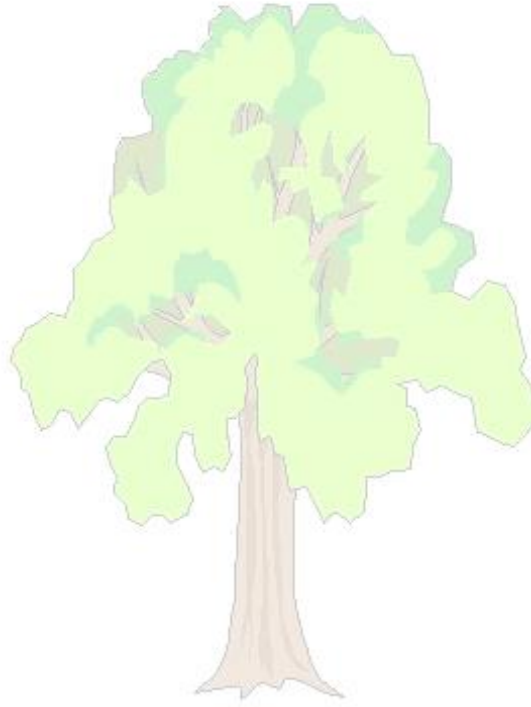


## Year 4 Science Long Term Plan

Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
What is a force? How do they help us? Forces	The Earth, Sun or Moon – which is the odd one out? How do we get day and night, the seasons and climates? Earth and Space	How do materials change? Properties and Change of Materials	Are all life cycles the same? Living Things and their Habitats	How do humans change throughout their life? Animals, Including Humans	



Unit 1 Science – What is a force? How can they help us?		
National Curriculum Links	Disciplinary Knowledge (Working Scientifically)	Key Vocabulary
<b>Forces</b> <ul style="list-style-type: none"> <li>Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object</li> <li>Identify the effects of air resistance, water resistance and friction, that act between moving surfaces</li> <li>Recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect</li> </ul>	<ul style="list-style-type: none"> <li>Plan a scientific enquiry, making choices about the variables to be changed</li> <li>Take accurate measurements and repeat readings using a newton meter</li> <li>Use scientific diagrams</li> </ul>	<b>Tier 2:</b> simple machine, effort, load, float, sink, streamlined, <b>Tier 3:</b> friction, resistance, forcemeter, contact force, gravity, gravitational pull, mass, matter, air resistance, water resistance, drag, upthrust, displace, lever, pulley, gear, transmission, mesh, axle, fulcrum, pivot, mechanisms, redirecting force
Pupil Offer		Famous People
		Isaac Newton Galileo Galilei Elon Musk

Unit 1	Week 1	Week 2	Week 3	Week 4	
Lesson Overview including Substantive knowledge	<b>Comparative / Fair Testing</b> <b>How Does Friction Affect the Amount of Force Required to Move an Object?</b> <ul style="list-style-type: none"> <li>Build on knowledge from Year 3 by looking at specific textures that provide more friction.</li> <li>Know that friction has an impact on the force needed to move an object.               <ul style="list-style-type: none"> <li>Know that forces can be measured.</li> </ul> </li> </ul> <p><b>Retrieval: Year 3 - forces</b></p> <p>Children to pick up different objects using two pencils, and discuss how some are easier than others. Define friction. Set up test – Which trainer provides the best grip? Teacher to model using force meter to measure force required to move shoe across the floor. Children to plan and conduct experiments. Children to record results in a graph. Discuss what other investigations could be done to explore friction further.</p>	<b>Pattern Seeking</b> <b>What Is Gravity?</b> <ul style="list-style-type: none"> <li>Know objects of different weights do fall at the same speed.</li> <li>Know that gravity is a force that acts at a distance and attracts all objects towards each other; larger objects have a stronger gravitational pull.</li> <li>Everything is pulled to Earth by gravity. This causes unsupported objects to fall.</li> </ul> <p><b>Retrieval: Friction Oaks National Entry/Exit Questions</b></p> <p>Children to compare two falling objects, e.g. one heavy and one light. Draw the conclusion that objects of different weights fall at the same speed.</p> <p>Define gravitational pull and how larger objects have a stronger pull. Children to create a diagram and explain what would happen in a free fall frame containing different objects.</p>	<b>Pattern Seeking</b> <b>Comparative / Fair Testing</b> <b>How Does Air Resistance Affect the Speed at which and Object Falls?</b> <ul style="list-style-type: none"> <li>Know air resistance as a type of friction force that acts in the opposite direction to that of an object moving through the air.</li> <li>Know air resistance acts differently according to the area of the object moving through the air and the speed at which it is moving.</li> <li>Know that gravity pulls objects down and air resistance pushes upwards.</li> </ul> <p><b>Retrieval: What is gravity?</b></p> <p>Introduce term air resistance. Children to move around the playground to feel air resistance on different sized pieces of paper and fabric. Teacher to explain how air resistance links to area of the object.</p>	<b>. Working Scientifically TAPS</b>  <i>Spinners</i>  Explore: make and drop a spinner. In groups consider variables and formulate a question e.g. <i>How does the length of wing/number of paper clips/size of paper affect the time it takes to fall?</i> Group roles may be useful e.g. dropper, timer, recorder, fair test checker. Children design their own table to record measurements with a focus on how they can make their results more reliable – repeat the test and take an average.  Groups or individuals to draw graphs then discuss patterns and accuracy of results.	
	Working Scientifically	Plan a scientific enquiry to answer a question and decide on the variables to be controlled. Take accurate measurements using a force-meter. Use scientific diagrams to show the direction of forces. Report and present findings, drawing conclusions.	Identify the scientific evidence that has been used to support or refute ideas about gravity	Plan a scientific enquiry, making choices about the variables to be changed to test the impact of air resistance. Take accurate measurements and repeat readings.	Measure, taking repeated readings
	Organisation & Communication	Measurements Labelled diagram Conclusion Class planning sheet	Labelled diagrams Explanation sentences for free fall frame	Measurements Labelled diagram Conclusion Class planning sheet	Tables and graphs
	Reading & Maths Opportunities	Isaac Newton Mini Vipers Activity Graph	What is Gravity Reading Comprehension		Graph

