Northlands Primary School and Nursery Science Progression

(updated July 2022)

Working Scientifically is to be embedded across all units and not to be taught as a separate topic.

Year	Animals including humans	Animals including humans	Everyday materials	Seasonal Changes	Plants	Working Scientifically
1	Study the names of a variety of common animals and mammals. Know if the animals are herbivores, carnivores or omnivores and be able to make simple comparisons. Name parts of the human body e.g. head, shoulders, knees, toes, eyes, ears, mouth and neck (songs can be used). Know the sense organs for sight and sound. Name and describe animals found on a farm, zoo and know if they are herbivores, carnivores or omnivores.	Know fish have fins, tails and scales. During this topic there are endless opportunities for trips to local farms, zoos, pet shops etc… Name parts of their body, including the 5 sense organs and the stimuli they detect (skin= touch) Be able to name and identify common invertebrates, reptiles and amphibians (Many invertebrates can be found in the school grounds and there are companies who will bring animals into school. STEM club will be making a bug hotel in Autumn 2021.) Pupils need to classify common animals as herbivores, carnivores or omnivores.	Know some common objects and what material they are made from e.g. tyres from rubber, windows from glass, houses from brick, tables from wood and cars from metal. Describe why the objects are made from these materials limited to simple properties, hard, soft, see through etc. Know what houses are usually made from and compare with houses made from different materials (e.g. thatched roof and wooden huts). State why each material is used. Know what materials/clothes are made from and why… by considering simple properties. They could investigate which materials are waterproof. Pupils to investigate "stretchy" materials. They use rulers to measure and record results in a simple bar chart. They could compare pieces of material e.g. wool, cotton and lycra. Pupils should classify materials as shiny and dull. Perhaps get them to make necklaces from shiny materials.	Know that in Summer the days are longer than in Winter. Know the difference in the weather in Summer compared to Winter and how this affects plants and humans. Know in winter that nights are longer and be able to describe the weather in Winter, describing what clothes they should wear in each season. Know some animals which live in the Arctic and Dessert. Consider which holiday clothes to pack when they go to hot or cold countries and why these clothes are suitable.	Structure of a tree and a flowering plant limited to stem, root, leaves, flower. Name common trees and flowers they will find growing wild in their garden. Identify buds on trees and plants and know that they develop into flowers. Pupils could grow some plants from buds. Pupils need to be aware of examples of evergreen and deciduous trees. They could go outside and explore their neighbourhood for the 2 different trees and make reference to the classification of a Christmas tree. Name and identify some of the flowers and trees that grow in their own gardens or local parks. Pupils could visit a local park.	Pupils should start to carry out simple investigations/tests. They should ask simple questions and recognise they can be answered in different ways. Pupils should be introduced to simple tables to identify/classify & record data to help in answering simple questions. Pupils should be introduced to simple charts using their observations to answer simple questions. **These criteria should be explored and embedded throughout your science curriculum.**

Northlands Primary School and Nursery Science Progression

(updated July 2022)

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Year	Living things and their habitats	Everyday materials	What is Science?	Plants	Animals including humans	Working Scientifically
2	Identify living and dead organisms. Explore the differences. Recognise that some things have never been alive. Examine rock pool habitats and back garden habitats. Use the word habitat correctly. Explore various habitats/micro habitats and understand that animals live in those best suited to them. Study garden and woodland food chains.	Identify everyday objects that are made from a variety of materials. Group objects based on differences. (e.g. vehicles) Know what happens when things bend or twist. Know why things are made from particular materials. Investigate what happens when catapults stretch. Study some new materials - tar and rubber. Investigate what happens when water and wax melt. Investigate which objects can be squashed or stretched.	Scientists and Inventors: study a diverse range of scientists, inventors and other influential figures from STEM. These should include scientists both in history and still alive *e.g. Elon Musk/Sarah Gilbert*. Topical science (science in the news) Children could present findings as a documentary/news bulletin to work towards working scientifically criteria) Overflow for **Everyday materials** objectives	Know plants need water to live and recognise what a plant looks like without water. Grow daffodils from bulb to flower and observe the changes that occur. Grow sunflowers and tulips. Know that flowers need sunlight and water to grow and the correct temperature. Know that trees can grow from seeds and trees need water, sunlight and air to survive.	Recognise and name the offspring of farm animals and know what the offspring need to survive. Study a healthy balanced diet and other human needs e.g. water, food and air to survive. Understand the importance of exercise and hygiene. Know what constitutes healthy eating…examine what they eat and how healthy their diets are.	Perform simple tests and state what they have found out. Be able to describe how they could find out the answer to simple questions through the use of an experiment. Take some readings using simple equipment e.g. timer. Be able to interpret pictograms. Make pictograms of their favourite activities in school. Identify and classify to show differences in closely related animals and objects. Measure the mass of different objects and state what they have found out by observation using simple tests and equipment. Show their results in tables. **These criteria should be explored and embedded throughout your science curriculum.**

