- Larkhill Primary – Science				
	Cycle A Year 5/6		Cycle B Year 5/6	
Programme of study	**Properties and changes of materials**	**Living things and their habitats**	**Earth and Space and Forces** Light and Electricity	**Animals, incl humans** **Evolution & Inheritance**
Coverage	Properties of materials; reversible and irreversible changes	Lifecycles (including plants)	The solar system Forces and gravity	Growing Up and Growing Old
Content (NC Objectives)	✓ 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.	✓ 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. ✓ 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 ✓ give reasons for classifying plants and animals based on specific characteristics.	✓ 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. ✓ *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.* ✓ 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. ✓ 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.	✓ describe the changes as humans develop to old age. ✓ 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 the ways in which nutrients and water are transported within animals, including humans ✓ .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
Notes and guidance	✓ exploring and comparing the properties of a broad range of materials, including relating	✓ study and raise questions about their local environment throughout the year.	✓ be introduced to a model of the Sun and Earth that enables them to explain day and night.	✓ draw a timeline to indicate stages in the growth and development of humans.

	these to what they learnt about magnetism (Y3) and electricity (Y4). ✓ explore reversible changes, including, evaporating, filtering, sieving, melting and dissolving, recognising that melting and dissolving are different processes. ✓ explore changes that are difficult to reverse, for example, burning, rusting and other reactions, for example, vinegar with bicarbonate of soda. ✓ 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. ✓ *Note: Pupils are not required to make quantitative measurements about conductivity and insulation at this stage. It is sufficient for them to observe that some conductors will produce a brighter bulb in a circuit than others and that some materials will feel hotter than others when a heat source is placed against them. Safety guidelines should be followed when burning materials*.	✓ observe life-cycle changes in a variety of living things, for example, plants in the vegetable garden or flower border, and animals in the local environment. ✓ find out about the work of naturalists and animal behaviourists, for example, David Attenborough and Jane Goodall. ✓ find out about different types of reproduction, including sexual and asexual reproduction in plants, and sexual reproduction in animals. ✓ build on their learning about grouping living things (Y4) by looking at the classification system in more detail. ✓ be introduced to the idea that broad groupings, such as micro-organisms, plants and animals can be subdivided. ✓ Through direct observations where possible, classify animals into commonly found invertebrates (such as insects, spiders, snails, worms) and vertebrates (fish, amphibians, reptiles, birds and mammals). ✓ discuss reasons why living things are placed in one group and not another. ✓ find out about the significance of the work of scientists such as Carl Linnaeus, a pioneer of classification	✓ learn that the Sun is a star at the centre of our solar system and that it has eight planets. ✓ understand that a moon is a celestial body that orbits a planet (Earth has one moon; Jupiter has four large moons and numerous smaller ones). ✓ Note: Pupils should be warned that it is not safe to look directly at the Sun, even when wearing dark glasses. ✓ 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. ✓ explore falling objects and raise questions about the effects of air resistance. ✓ explore the effects of air resistance by observing how different objects such as parachutes and sycamore seeds fall. ✓ experience forces that make things begin to move, get faster or slow down. ✓ explore the effects of friction on movement and find out how it slows or stops moving objects, for example, by observing the effects of a brake on a bicycle wheel. ✓ explore the effects of levers, pulleys and simple machines on movement. ✓ find out how scientists, for example, Galileo Galilei and Isaac Newton helped to develop the theory of gravitation. ✓ build on learning (Y3), exploring the way that light behaves, including light sources, reflection and shadows. ✓ talk about what happens and make predictions. ✓ Build on learning (Y4), construct simple series circuits, to help them to answer questions about what happens when they try different components, for example, switches, bulbs, buzzers and motors. ✓ learn how to represent a simple circuit in a diagram using recognised symbols. ✓ *Note: Pupils are expected to learn only about series circuits, not parallel circuits. Pupils should be taught to take the necessary precautions for working safely with electricity*.	✓ learn about the changes experienced in puberty. ✓ build on their learning about the main body parts and internal organs (Y3, Y4) (skeletal, muscular and digestive system) to explore and answer questions that help them to understand how the circulatory system enables the body to function. ✓ learn how to keep their bodies healthy and how their bodies might be damaged – including how some drugs and other substances can be harmful to the human body. ✓ build on learning about fossils (rocks, Y3), find out more about how living things on earth have changed over time. ✓ Be introduced to the idea that characteristics are passed from parents to their offspring, for instance by considering different breeds of dogs, and what happens when, for example, labradors are crossed with poodles. ✓ appreciate that variation in offspring over time can make animals more or less able to survive in particular environments, for example, by exploring how giraffes' necks got longer, or the development of insulating fur on the arctic fox. ✓ find out about the work of palaeontologists such as Mary Anning and about how Charles Darwin and Alfred Wallace developed their ideas on evolution. ✓ *Note: At this stage, pupils are not expected to understand how genes and chromosomes work.*
Working Scientifically	✓ planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary ✓ 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 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.			