Unit 1	Week 5	Week 6	Week 7	Week 8
Lesson Overview including Substantive knowledge	<p><b>Pattern Seeking</b> <b>What Changes the Effects of Water Resistance?</b></p> <ul style="list-style-type: none"> <li>Know water resistance is a push force that uses friction to slow things down as they move through water.</li> <li>Know upthrust pushes upwards against objects falling downwards in liquid; if the upthrust is equal to the weight of the object, the object will float.</li> <li>Know that objects with a smaller surface area move more quickly through water and those with a streamlined shape also displace less water so move more quickly through it.</li> </ul> <p><b>Retrieval: Definitions for friction, gravity and air resistance</b></p> <p>Introduce water resistance and upthrust and apply to images, explaining that different shaped objects and difference surface areas affect resistance. Pupils to explore using playdough, and will try to find the shape that travelled most quickly and the slowest. Children to have a boat race challenge. They will use a force meter to pull three different boats.</p>	<p><b>Pattern seeking</b> <b>What Impact do Gears, Levers and Pullys Have on Forces?</b></p> <ul style="list-style-type: none"> <li>Know we use simple machines when we need to turn large forces into smaller ones.</li> <li>Know that levers, pulleys and gears are simple machines that allow us to achieve tasks that require a lot of force.</li> </ul> <p>Discuss big forces and how machines might be needed for certain tasks. Share knowledge from DT about levers, pulleys and gears.</p> <p>Children to complete experiment for levers with the fulcrum being placed in different positions.</p> <p>Children to complete experiment for pulleys, investigating the force required to lift an object and the force if using a pulley.</p> <p>Children to use different sized gears to investigate different questions about force and speed.</p>	<p><b>Retrieval- BIG QUESTION</b></p> <p>Pupils will be producing an information page to detail what a force is as well as the benefits/uses of forces. This will include concept cartoons and pictures to promote discussion around what it would be like without forces.</p>	<p><b>REVIEWING</b></p> <p>Teachers to plan one additional week to address missing knowledge or remaining misconceptions. This lesson content and outcomes will vary between classes.</p>
Working Scientifically	<p>Use knowledge of water resistance to make predictions. Plan a scientific enquiry to test the effects of shape and surface area on water resistance. Measure speed and identify relationships between water resistance and shape.</p>	<p>Use diagrams and labels to show the direction of a range of forces. Explain causal relationships in the components of levers, gears and pulleys.</p>		
Organisation & Communication	<p>Recording force needed to move boat Annotated diagrams Explanation sentences</p>	<p>Annotated drawings Force tables</p>		
Reading & Maths Opportunities				