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(updated July 2022)

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Year	Plants	Animals including humans	Rocks	Light	Forces and Magnets	Working Scientifically
3	Plants could be grown in the classroom. Label a plant and know the function of each part, including stem to carry water from roots to leaves. Understand the requirements of plants to grow? Be able to label a flower and know it is the reproductive part of the plant. Describe how pollination occurs by insects or wind. Be aware that different plants require different amounts of light and water to grow. Know how seeds are formed and describe seed dispersal. There is scope to investigate how making seeds with different masses affects how far they can be dispersed… using a hair dryer or straws.	Calcium is needed to make strong bones. Animals cannot make their own food but eat other animals and plants. Be able to name and locate, skull, pelvis and rib cage. Humans need meat (protein to grow), dairy, starchy foods for energy, vegetables/fruit (for health) in their diet. Name important bones of the skeleton and know the function of bones and what would happen if humans did not have bones Compare and contrast the diets of different animals. Know the function of muscles.	Use hand lenses or their eyes to group rocks based on whether they have grains, or crystals in them. Know pumice is a light rock that can float. Know that soil comes from rocks and dead plant and animals. Identify fossils in some rocks. Describe what a fossil is. Reinforce that rocks can have grains or crystals. Compare different soils. Know what happens when rocks rub together.	Light is needed to see and dark is the absence of light. Know that it is dangerous to look directly at the sun. Light can be reflected from surfaces and know how shadows are made. Make a shadow puppet and explain how it works. Investigate how the height of shadow changes during the day. Use sunlight and chalk in the yard or torches and small toys.	Know that magnets will stick to magnetic materials. Magnetic forces act at a distance. Know that magnets have 2 poles - north and south. Investigate how things move on different surfaces. Suggest uses for magnets Be able to predict whether magnets will attract or repel based on the poles that are brought together. Show this by dangling a magnet on a string and bring another magnet towards it.	Plan & set up simple experiments that are fair tests that involve equipment such as thermometers and stop watches. Draw simple conclusions using correct scientific language. Able to ask relevant questions and provide answers to support their findings. Use *standard units* correctly during practicals. Make predictions. Store results in tables & draw simple conclusions from them. Look for trends, similarities and differences. Draw labelled diagrams when presenting information/results of practical experiments Use evidence to suggest improvements for investigations and raise further questions. Produce bar charts with keys. **These criteria should be explored and embedded throughout your science curriculum.**

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(updated July 2022)

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Year	Living things and their habitats	Animals including humans	States of matter	Sound	Electricity	Working Scientifically
4	Use keys to identify vertebrates; know that vertebrates can be divided into 5 main groups (birds, mammals, fish, reptiles and amphibians). Consider the negative effects of litter in an environment and consider destruction of habitat through development. This could be done by project based learning. Know that invertebrates can be grouped as snails, slugs, worms, insects and spiders. Explore the positive effects of nature reserves. Study flowering and non-flowering plants (ferns and mosses). Study the negative effects of pollution and deforestation.	Recognise teeth in carnivores and herbivores and describe why they are different. Study food chains, identifying producers, predators and prey. Know the name of organs in the digestive system (limited to stomach, small intestine (skinny one), large intestine, oesophagus and mouth). Structure of Human teeth. Know the function of the different parts of the digestive system. Know how teeth can be damaged by sugary food, acid and plague and how to look after them.	Identify Solids, Liquids and Gases and make simple descriptions for them. eg solids hold their shape; liquids form a pool not a pile and gases escape from an unsealed container. Ensure pupils can describe solids, liquids, gases and changes in state of water. Pupils could investigate what affects how fast water evaporates. Study the changes of state of chocolate and measure temp. with a thermometer. The water cycle involves changes in state and rate of evaporation. Pupils could make ice cream or chocolate crispy cakes and refer to changes of state. Investigate the temperature at which different substances melt.	Know that sounds are made by vibrations and that the further away the sound is made the lower in volume they become. Use a simple classroom based experiment to show this. Know how sounds travel through a medium to the ear. Make and play their own instruments (Guitars /drums, etc.) and conclude that the harder they are plucked/banged the louder they sound. Make ear muffs from different materials and investigate which ones are the best insulators. Explore the pattern between pitch of an object and the object itself (use elastic bands of different length or width and pluck across margarine tubs). The thinner the strings the higher the pitch. Reinforce the pattern between volume and strength of vibrations.	Identify common appliances that use electricity from their homes or in school. Build a simple circuit and draw them accurately. (circuit symbols are covered in year 6). Know how to work safely with electricity. Recognise the effect of an open and closed switch and relate this to a closed circuit. Note how increasing the number of batteries in a circuit leads to brighter bulbs. Identify good conductors that could be used in a circuit.	Plan & set up simple experiments that are fair tests that involve equipment such as thermometers and data loggers. Ask relevant questions and draw simple conclusions using correct scientific language. Make predictions about planned tests and their outcomes. Draw labelled diagrams in presenting evidence. Store results in tables & draw simple conclusions from them. Use *standard units* correctly. Look for trends, similarities and differences. Use secondary evidence. Produce bar charts and other forms of tables. Use evidence to suggest improvements for investigations and raise further questions.

