



# Science Progression – Cycle A UKS2



## Term 1 - Earth and Space (Year 5 NC)

National Curriculum Objectives	Key Knowledge	Vocabulary	Key Scientists	Prior Learning	Future Learning
<p>Describe the movement of the Earth, and other planets, relative to the Sun in the solar system</p> <p>Describe the movement of the Moon relative to the Earth</p> <p>Describe the Sun, Earth and Moon as approximately spherical bodies</p> <p>Describe the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.</p>	<p>Stars, planets and moons have so much mass they attract other things, including each other due to a force called gravity.</p> <p>Gravity works over distance.</p> <p>Objects with larger masses exert bigger gravitational forces.</p> <p>Objects like planets, moons and stars spin.</p> <p>Smaller mass objects like planets orbit large mass objects like stars.</p> <p>Stars produce vast amounts of heat and light.</p> <p>All other objects are lumps of rock, metal or ice and can be seen because they reflect the light of stars.</p>	<p>Earth, Sun, Moon, Axis, Rotation, Day, Night, Phases of the Moon, star, constellation, waxing, waning, crescent, gibbous. Mercury, Venus, Mars, Jupiter, Saturn, Uranus, Neptune, planets, solar system, day, night, rotate, orbit, axis, spherical, geocentric, heliocentric.</p>	<p>Claudius Ptolemy and Nicolaus Copernicus (Heliocentric vs Geocentric Universe)</p> <p>Neil Armstrong (First man on the Moon)</p> <p>Helen Sharman (First British astronaut)</p> <p>Tim Peake (First British ESA astronaut)</p>	<p>Understand changes in weather patterns and seasons.</p> <p>Compare how things move on different surfaces.</p> <p>Notice that some forces need contact between two objects, but magnetic forces can act at a distance.</p> <p>Describe magnets as having two poles.</p> <p>Predict whether two magnets will attract or repel each other, depending on which poles are facing</p>	<p>In KS3:</p> <p>Gravity force, weight = mass x gravitational field strength (g), on Earth g=10 N/kg, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and Sun (qualitative only)</p> <p>Our Sun as a star, other stars in our galaxy, other galaxies</p> <p>The seasons and the Earth's tilt, day length at different times of year, in different hemispheres the light year as a unit of astronomical distance</p>



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Key Question(s):	Working Scientifically opportunities:	Big Question - Assessment opportunity	Linked Texts		
<p>How does temperature/size/day length/year length change as you get closer/further to the sun?</p> <p>How does distance from a light source affect how much light hits an object?</p> <p>Does having more moons result in more light hitting a planet? How could you test this?</p> <p>How does speed/size of a meteorite affect the size of the moon crater formed?</p> <p>If the moon became heavier as a result of meteorite collisions what would happen to its position relative to Earth?</p> <p>If the mass of the Earth is 80x that of the moon, why is the gravity at the Earth's surface only 6x greater than at the surface of the moon?</p> <p>Why do we have day/night/months/years/seasons?</p> <p>Why does day length change?</p>	<p>Competitive tests - How does the length of daylight hours change in each season?</p> <p>Identify and Classify - How could you organise all the objects in the solar system into groups?</p> <p>Observation Overtime - Can you observe and identify all the phases in the cycle of the Moon?</p> <p>Pattern Seeking - Is there a pattern between the size of a planet and the time it takes to travel around the Sun?</p>	<p>Sun, Earth &amp; Moon: What is moving and how do we know?</p>	<p>The Skies Above My Eyes (Charlotte Guillain &amp; Yuval Zommer)</p> <p>George's Secret Key to the Universe (Lucy and Stephen Hawking with Christophe Galfard)</p> <p>The Way Back Home (Oliver Jeffers)</p>		



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<p>Why does shadow size change over the course of a day?</p>	<p>Research - What unusual objects did Jocelyn Bell Burnell discover? How do astronomers know what stars are made of? How have our ideas about the solar system changed over time?</p>				
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## Term 2 - Living Things and their Habitats (Year 5 NC)