Unit 2 Science – The Earth, Sun or Moon – which is the odd one out? How do we get day and night, the seasons and climates?		
National Curriculum Links	Disciplinary Knowledge (Working Scientifically)	Key Vocabulary
<b>Earth and Space</b> <ul style="list-style-type: none"> <li>describe the movement of the Earth and other planets relative to the sun in the solar system</li> <li>describe the movement of the moon relative to the Earth</li> <li>describe the sun, Earth and moon as approximately spherical bodies</li> <li>use the idea of the Earth’s rotation to explain day and night and the apparent movement of the sun across the sky</li> </ul>	<ul style="list-style-type: none"> <li>Recognise when secondary sources can answer a question which cannot be answered in practical work.</li> <li>Identifying scientific evidence that has been used to support or refute ideas or arguments</li> <li>Make decisions about when to take readings or make adjustments to the plan in order to get accurate data.</li> </ul>	<b>Tier 2:</b> Earth, sun, moon, planet, star, solar system, rotate, seasons, shadows, position, 24 hours, daytime, night-time  <b>Tier 3:</b> orbit, atmosphere, scale, heliocentric, geocentric, planetary movement, axis, Goldilocks zone
<b>Pupil Offer</b>	<b>Famous People</b>	
	Tim Peake Nicolaus Copernicus	

Unit 2	Week 1/2	Week 3/4	Week 5
	<p style="text-align: center;"><b>Other</b></p> <p style="text-align: center;"><b>How Does Our Position in The Solar System Impact Life on Earth?</b></p> <ul style="list-style-type: none"> <li>Know that the Earth orbits the sun whilst spinning on its axis.</li> <li>Know that the moon orbits Earth. It is not a light source but reflects light from the sun.</li> <li>Know that the position of Earth in the solar system is ideal for supporting life on Earth.</li> </ul> <p style="text-align: center;"><b>Retrieval: Y3 - shadows</b></p> <p>Explain key points of the sun and moon. Use terminology ‘approximately spherical bodies’.</p> <p>Pupils will be proving the shape of the Earth using scientific research.</p> <p>Show children simplified videos of sun and moon orbits while Earth is also rotating. Children to make a model to help them remember this.</p> <p>Introduce and discuss the goldilocks zone</p>	<p style="text-align: center;"><b>Research</b></p> <p style="text-align: center;"><b>Does Anything Else Orbit the Sun?</b></p> <ul style="list-style-type: none"> <li>Know the names and order of the planets in the solar system.</li> <li>Know the sun is at the centre of the solar system (which is a model called heliocentrism).</li> <li>Know some facts about the planets in the solar system.</li> </ul> <p><b>Retrieval: Prior knowledge about planets</b></p> <p>Introduce terms geocentric and heliocentric. Ask children questions about why and how science changed the model of the universe.</p> <p>Look at the names of the planets and consider different methods to remember their order. Can they notice anything that would make life more difficult on other planets (e.g. heat)</p> <div style="border: 1px solid blue; padding: 5px; margin: 10px 0;"> <p style="text-align: center;"><b>Working Scientifically TAPS</b></p> <p style="text-align: center;"><i>Solar System Research (Review)</i></p> <p>Use an animation, photo or video clip to begin a discussion about our solar system. Raise questions about different planets in our solar system e.g. movement, relative movement, size etc.</p> <p>Provide books or access to the internet. Help to phrase search questions.</p> <p>How will you share your research? Agree options e.g. labelled diagram or model, information leaflet, drama, animation, presentation etc.</p> <p>Small groups could research different planets or different features. Present/share outcomes with rest of the class.</p> <p>Groups could peer assess against agreed success criteria e.g. clarity.</p> </div> <p>Children to make a hanging model of the solar system, trying to show the different sizes.</p>	<p style="text-align: center;"><b>Other</b></p> <p style="text-align: center;"><b>How Do We Get Night And Day?</b></p> <ul style="list-style-type: none"> <li>Know the Earth rotates constantly, and a full rotation takes 24 hours. When our part of the Earth is facing the sun, it is daytime, but we keep rotating until we are facing away from the sun, and this is night time.</li> <li>Know that the tilt of Earth leads to the changes in seasons.</li> </ul> <p><b>Retrieval: Orbits and rotations of Earth, Sun, Moon and Year 1 – seasonal change</b></p> <p>Discuss differences between day and night. Watch videos to deepen understanding and explain that we get day and night due to the rotation of the Earth. Children to use torches and globes to see this practically.</p> <p>Explain that the tilt of the planet gives us seasons. Children to watch and identify if the selected country is in a warmer or colder season.</p> <p>Role play to be used to explain night and day, and seasons.</p>
Lesson Overview including Substantive knowledge			
Working Scientifically	Create a model to understand the movement of Earth in relation to the sun and moon.	Identify scientific evidence that has been used to support or refute ideas or arguments e.g. heliocentric universe. Use secondary sources to find out information about planets in the solar system. Create a to-scale model of the Solar System to understand distances and sizes. Report and present findings from enquiries using appropriate scientific language	Use a model to understand the movement of the Earth
Organisation & Communication	Models to be stored in books or photographed	Research presented in table or poster Hanging solar system	Video of role play
Reading & Maths Opportunities	Introduction to the solar system- Micro Viper Our Solar System	Literacy Shed Plus Stage 5 – The Planets (Explanation text focused on vocabulary)	

