Year 5 and 6 - Science Programme of Study

Programme of study	Earth and Space	Electricity	Animals inc humans	Forces	Living things and their habitats
Coverage	The solar system	Symbols and circuits	Growing up and growing old	Forces and gravity	Classification
Content	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.	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.	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.	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 **G**ive reasons for classifying plants and animals based on specific characteristics.
Notes and guidance	Be introduced to a model of the Sun and Earth that enables them to explain day and night. Learn that the Sun is a star at the centre of our solar system and that it has eight planets.	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.	Draw a timeline to indicate stages in the growth and development of humans. Learn about the changes experienced in puberty.	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.	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)

	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). 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.	learn how to represent a simple circuit in a diagram using recognised symbols.		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.	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.
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.				
	Comparing the time of day at different places on the Earth through internet	Systematically identifying the effect of changing one	Researching the gestation periods of other animals and comparing them with humans	Exploring falling paper cones or cup-cake cases, and designing and making a variety of	Using classification systems and keys to identify some animals and plants in the immediate environment.

	links and direct communication Creating simple models of the solar 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.	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.	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.	Research unfamiliar animals and plants from a broad range of other habitats and decide where they belong in the classification system.
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.				
	How could you organise all the objects in the solar system into groups? Can you observe and identify all the phases in the cycle of the Moon?	How would you group electrical components and appliances based on what electricity makes them do?	Can you identify all the stages in the human life cycle?	Can you label and name all the forces acting on the objects in each of these situations?	How would you make a classification key for vertebrates/invertebrates or microorganisms?

<table>
<tr><td>Comparative testing</td><td colspan="5">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.</td></tr>
<tr><td></td><td>How does the length of daylight hours change in each season?</td><td>Which make of battery lasts the longest?

Which type of fruit makes the best fruity battery?</td><td>Who grows the fastest, girls or boys?</td><td>Which seed shape takes the longest time to fall?

Which shape parachute takes the longest to fall?</td><td>Which is the most common invertebrate on our school playing field?</td></tr>
<tr><td>Fair tests</td><td colspan="5">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.</td></tr>
<tr><td></td><td></td><td>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?</td><td>How does age affect a human’s reaction time?</td><td>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</td><td></td></tr>
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				time it takes to fall to the ground?	
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.				
	Is there a pattern between the size of a planet and the time it takes to travel around the Sun?	Does the temperature of a light bulb go up the longer it is on?	Are the oldest children in our school the tallest?	Do all objects fall through water in the same way?	Do all flowers have the same number of petals?
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'.				
	How have our ideas about the solar system changed over time? What unusual objects did Jocelyn Bell Burnell discover?	How has our understanding of electricity changed over time?	Why do people get grey/white hair when they get older?	How do submarines sink if they are full of air?	What do different types of microorganisms do? Are they always harmful?
Ideas over time	Explore and talk about their own and other people's scientific ideas. Begin to recognise how scientific ideas change and develop over time. Use a range of secondary sources of information. Develop their use of scientific language. Explain ideas using their scientific knowledge and understanding. Evaluate the significance, strengths and weaknesses of different scientists' ideas.				

	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 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?	How have our ideas about gravity changed over time?	How did Carl Linneaus' ideas help us to group plants?
Scientists to research	**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)	**Galileo Galilei** (Gravity and Acceleration) **Isaac Newton** (Gravitation) **Archimedes of Syracuse** (Levers)	**Carl Linnaeus** (Identifying, Naming and Classifying Organisms)