National Curriculum Objectives	Key Knowledge	Vocabulary	Key Scientists	Prior Learning	Future Learning
<p>Know the life cycle of different living things, e.g. Mammal, amphibian, insect bird.</p> <p>Know the process of reproduction in plants.</p> <p>Know the process of reproduction in animals.</p>	<p>Different animals mature at different rates and live to different ages.</p> <p>Some organisms reproduce sexually where offspring inherit information from both parents.</p> <p>Some organisms reproduce asexually by making a copy of a single parent.</p>	<p>Reproduction, Sexual, Asexual, Pollination, Dispersal, reproduction, cell, fertilisation, pollination, male, female, pregnancy, young, mammal, metamorphosis, amphibian, insect, egg, embryo, bird, plant</p>	<p>James Brodie of Brodie (Reproduction of Plants by Spores)</p> <p>David Attenborough (Naturalist and Nature Documentary Broadcaster)</p>	<p>Construct and interpret a variety of food chains, identifying producers, predators and prey</p> <p>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.</p>	<p>Classify living things into broad groups according to observable characteristics and based on similarities and differences.</p> <p>Give reasons for classifying plants and animals based on specific characteristics.</p>



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	Environmental change can affect how well an organism is suited to its environment. Different types of organisms have different lifecycles.			Identify and name a variety of plants and animals in their habitats, including micro habitats.	
<b>Key Question(s):</b>	<b>Working Scientifically opportunities:</b>	<b>Big Question - Assessment opportunity</b>	<b>Linked Texts</b>		
<p>What is a life cycle? What types of life cycles are there? Are life cycles the same? Do plants reproduce in the same ways as us? How do plants spread their seeds?</p>	<p>Competitive tests - How does the level of salt affect how quickly brine shrimp hatch?</p> <p>Identify and Classify - Compare this collection of animals based on similarities and differences in their lifecycle.</p> <p>Observation Overtime - How do brine shrimp change over their lifetime? How does a bean change as it germinates?</p>	<p>Do all plants and animals reproduce in the same way?</p>	<p>The Land of Neverbelieve (Norman Messenger)</p> <p>Mummy Laid an Egg (Babette Cole)</p>		



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	<p>Pattern Seeking - Is there are relationship between number of petals and number of stamen?</p> <p>Research - What are the differences between the life cycle of an insect and a mammal?</p>				
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## Term 3 - Animals including Humans (Year 5 NC)

National Curriculum Objectives	Key Knowledge	Vocabulary	Key Scientists	Prior Learning	Future Learning
<p>Describe the changes as humans develop to old age.</p>	<p>Different animals mature at different rates and live to different ages. Puberty is something we all go through, a process which prepares our bodies for being adults, and reproduction Hormones control these changes; which can be physical and/or emotional.</p>	<p>Foetus, Embryo, Womb, Gestation, Baby, Toddler, Teenager, Elderly, Growth, Development, Puberty, Hormone, Physical, Emotional,</p>	<p>Dr Steve Jones (Genetisist)  Prof Robert Winston (Human Scientist)</p>	<p>Describe the simple functions of the basic parts of the digestive system in humans. Identify the different types of teeth in humans and their simple functions.</p>	<p>Following Year: 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</p>



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Key Question(s):	Working Scientifically opportunities:	Big Question - Assessment opportunity	Linked Texts		
<p>What do humans look like? Do all animal embryos look the same? How do humans change? Why do humans change? What causes puberty? What changes do we go through during puberty? Are there any patterns between vertebrate animals and their gestation periods?</p>	<p>Competitive tests - How does age affect a human's reaction time? Who grows the fastest, girls or boys?</p> <p>Identify and Classify - Can you identify all the stages in the human life cycle?</p> <p>Observation Overtime - How do different animal embryos change?</p> <p>Pattern Seeking - Is there a relationship between a mammal's size and its gestation period?</p> <p>Research - Why do people get grey/white</p>	<p>Why and how does the human body change over time?</p>	<p>Hair in Funny Places (Babette Cole)</p> <p>Giant (Kate Scott)</p> <p>You're Only Old Once! (Dr. Seuss)</p>		<p>water are transported within animals, including humans.</p>



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## Term 4 - Materials: Mixtures and Separations (Year 5 NC)