Unit 2	Week 6	Week 7	Week 8
Lesson Overview including Substantive knowledge	<p style="text-align: center;"><b>Pattern Seeking</b></p> <p style="text-align: center;"><b>How Can Shadows Show Us That Earth Is Rotating?</b></p> <ul style="list-style-type: none"> <li>Know that shadows change throughout the day as the earth rotates on its axis.</li> <li>Know that the length of shadows varies based on the position of the sun.</li> </ul> <p><b>Retrieval: Day and night and Y3 – shadow lengths</b>            Explain that children will complete a task to measure shadows over the day (note: this was done more simply in Year 3, so the conclusion linking to the Earth's rotation is vital)            Children should plot this on a line graph. Following a discussion, they should write what the line tells them. Discuss as a class how shadows tell us that the Earth is rotating.</p>	<p style="text-align: center;"><b><u>BIG QUESTION ANSWER</u></b></p> <p>Children to list as many reasons as they can about which one is the odd one out: Earth, Sun or Moon. Children can then debate this in small groups.</p> <p>Children to create a knowledge organiser for other details learned in this topic. Their knowledge organiser should also include diagrams and definitions of key vocabulary.</p>	<p style="text-align: center;"><b><u>REVIEWING</u></b></p> <p>Teachers to plan one additional week to address missing knowledge or remaining misconceptions. This lesson content and outcomes will vary between classes.</p>
Working Scientifically	Plan a pattern-seeking investigation to identify how shadows change throughout the day. Take accurate measurements and record results in a table of their own design. Present data in a line graph and identify the pattern. Draw conclusions from this pattern and link this to historic views of the movement of the Earth and sun.		
Organisation & Communication	Recording tables Line graph Concluding sentence	Green slips or videos of debates Knowledge organiser	
Reading & Maths Opportunities	Statistics- recording data (line graph)		





### Unit 3 Science – How are materials different and how do materials change?

National Curriculum Links	Disciplinary Knowledge (Working Scientifically)	Key Vocabulary
<p><b>Properties of Materials</b></p> <ul style="list-style-type: none"> <li>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</li> <li>Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution</li> <li>Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating</li> <li>Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic</li> <li>Demonstrate that dissolving, mixing and changes of state are reversible changes</li> <li>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</li> </ul>	<ul style="list-style-type: none"> <li>Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary</li> <li>Use scales which involve decimal measurements</li> <li>Communicate their findings using relevant scientific language and illustrations.</li> </ul>	<p><b>Tier 2:</b> material, mixture, burning, rust</p> <p><b>Tier 3:</b> thermal, conductor, insulator, transference, independent/dependent/controlled variable, dissolve, solid, liquid, gas, states of matter, solution, filtration, sieving, evaporation, permeable, vapour, particles, irreversible, chemical changes, acid</p>
<b>Pupil Offer</b>	<b>Famous People</b>	
	Hugh Bradner Albert Einstein	