	✓ carrying out tests to answer questions, for example, 'Which materials would be the most effective for making a warm jacket, for wrapping ice cream to stop it	✓ observing and comparing the life cycles of plants and animals in their local environment with other plants and animals around the world (in the rainforest, in the oceans, in desert	✓ comparing the time of day at different places on the Earth through internet links and direct communication ✓ creating simple models of the solar system	✓ researching the gestation periods of other animals and comparing them with humans

	melting, or for making blackout curtains?' ✓ compare materials in order to make a switch in a circuit. ✓ observe and compare the changes that take place, for example, when burning different materials or baking bread or cakes. ✓ research and discuss how chemical changes have an impact on our lives, for example, cooking, and discuss the creative use of new materials such as polymers, super-sticky and super-thin materials.	areas and in prehistoric times), asking pertinent questions and suggesting reasons for similarities and differences. ✓ try to grow new plants from different parts of the parent plant, for example, seeds, stem and root cuttings, tubers, bulbs. ✓ observe changes in an animal over a period of time (for example, by hatching and rearing chicks), comparing how different animals reproduce and grow ✓ using classification systems and keys to identify some animals and plants in the immediate environment. ✓ research unfamiliar animals and plants from a broad range of other habitats and decide where they belong in the classification system.	✓ constructing simple shadow clocks and sundials, calibrated to show midday and the start and end of the school day ✓ finding out why some people think that structures such as Stonehenge might have been used as astronomical clocks ✓ *exploring falling paper cones or cup-cake cases, and designing and making a variety of parachutes and carrying out fair tests to determine which designs are the most effective.* ✓ *explore resistance in water by making and testing boats of different shapes.* ✓ *design and make products that use levers, pulleys, gears and/or springs and explore their effects.* ✓ deciding where to place rear-view mirrors on cars ✓ designing and making a periscope and using the idea that light appears to travel in straight lines to explain how it works. ✓ investigate the relationship between light sources, objects and shadows by using shadow puppets. ✓ extend their experience of light by looking a range of phenomena including rainbows, colours on soap bubbles, objects looking bent in water and coloured filters *(they do not need to explain why these phenomena occur).* ✓ systematically identifying the effect of changing one component at a time in a circuit; ✓ designing and making a set of traffic lights, a burglar alarm or some other useful circuit.	✓ finding out and recording the length and mass of a baby as it grows. ✓ exploring the work of scientists and scientific research about the relationship between diet, exercise, drugs, lifestyle and health. ✓ observing and raising questions about local animals and how they are adapted to their environment ✓ comparing how some living things are adapted to survive in extreme conditions, for example, cactuses, penguins and camels. ✓ analyse the advantages and disadvantages of specific adaptations, such as being on two feet rather than four, having a long or a short beak, having gills or lungs, tendrils on climbing plants, brightly coloured and scented flowers.