National Curriculum Objectives	Key Knowledge	Vocabulary	Key Scientists	Prior Learning	Future Learning
<p>Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. 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.</p>	<p>When two or more substances are mixed and remain present the mixture can be separated. Some changes can be reversed and some can't. Materials change state by heating and cooling.</p>	<p>Solid, liquid, gas, particles, state, materials, properties, matter, melt, freeze, water, ice, temperature, process, condensation, evaporation, water vapour, energy, precipitation, collection,</p>	<p>Spencer Silver, Arthur Fry and Alan Amron (Post-It Notes)</p> <p>Ruth Benerito (Wrinkle-Free Cotton)</p>	<p>KS1: Distinguish between an object and the material from which it is made. Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. Describe the simple physical properties of a variety of everyday materials. Compare and group together a variety of everyday materials on the basis of their simple physical properties. Identify and compare the suitability of a</p>	<p>Year 5: 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. Give reasons based on evidence from comparative and fair tests, for the particular uses of everyday materials, including wood, metals and plastic. Demonstrate that dissolving, mixing and</p>



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				<p>variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses.</p> <p>Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.</p>	<p>changes of state are reversible changes.</p> <p>Explain that some changes result in the formation of new materials, and this kind of change is usually not reversible, including changes associated with burning and the action of acid on bicarbonate of soda</p>
<b>Key Question(s):</b>	<b>Working Scientifically opportunities:</b>	<b>Big Question - Assessment opportunity</b>	<b>Linked Texts</b>		
<p>What are mixtures?</p> <p>What does dissolving mean?</p> <p>Which of the following dissolve in water: sugar, bicarbonate of soda, oil, chocolate, coffees, dark vinegar and wax?</p> <p>How does the amount of water used affect how much sugar will dissolve in it?</p> <p>Which sweets dissolve in water?</p>	<p>Competitive tests - How does the temperature of tea affect how long it takes for a sugar cube to dissolve? Which type of sugar dissolves the fastest?</p> <p>Identify and Classify - Can you group these materials based on whether they are transparent or not?</p>	<p>How can we separate a mixture of water, iron filings, salt and sand?</p>	<p>Itch (Simon Mayo)</p> <p>Kensuke's Kingdom (Michael Morpurgo)</p> <p>The BFG (Roald Dahl)</p>		





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<p>How can we separate mixtures? How can we clean our dirty water?</p>	<p>Observation Overtime - How does a container of salt water change over time? How does a sugar cube change as it is put in a glass of water?</p> <p>Pattern Seeking - Do all stretchy materials stretch in the same way? How does temperature affect how much solute we can dissolve?</p> <p>Research - What are microplastics and why are they harming the planet?</p>				
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### Term 5 - Materials: Changes (Year 5 NC)

National Curriculum Objectives	Key Knowledge	Vocabulary	Key Scientists	Prior Learning	Future Learning
<p>Compare and group together everyday materials on the basis of</p>	<p>All matter (including gas) has mass.</p>	<p>Hardness, Solubility, Transparency, Conductivity, Magnetic,</p>	<p>Spencer Silver, Arthur Fry and Alan Amron</p>	<p>Year 4: Compare and group materials together,</p>	<p>In KS3: The concept of a pure substance</p>



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<p>their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. comparative and fair tests, for the particular uses of everyday materials, including wood, metals 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 this kind of change is usually not reversible, including changes associated with burning and the action of acid on bicarbonate of soda</p>	<p>Sometimes mixed substances react to make a new substance. These changes are usually irreversible. Heating can sometimes cause materials to change permanently. When this happens, a new substance is made. These changes are not reversible. Indicators that something new has been made are: The properties of the material are different (colour, state, texture, hardness, smell, temperature) If it is not possible to get the material back easily it is likely that it is not there anymore and something new has been made (irreversible change)</p>	<p>Filter, Evaporation, Dissolving, Mixing Material, conductor, dissolve, insoluble, suspension, chemical, physical, irreversible, solution, reversible, separate, mixture, insulator, transparent, flexible, permeable, soluble, property, magnetic, hard.</p>	<p>(Post-It Notes) Ruth Benerito (Wrinkle-Free Cotton)</p>	<p>according to whether they are solids, liquids or gases. Observe that some materials change state when heated or cooled, and measure and research the temperature at which this happens in degrees Celsius. Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.</p>	<p>mixtures, including dissolving. Diffusion in terms of the particle model. Simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography. The identification of pure substances.</p>
<p><b>Key Question(s):</b></p>	<p><b>Working Scientifically opportunities:</b></p>	<p><b>Big Question - Assessment opportunity</b></p>	<p><b>Linked Texts</b></p>		