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Year	Animals including humans	Living things and habitats	Properties and changes of materials	Earth and Space	Forces	Working Scientifically
5	Know the changes from birth to 10 years old. Know the changes that happen at old age. Know about changes at puberty.	Study the life cycle of a mammal and an amphibian. Sexual reproduction involves a male and a female. Study the life cycle of an insect e.g. butterfly and a bird. Study the lifecycle of a flowering plant including wind/insect pollination. Asexual reproduction in plants (it is possible to grow some spider plants from cuttings.)	Investigate which materials are soluble. Know about soluble and insoluble substances and what happens during dissolving. Know that large, insoluble materials can be separated by a sieve. Start using terms such as hard/soft to describe materials. Know how to apply the uses of wood and plastics intelligently. In burning, know that a different new material is made. What happens during dissolving? Any insoluble material can be separated by filtering. Learn about the use of metals. Melting is a change of state and how to increase the speed of melting (investigate). Baking is an example of an irreversible reaction as new materials are made. Experiment on how different materials respond to magnets. Learn about properties limited to transparent materials and conductivity. Investigate which materials will conduct electricity in a simple circuit. Know that any soluble material can be separated from water by evaporation. Study the reaction of vinegar and bicarbonate of soda to produce carbon dioxide. Know this is an example of a reversible reaction as a new material is made.	Know there are 8 planets in our solar system (not 9 as once thought.) Know that planets orbit the Sun. Know that the moon orbits the Earth. Understand why we get day and night. Explain how the sun appears to move across the sky, but is actually stationary. See how the Sun, Earth and Moon are spherical bodies.	Learn that gravity is a force that pulls things to the Earth. Friction is a contact force that opposes motion. Measure force and how friction slows the movement of objects so they take more force to be pulled along. Learn that moving objects have air resistance e.g. parachutist, moving car. Understand that falling objects with same mass and shape will fall at the same speed. However, if the surface area is larger, the force of air resistance will increase and the object will fall slower. Know how a simple lever works… starting with opening jars. Study simple pulleys… those used to lift buckets of water or materials up to a roofer. Know that water resistance, slows down objects moving through the water. Investigate making simple boats from foil and use a hair dryer to move the boats. How gears can be used e.g. in a watch/clock or steam engine	Plan scientific enquiries to answer questions. Measure accurately. Introduce pupils to the fact there are some scientific ideas that have changed over time eg The structure of the solar system and 8/9 planets. Be able to produce & interpret bar charts recording info accurately. Use test results to make predictions using a range of scientific equipment. Learn that in an investigation that the variable you measure is called the "dependent variable" and the "independent variables" are the ones you need to keep the same in order to make a fair test. To be able to make conclusions and identify the data used to produce these conclusions. Report these orally as well as in writing. Use of secondary scientific evidence. Study the work of David Attenborough and Jane Goodall.