Identifying and Classifying	✓ Regularly revisit KS1 skills: Focus on asking questions about the similarities and differences between things. ✓ Go outside to explore the world around them at all times of the year. ✓ Increased focus on measuring and using data to answer 'big questions'. ✓ Continue to build on their observational skills, becoming more independent in identifying, through the use of increasingly complex tools, as well as developing higher order skills in reasoning and justification when explaining how they have chosen to group things. ✓ Design simple tests to help them classify materials, as well as independently using a range of secondary sources to support them in identifying a range of living things.			
	✓ Can you group these materials based on whether they are transparent or not? ✓	✓ Compare this collection of animals based on similarities and differences in their lifecycle. ✓ How would you make a classification key for vertebrates/invertebrates or microorganisms?	✓ How could you organise all the objects in the solar system into groups? ✓ Can you label and name all the forces acting on the objects in each of these situations? ✓ Can you observe and identify all the phases in the cycle of the Moon? ✓ Can you identify all the colours of light that make white light when mixed together? What colours do you get if you mix different colours of light together?	✓ Can you identify all the stages in the human life cycle? ✓ Which organs of the body make up the circulatory system, and where are they found? ✓ Compare the skeletons of apes, humans, and Neanderthals – how are they similar, and how are they different? ✓ Can you classify these observations into evidence for the

			✓ How would you group electrical components and appliances based on what electricity makes them do?	idea of evolution, and evidence against?
Comparative testing	✓ Use an increasingly wide range of equipment to make measurements. ✓ Learn what it means to measure accurately and check for reliability. ✓ Learn to independently plan how to record and analyse the data, using tables, pictograms, and bar charts to compare the measurements they make. Use the bar charts to draw conclusions about what they have found out to be the answer to their 'big question' ✓ Evaluate the procedure they used and the quality of their data, suggesting ways they could improve their test.			
	✓ Which type of sugar dissolves the fastest? ✓ Which shoe is the most slippy?	✓ Which is the most common invertebrate on our school playing field?	✓ How does the length of daylight hours change in each season? ✓ Which seed shape takes the longest time to fall? ✓ Which shape parachute takes the longest to fall? ✓ Which material is most reflective? ✓ Which make of battery lasts the longest? ✓ Which type of fruit makes the best fruity battery?	✓ Who grows the fastest, girls or boys? ✓ Which type of exercise has the greatest effect on our heart rate? ✓ What is the most common eye colour in our class?
Fair Testing	✓ Plan their own tests to collect data. ✓ Through fair testing learn to understand the different types of variables: • the dependent variable that they will change in their test, • the independent variable that they are going to measure so that they can find out how the dependent variable affects it, • the control variables which the children will need to keep the same so that they don't affect their results. ✓ Measure and record data that can then be displayed in a scatter graph or line graph. ✓ Use their data to draw conclusions that identify a causal relationship eg 'when you increase X, Y will always decrease'. ✓ Throughout KS2, become progressively more systematic in how they approach fair tests and increasingly independent. ✓ Written conclusions to become increasingly sophisticated, with more focus on scientific explanations. ✓ Focus on their skills in evaluating their scientific enquiries. ✓ Learn to critique not just their experimental methods but also their data by reflecting on reliability and accuracy.			
	✓ How does the temperature of tea affect how long it takes for a sugar cube to dissolve?	✓ How does the level of salt affect how quickly brine shrimp hatch?	✓ How does the angle of launch affect how far a paper rocket will go? ✓ How does the surface area of a container affect the time it takes to sink? ✓ How does the surface area of a parachute affect the time it takes to fall to the ground? ✓ How does the angle that a light ray hits a plane mirror affect the angle at which it reflects off the surface? ✓ How does the voltage of the batteries in a circuit affect the brightness of the lamp? ✓ How does the voltage of the batteries in a circuit affect the volume of the buzzer?	✓ How does age affect a human's reaction time? ✓ How does the length of time we exercise for affect our heart rate? ✓ Can exercising regularly affect your lung capacity?