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<p>The key question we want children to interrogate is "have we made a new substance?"</p> <p>Add sugar to fizzy water; it fizzes up. Has a new substance been made? (No, the gas was dissolved in the water and adding sugar made it become un dissolved)</p> <p>Add baking powder to vinegar, it fizzes up. Has a new substance been made? (Yes the gas was not in the vinegar as it wasn't fizzy, so it must have been made)</p> <p>Add water to instant snow.</p> <p>Use lemon juice as an invisible ink, heating gently makes the ink visible. Is this a new substance?</p> <p>When water is added to jelly and it is set, is it a new substance.</p>	<p>Competitive tests - Which material rusts fastest/slowest? How can we change the 'jellyness' of jelly?</p> <p>Identify and Classify - Can you identify and classify these reactions and changes into reversible, and irreversible? Can you describe their groups similarities and differences?</p> <p>Observation Overtime - How does a nail in salt water change over time?</p> <p>Pattern Seeking - What patterns can you notice in different reactions? How does the amount of bicarbonate of soda, washing up liquid and vinegar affect the reaction?</p>	<p>How can we change materials reversibly and irreversibly?</p>	<p>Itch (Simon Mayo)</p> <p>Kensuke's Kingdom (Michael Morpurgo)</p> <p>The BFG (Roald Dahl)</p>		
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<p>When materials are heated or mixed with other materials they sometimes can be made to turn into new materials. How would we know if it was a new material or the same material mixed differently?</p>	<p>Research - What are smart materials and how can they help us?</p>				
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### Term 6 - Forces and Magnets (Year 5 NC)

National Curriculum Objectives	Key Knowledge	Vocabulary	Key Scientists	Prior Learning	Future Learning
<p>Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object and the impact of gravity on our lives. Identify the effects of air resistance, water resistance and friction, which act between moving surfaces.</p>	<p>Air resistance and water resistance are forces against motion caused by objects having to move air and water out of their way. Friction is a force against motion caused by two surfaces rubbing against each other. Some objects require large forces to make them move; gears, pulley</p>	<p>Air resistance, Water resistance, Friction, Gravity, Newton, Gears, Pulleys, force, push, pull, opposing, streamline, brake, mechanism, lever, cog, machine, pulley.</p>	<p>Galileo Galilei (Gravity and Acceleration)  Isaac Newton (Gravitation)  Archimedes of Syracuse (Levers)  John Walker (The Match)</p>	<p>Compare how things move on different surfaces. Know how a simple pulley works and use making lifting an object simpler Notice that some forces need contact between two objects, but magnetic forces can act at a distance. Observe how magnets attract and repel each</p>	<p>In KS3: opposing forces and equilibrium: weight held by stretched spring or supported on a compressed surface forces being needed to cause objects to stop or start moving, or to change their speed or direction of motion (qualitative only)</p>



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<p>Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.</p>	<p>and levers can reduce the force needed to make things move</p>			<p>other and attract some materials and not others. 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. Describe magnets as having two poles. Predict whether two magnets will attract or repel each other, depending on which poles are facing.</p>	<p>change depending on direction of force and its size.</p>
<p><b>Key Question(s):</b></p>	<p><b>Working Scientifically opportunities:</b></p>	<p><b>Big Question - Assessment opportunity</b></p>	<p><b>Linked Texts</b></p>		
<p>What actually is a force? How can a force act on an object? How can we see forces? How can we measure forces? How does the saltiness (salinity) of water</p>	<p>Competitive tests - How does the angle of launch affect how far a paper rocket will go? How does the surface area of an object affect the time it takes to sink?</p>	<p>How and why do objects move?</p>	<p>The Enormous Turnip (Katie Daynes)  Leonardo's Dream (Hans de Beer)  The Aerodynamics of Biscuits (Clare Helen Welsh)</p>		



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<p>affect the water resistance? How does the length of a piece of a paper helicopter's wings affect the time it takes to fall? How does the changing the shape of a piece of plasticine affect water resistance? How does adding holes to a parachute affect the time it takes to fall? How does the amount/depth of tread affect the friction between a shoe and a surface? How can we use levers to lift more? What is the most effective way to move an object? How do see-saws work? Can you create a pulley system to lift a given load?</p>	<p>Identify and Classify - Can you label and name all the forces acting on the objects in each of these situations?</p> <p>Observation Overtime - How long does a pendulum swing for before it stops?</p> <p>Pattern Seeking - Do all objects fall through water in the same way? How does surface area of parachute affect the time it takes to fall? Research - How do submarines sink if they are full of air?</p>				
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