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Year	Animals including humans	Living things and their habitats	Evolution and Inheritance	Light	Electricity	Working Scientifically
6	Recognise diagrams of the human circulatory system and know the function of the heart. Be aware of the main nutrients in foods and which foods are rich in them. State why they are needed in the body and how over eating can result in obesity or under eating can result in anorexia or starvation. Know blood travels through blood vessels. State the job of the heart and lungs. Know blood vessels carry food oxygen and water around the body. Be aware of the effect of smoking and alcohol on the body.	Recall how animals are classified i.e. vertebrate and invertebrates. Be able to describe some feature of the 5 groups of vertebrates. Know there are 3 main kingdoms: plants, animals and micro-organisms and that plants can be divided into flowering and non-flowering. Reinforce features of the 5 vertebrates and differences between insects and spiders, which are invertebrates. Know, recognise and picture the 3 groups that non-flowering plants are classified into.	Know what a fossil is and that Mary Anning was the first person to find fossils of dinosaurs. Know that living things produce offspring of the same kind but the offspring may be slightly different to each other. Describe how the arctic fox and polar bear are adapted to live in the arctic. Know that without fossils we may never have known that animals have adapted slowly over time. Describe how offspring are not identical to either parent but inherit features from both. Describe how animals are adapted - both those who are predators and prey. Know that Charles Darwin suggested the theory of evolution that states that organisms change slowly over time to adapt to their surroundings in order to survive. Recognise which features an offspring has inherited from which parent. Know how plants are adapted to live in the desert.	Draw light rays as straight lines with arrows pointing in the direction the light is travelling. (note light enters our eyes). Draw shadows the same shape as the object, demonstrating that light travels in straight lines. Draw diagrams to show that we see light because light bounces off objects into our eyes. Remember, light rays are drawn as straight lines and must have an arrow on to show the direction of travel. Lasers can be used to show a ray of light by sprinkling talc above the laser. Draw diagrams to show light rays reflecting off mirrors. Be able to draw and explain how periscopes work.	Recognise and draw symbols for wires, cells, bulbs, buzzers and switches. Investigate what happens to the brightness of bulbs when the number of cells is increased. Build circuits from circuit diagrams and vice versa. Investigate role of switches and conductors. Investigate how increasing the number of cells in a circuit change the volume of sound made by a buzzer. Reinforce drawing circuit diagrams.	To plan simple experiments that are fair tests and write simple methods and answer related questions. To state the range and intervals that are being recorded. Produce & interpret data having already made predictions in relation to investigations. Make simple conclusions. Know repeating an experiment leads to reliable results. Ensure tables have units. Write conclusions starting to include scientific reasons (why). Identify the data used to produce these conclusions. Produce bar charts by developing the scale independently - more able may attempt line graphs and scatter graphs. Start to evaluate a practical method, looking at strengths and weaknesses and suggest improvements. Express these orally as well as in written form. Use secondary sources to identify evidence that has been used to support or refute ideas or arguments.

	Know the difference in the function of arteries (away from heart) and veins (towards heart). Be aware of the benefit of exercise on your body, specifically the heart. Describe how water is transported around plants (stem and veins).					

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Working Scientifically Progression

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Pupils should start to carry out simple investigations/tests. They should ask simple questions and recognise they can be answered in different ways. Pupils should be introduced to simple tables to identify/ classify & record data to help in answering simple questions. Pupils should be introduced to simple charts using their observations to answer simple questions.	Perform simple tests and state what they have found out. Be able to describe how they could find out the answer to simple questions through the use of an experiment. Take some readings using simple equipment e.g. timer. Be able to interpret pictograms. Make pictograms of their favourite activities in school. Identify and classify to show differences in closely related animals and objects. Measure the mass of different objects and state what they have found out by observation using simple tests and equipment. Show their results in tables.	Plan & set up simple experiments that are fair tests that involve equipment such as thermometers and stop watches. Draw simple conclusions using correct scientific language. Able to ask relevant questions and provide answers to support their findings. Use *standard units* correctly during practicals. Make predictions. Store results in tables & draw simple conclusions from them. Look for trends, similarities and differences. Draw labelled diagrams when presenting information/results of practical experiments Use evidence to suggest improvements for investigations and raise further questions. Produce bar charts with keys.	Plan & set up simple experiments that are fair tests that involve equipment such as thermometers and data loggers. Ask relevant questions and draw simple conclusions using correct scientific language. Make predictions about planned tests and their outcomes. Draw labelled diagrams in presenting evidence. Store results in tables & draw simple conclusions from them. Use *standard units* correctly. Look for trends, similarities and differences. Use secondary evidence. Produce bar charts and other forms of tables. Use evidence to suggest improvements for investigations and raise further questions.	Plan scientific enquiries to answer questions. Measure accurately. Introduce pupils to the fact there are some scientific ideas that have changed over time eg The structure of the solar system and 8/9 planets. Be able to produce & interpret bar charts recording info accurately. Use test results to make predictions using a range of scientific equipment. Learn that in an investigation that the variable you measure is called the "dependent variable" and the "independent variables" are the ones you need to keep the same in order to make a fair test. To be able to make conclusions and identify the data used to produce these conclusions. Report these orally as well as in writing. Use of secondary scientific evidence. Study the work of	To plan simple experiments that are fair tests and write simple methods and answer related questions. To be able to state the range and intervals that are being recorded. Produce & interpret data having already made predictions in relation to investigations. Make simple conclusions. Know repeating an experiments leads to reliable results. Ensure tables have units. Write conclusions starting to include scientific reasons (why). Identify the data used to produce these conclusions. Produce bar charts by developing the scale independently - more able may attempt line graphs and scatter graphs. Start to evaluate a practical method, looking at strengths and weaknesses and suggest improvements. Express these orally as well as in written form. Use secondary sources to identify evidence that has been

				David Attenborough and Jane Goodall.	used to support or refute ideas or arguments.