Research	✓ Reading for information and note-taking. ✓ Learn to interpret the information they find and critically consider its relevance in answering their 'big questions'. ✓ Use a range of secondary sources, including books, websites, and video to find their information. ✓ Listen to presentations from experts and science professionals to get their information, or ask them questions in interviews and letters ✓ Find more data in their research and use this to help answer questions ✓ Start to collect their own data through questionnaires and interviews. ✓ Begin to evaluate the quality of the information they have found and how well it has enabled them to draw conclusions and answer their 'big question'.			

	✓ What are microplastics and why are they harming the planet?	✓What are the differences between the life cycle of an insect and a mammal? ✓What do different types of microorganisms do? Are they always harmful?	✓ How have our ideas about the solar system changed over time? ✓ What unusual objects did Jocelyn Bell Burnell discover? ✓ How do submarines sink if they are full of air? ✓ How do astronomers know what stars are made of? ✓ How has our understanding of electricity changed over time?	✓ Why do people get grey/white hair when they get older? ✓ How have our ideas about disease and medicine changed over time? ✓ What happened when Charles Darwin visited the Galapagos islands? ✓ Why do some people need to wear glasses to see clearly?
Ideas over time	✓			
	✓ What did Stephanie Kwolek discover and why was it important?	✓ How did the experiments and ideas of Jan Ingenhousz help improve our understanding of plants? ✓ How did Carl Linneaus' ideas help us to group plants?	✓ How have our ideas about the solar system changed over time? ✓ How is astronomer and planetary scientist Sara Seager changing our ideas about the universe? ✓ How have our ideas about gravity changed over time? ✓ Cameras detect light – how has our understanding of light and its effects changed camera design throughout history? ✓ How has our understanding of electricity changed over time? ✓ How have batteries changed over time?	✓ How and why has life expectancy in the UK changed since the Middle Ages? ✓ What ideas did Edward Jenner have about small pox and how did he test them?
Pattern seeking	✓ Begin to think for themselves when deciding what they should measure and observe. ✓ Begin to make decisions about the most appropriate equipment to use to collect data. ✓ Begin to think even more about their planning, including identifying the variables that they cannot control and suggesting the potential impact those variables might have on the data they collect. ✓ Use a data logger to collect the most accurate data they can. ✓ Using data analysis techniques to spot patterns, including using tabulated data and a variety of charts and graphs. ✓ Use data and graphs to support their explanations when describing relationships. ✓ Use pattern seeking as a preliminary test; use their findings to form and justify their own predictions, then propose further investigations to test these predictions.			
	✓ Do all stretchy materials stretch in the same way?	✓ Is there a relationship between a mammal's size and its gestation period? ✓ Do all flowers have the same number of petals?	✓ Is there a pattern between the size of a planet and the time it takes to travel around the Sun? ✓ Do all objects fall through water in the same way? ✓ Is there a pattern to how bright it is in school over the day? And, if there is a pattern, is it the same in every classroom? ✓ Does the temperature of a light bulb go up the longer it is on?	✓Are the oldest children in our school the tallest? ✓Is there a pattern between what we eat for breakfast and how fast we can run? ✓Is there a pattern between the size and shape of a bird's beak and the food it will eat? ✓What ideas did American geneticist Barbara McClintock have about genes that won her a Nobel Prize?
