or arguments
Knowledge	<p>At Key Stage 1, pupils in the Morpeth Partnership are taught about:</p> <ul style="list-style-type: none"> Plants Animals, including humans Everyday materials (Y1) and their uses (Y2) Seasonal changes Living things and their habitats <p>Please see the Primary National Curriculum document for Year 1 and 2 detail</p>		
	<p>At Lower Key Stage 2, pupils in the Morpeth Partnership are taught about:</p> <ul style="list-style-type: none"> Plants Animals, including humans Rocks 		

	<ul style="list-style-type: none"> • Light • Forces and magnets • Living things and their habitats • States of matter • Sound • Electricity <p>Please see the Primary National Curriculum document for Year 3 and 4 detail</p>
	<p>At Upper Key Stage 2, pupils in the Morpeth Partnership are taught about:</p> <ul style="list-style-type: none"> • Living things and their habitats • Animals, including humans • Properties and changes of materials • Earth and space • Forces • Evolution and inheritance • Light • Electricity <p>Please see the Primary National Curriculum document for Year 5 and 6 detail</p>
	<p>At Key Stage 3, pupils in the Morpeth Partnership are taught about:</p> <ul style="list-style-type: none"> • Cells, tissues, organs and systems • Sexual reproduction in animals • Muscles and bones • Ecosystems • Mixtures and separation • Acids and alkalis • Particle model • Atoms, elements and molecules • Energy • Current electricity • Forces • Sound • Food and nutrition • Plants and their reproduction • Breathing and respiration • Unicellular organisms • Combustion

	<ul style="list-style-type: none"> • Periodic table • Metals and their uses • Fluids • Light • Energy transfers • Earth and space
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Progression of key skills from Y1 - Y6

	Planning, communication and sources	Enquiring, testing, obtaining and presenting evidence	Observing and recording	Considering evidence and evaluating
End of Year 1	draw simple pictures talk about what they see and do use simple charts to communicate findings identify key features ask questions	test ideas suggested to them say what they think will happen use first hand experiences to answer questions begin to compare some living things	make observations using appropriate senses record observations Communicate observations orally, in drawing, labelling, simple writing and using information technology	make simple comparisons and groupings say what has happened say whether what has happened was what they expected
End of Year 2	describe their observations using some scientific vocabulary use a range of simple texts to find information suggest how to find things out identify key features ask questions	use simple equipment provided to aid observation compare objects, living things or events make observations relevant to their task begin to recognise when a test or comparison is unfair use first hand experiences to answer questions	respond to questions asked by the teacher ask questions collect and record data (supported by the teacher) suggest how they could collect data to answer questions begin to select equipment from a limited range	say what has happened say what their observations show and whether it was what they expected begin to draw simple conclusions and explain what they did begin to suggest improvements in their work
End of Year 3	use pictures, writing, diagrams and tables as directed by their teacher use simple texts, directed by the teacher, to find information record their observations in written, pictorial and diagrammatic	put forward own ideas about how to find the answers to questions recognise the need to collect data to answer questions carry out a fair test with support recognise and explain why it is a fair test	make relevant observations measure using given equipment select equipment from a limited range	begin to offer explanations for what they see and communicate in a scientific way what they have found out begin to identify patterns in recorded measurements

	forms select the appropriate format to record their observations	with help, pupils begin to realise that scientific ideas are based on evidence		suggest improvements in their work evaluate their findings
End of Year 4	record observations, comparisons and measurements using tables and bar charts begin to plot points to form a simple graph use graphs to point out and interpret patterns in their data select information from a range of sources provided for them	with help, pupils begin to realise that scientific ideas are based on evidence show in the way they perform their tasks how to vary one factor while keeping others the same decide on an appropriate approach in their own investigations to answer questions describe which factors they are varying and which will remain the same and say why	carry out measurement accurately make a series of observations, comparisons and measurements select and use suitable equipment make a series of observations and measurements adequate for the task	predict outcomes using previous experience and knowledge and compare with actual results begin to relate their conclusions to scientific knowledge and understanding suggest improvements in their work, giving reasons
End of Year 5	record observations systematically use appropriate scientific language and conventions to communicate quantitative and qualitative data select a range of appropriate sources of information including books and the internet	use previous knowledge and experience combined with experimental evidence to provide scientific explanations recognise the key factors to be considered in carrying out a fair test	make a series of observations, comparisons and measurements with increasing precision select apparatus for a range of tasks plan to use apparatus effectively begin to make repeat observations and measurements systematically	make predictions based on their scientific knowledge and understanding draw conclusions that are consistent with the evidence relate evidence to scientific knowledge and understanding offer simple explanations for any differences in their results make practical suggestions about how their working methods could be improved
End of Year 6	choose scales for graphs which show data and features effectively identify measurements and observations which do not fit into the main pattern begin to explain anomalous data use appropriate ways to communicate quantitative data using scientific language	describe evidence for a scientific idea use scientific knowledge to identify an approach for an investigation explain how the interpretation leads to new ideas	measure quantities with precision using fine -scale divisions select and use information effectively make enough measurements or observations for the required task	make reasoned suggestions on how to improve working methods show how interpretation of evidence leads to new ideas explain conclusions, showing understanding of scientific ideas

	Scientific attitudes	Experimental skills and investigations	Analysis and evaluation	Measurement
End of KS3	<p>Pay attention to objectivity and concern for accuracy, precision, repeatability and reproducibility. (8F)</p> <p>Understand that scientific methods and theories develop (8E) as earlier explanations are modified to take account of new evidence and ideas (7G), together with the importance of publishing results and peer review (8L).</p> <p>Evaluate risks (7E)(7F).</p>	<p>Ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge and experience (7F)(8C).</p> <p>Make predictions using scientific knowledge and understanding (throughout).</p> <p>Select, plan and carry out the most appropriate types of scientific enquiries to test predictions, including identifying independent, dependent and control variables (throughout).</p> <p>Use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety (7E)(7F).</p> <p>Make and record observations and measurements using a range of methods for different investigations; and evaluate</p>	<p>Apply mathematical concepts and calculate results (7A)(8I).</p> <p>Present observations and data using appropriate methods, including tables and graphs (8E)(8L).</p> <p>Interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions (throughout).</p> <p>Present reasoned explanations, including explaining data in relation to predictions and hypotheses (8F).</p> <p>Evaluate data, showing awareness of potential sources of random and systematic error (throughout).</p>	<p>Understand and use SI units and IUPAC (International Union of Pure and Applied Chemistry) chemical nomenclature (7A)(8I).</p> <p>Use and derive simple equations and carry out appropriate calculations (7H)(8G).</p> <p>Undertake basic data analysis including simple statistical techniques (throughout).</p>

		<p>the reliability of methods and suggest possible improvements (throughout).</p> <p>Apply sampling techniques. (8D)</p>	<p>Identify further questions arising from their results (7K).</p>	
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Scientific concepts

At the end of Key Stage 1, the pupils will have developed an understanding of the following scientific concepts:	At the end of Key Stage 2, the pupils will have developed an understanding of the following scientific concepts:
<p>Life processes - living, not living or never been alive, basic needs, survival</p> <p>Human body and senses</p> <p>Exercise, food and hygiene</p> <p>Variety of common animals e.g fish, mammals, amphibians</p> <p>Plants - deciduous and evergreen trees, what plants need to stay alive</p> <p>Structure of plants and trees</p> <p>Habitats and microhabitats</p> <p>Food chain and sources of food</p> <p>Materials - what are they, what are their properties and how are they used?</p> <p>Can they be changed?</p> <p>Seasons - why do they occur?</p> <p>Weather</p>	<p>Life processes - reproduction in plants and animals, development to old age</p> <p>Skeleton and muscles</p> <p>Nutrition and the digestive system</p> <p>Food chains</p> <p>Teeth and their simple functions</p> <p>Circulatory system - heart, blood vessels and blood</p> <p>Digestive system in humans</p> <p>Diet, exercise, drugs and lifestyle</p> <p>Functions of plants e.g roots, stem and what plants need for life and growth</p> <p>Life cycle of flowering plants and mammals, amphibians, insects, bird</p> <p>Classification of living things</p> <p>Materials - physical and chemical properties</p> <p>Solids, liquids and gases</p> <p>Changes of state</p> <p>Dissolving</p> <p>Chemical change</p> <p>Day and night</p> <p>Moon, Sun, Stars</p> <p>Solar system</p>

	<p>Erosion Igneous, metamorphic and sedimentary rocks Soil Weathering and its impact</p> <p>Sources of light How eyes function How light travels Rainbows Shadows</p> <p>Force Gravity Friction Air and water resistance Application of forces Magnetic force</p> <p>Sound Loudness, pitch, echoes Ears and how they work</p> <p>Electricity Circuits, voltage, conductors, insulators, switches Resistance Static electricity</p> <p>(Upper KS2) Evolution and fossil record Natural selection Survival of the fittest Natural variation in living things Artificial variation in living things</p>
<p>At the end of Key Stage 3, the pupils will have developed an understanding of the following scientific concepts:</p>	
<p>7A Understand the structure and function of cells. 7B Describe the process of reproduction in animals. 7C Understand the role of muscles and bones within the body.</p>	

- 7D Explain how living things are adapted to their habitats and how they interact with one another.
- 7E Carry out simple separation techniques e.g. filtration, evaporation, distillation and chromatography.
- 7F Explore, classify and understand the uses of a range of common acids and alkalis.
- 7G Understand the arrangement and behaviour of particles in the solid, liquid and gaseous states.
- 7H Identify elements, mixtures and compounds from descriptions and particle diagrams.
- 7I Understand how energy is stored, released and transferred and know the key difference between renewable and non-renewable energy sources.
- 7J Explain the principles of current, potential difference and resistance in series and parallel electrical circuits.
- 7K Describe, measure and represent a range of contact and non-contact forces.
- 7L Describe the key features and principles of waves and understand waves as a mode of energy transfer.

- 8A Describe the biological process of digestion and understand the importance of a balanced diet.
- 8B Understand the process of reproduction in plants.
- 8C Understand the process of gas exchange and how energy is released in the body.
- 8D Explain the differences between unicellular and multicellular organisms.
- 8E Explain how hydrogen and hydrocarbons react with oxygen.
- 8F Understand how to group elements based on their physical properties and chemical behaviour.
- 8G Describe the common properties of metals and explain how they react with acids, water and oxygen.
- 8H Describe the rock cycle in terms of the formation of igneous, sedimentary and metamorphic rocks.
- 8I Describe how the density of objects and the pressure within a fluid can be explained in terms of the particle model.
- 8J Be able to describe how light travels and interacts with different media.
- 8K Understand how energy is stored and transferred.
- 8L Describe the Earth's position within the Solar System in relation to stars, constellations and galaxies.