End of Unit TAPS Assessments	**Champion tape** ✓ Can children recommend a champion tape? ✓ Can children explain how they have come to their conclusion?	**Life cycle research** ✓ Can children present their research clearly? ✓ Can children present using scientific language?	**Craters** ✓ Can children design simple tables to record results? ✓ Can children present results as a bar chart or line graph? **Spinners**	**Growth survey** ✓ Can children record and present results clearly? **Heart Rate Headstands**

	Dissolving ✓ Can children plan a fair test to investigate factors affecting the speed at which solids dissolve in water? **Insulation layers** ✓ Can children carry out an investigation to test a hypothesis? **Testing nappy absorbency** ✓ Can children plan and carry out a fair test to compare the absorbency of different brand nappies? ✓ Can children explain why the test is/is not fair? **Sugar cube snacks** ✓ Can children record data clearly and accurately? ✓ Can children record repeat readings?	**Invertebrate research** ✓ Can children report and present information about an invertebrate classification group **Outdoor Keys** ✓ Can children create questions which separate animal groups? ✓ Can children use a classification key? Can children record their research clearly, using scientific language?	✓ Can children improve accuracy by repeating measurements? ✓ Can children identify patterns in results? **Aqua dynamics** ✓ Can children use test results to make predictions relating water resistance to surface area? ✓ Can children identify variables which may affect the results? **Investigating Shadows** ✓ Can children make accurate measurements? ✓ Can children choose the appropriate type of graph to present their results? **Bulb brightness** ✓ Can children raise a question relating to simple circuits and the brightness of the bulb? ✓ Can children decide what evidence to collect in order to answer the question?	✓ Can children plan a scientific enquiry to answer their question? ✓ Can children explain their findings and consider the degree of trust in their results? Can children make predictions based on their results? **Fossil habitats** ✓ Can children use evidence (from fossils or research) to develop ideas? ✓ Can children discuss whether evidence supports ideas? **Egg Strength** ✓ Can the children explain how they are testing the strength of the eggs? Can the children consider the trustworthiness of their method/results?
Additional TAPS activities	✓ Demonstrate that changes of state are reversible changes. ✓ 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. ✓ Know that some materials will dissolve in liquid to form a solution.	✓ 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. ✓ Create keys to classify animals.	✓ Describe the movement of the Earth in relation to the Sun. ✓ Identify the effects of water resistance. ✓ Identify the effects of air resistance. ✓ Gather ideas about light at beginning and end of unit. ✓ Investigate shadows and distance from light source – draw diagram or create table ✓ Investigate what happens when they change components in a circuit. ✓ Explore different electrical components, pose questions and make predictions.	✓ Describe the changes as humans develop to old age. ✓ Design an investigation about reactions when catching rulers ✓ Label how a X is adapted to its environment eg Polar bear and arctic. ✓ Invent their own animal and explain how it is adapted to its environment.
Scientists to research	✓ **Spencer Silver,** ✓ **Arthur Fry and Alan Amron** (Post-It Notes) ✓ **Ruth Benerito (**Wrinkle-Free Cotton)	✓ **David Attenborough** (Naturalist and Nature Documentary Broadcaster) ✓ **James Brodie of Brodie** (Reproduction of Plants by Spores) ✓ **Carl Linnaeus** (Identifying, Naming and Classifying Organisms) ✓ **Charles Darwin and Alfred Russel Wallace** (Theory of Evolution by Natural Selection) ✓ **Jane Goodall** (Chimpanzees)	✓ **Galileo Galilei (**Gravity and Acceleration) ✓ **Isaac Newton** (Gravitation) ✓ **Archimedes of Syracuse** (Levers) ✓ **Claudius Ptolemy and Nicolaus Copernicus** (Heliocentric vs Geocentric Universe) ✓ **Neil Armstrong -** First man on the Moon) ✓ **Helen Sharman -** (First British astronaut) ✓ **Tim Peake -** (First British ESA astronaut) ✓ **Alessandro Volta** (Electrical Battery) ✓ **Nicola Tesla** (Alternating Currents)	✓ **Thomas Young** (Wave Theory of Light) ✓ **Ibn al-Haytham (Alhazen)** ✓ (Light and our Eyes) ✓ **Justus von Liebig** (Theories of Nutrition and Metabolism) ✓ **Sir Richard Doll** (Linking Smoking and Health Problems) **Leonardo Da Vinci** (Anatomy)

Investigations that work well	✓			