Unit 3	Week 1	Week 2	Week 2	Week 3	
Lesson Overview including Substantive knowledge	<p><b>Comparative / Fair Testing</b></p> <p><b>What Material Is Most Effective in Keeping a Cup of Tea Warm?</b></p> <ul style="list-style-type: none"> <li>Compare and group together everyday materials on the basis of their properties, including thermal conductivity.</li> </ul> <p><b>Retrieval: Year 1, 2, 4 Materials and their properties</b></p> <p>Children to feel cups made from different materials, all holding warm water. Ask pupils what they notice. Introduce word thermal conductor and link to knowledge in electricity about electrical conductors. Repeat with insulator. Children to identify which cups were good thermal conductors and which were insulators. Children to create a plan to test which material would be the best at insulating. Children to record this on a line graph. They will write a sentence to explain what they think it is showing.</p>	<p><b>Comparative / Fair Testing</b></p> <p><b>What Materials Make the Best Thermal Insulators?</b></p> <ul style="list-style-type: none"> <li>Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including thermal conductivity and thermal insulation.</li> </ul> <p><b>Retrieval: vocabulary and Year 2 – suitability of materials</b></p> <p>Children to plan experiment to stop an ice cube from melting. Explain the role of different variables within the experiment. Children should identify that the materials with air pockets are the best and explain that this is because air is a poor conductor of heat. Discuss the real-world applications of insulation in a variety of contexts. Provide children a concept cartoon around building a snowman. Children to explain their answers in relation to conductors and insulators of heat.</p>	<p><b>Comparative / Fair Testing</b></p> <p><b>When We Change a Material, Is It Always Forever?</b></p> <ul style="list-style-type: none"> <li>Know that dissolving and changes of state are reversible changes.</li> <li>Know that some materials will dissolve in liquid to form a solution.</li> <li>Know that the process of evaporation can be used to help recover a substance from a solution.</li> </ul> <p><b>Retrieval: Year 4 – Solid, liquid, gas</b></p> <p>Discuss how water changing states is a reversible change. Explain other examples such as mixing and dissolving of sugar in water. Introduce term solution. Demonstrate dissolving a spoon of salt in water and discuss how we know it is still there. Ask children what might affect how well sugar dissolves. Children to complete experiment to find out whether the temperature affects the time it takes. Afterwards, children to share answers and discuss whether the test was fair, accurate and reliable.</p> <div style="border: 1px solid black; padding: 5px;"> <p><b>Working Scientifically TAPS</b></p> <p><i>Dissolving (Plan)</i></p> <p>Ask children to think of everyday example of dissolving solids in water (e.g. sugar in tea, salt in cooking water). Ask them to suggest ways of making the sugar dissolve faster (e.g. stirring, temperature of the water, size of sugar grains, volume of water). Ask them to choose a factor to investigate and to plan a fair test. Post it planners or planning boards could be used to focus on types of variable. Carry out tests and discuss outcomes.</p> </div>		
	Working Scientifically	Understand how to take measurements using a thermometer with increasing accuracy. Decide how to measure which cup is the best thermal insulator. Use the information from line graphs to draw conclusions	Use previous test results (from enquiry 1) to make a prediction to set up further fair tests. Plan an enquiry (fair test) answer a question, including recognising and controlling variables. Record, report and present findings.	Plan a fair test, recognising and control the variables. Use a thermometer increasingly accurately. Understand why scientists take repeat reading. Report and present findings, explaining how accurate and reliable their results are. Plan a scientific enquiry to answer a question recognising & controlling variables	
	Organisation & Communication	Post it note plans Line graphs Concluding sentences	Post it note plan Measurements taken Conclusion sentences	Results grid	
	Reading & Maths Opportunities	Statistics- recording data (line graph)		Measurements & reading scales (thermometer)	

Unit 3	Week 4	Week 5	Week 6	Week 7
Lesson Overview including Substantive knowledge	<p><b>Problem Solving</b></p> <p><b>How Can We Separate a Mixture?</b></p> <ul style="list-style-type: none"> <li>Know that mixing is a reversible change.</li> <li>Know how to separate mixtures using filtering, sieving, evaporating and using magnets.</li> </ul> <p><b>Retrieval: reversible changes</b></p> <p>Show children different filters, sieves, funnels and muslin. Ensure children know what they do. Demonstrate rice and salt together and how sieving can separate. Mixing is always reversible. Show coffee grains or sand and water. Demonstrate filtering. Mix sugar, sand and water. Discuss evaporation. Children to be presented with a number of different stations to practise filtration, sieving and evaporation (Evaporation subject to risk assessment)</p>	<p><b>Problem Solving</b></p> <p><b>When Does a Change Make a New Material?</b></p> <ul style="list-style-type: none"> <li>Know that some changes which materials undergo are not reversible and often result in the formation of a new material.</li> <li>Know that these new materials can be useful, but also the changes can be problematic.</li> </ul> <p><b>Retrieval: sieving, filtering, evaporation</b></p> <p>Introduce non-reversible changes. Show video of an egg cooking and have children describe verbally the changes that they see. Repeat with match burning and objects rusting. Children to observe bicarbonate of soda with vinegar or lemon juice. Then repeat with a balloon to see the gas being produced.</p>	<p><b>BIG QUESTION ANSWER</b></p> <p>Pupils will be presented with groups of items. They will then need to talk about the different characteristics in turn. They will write a letter to Michael (Kensuke's Kingdom) on how this will help them stay alive on a desert island. The letter should also talk about non-reversible changes covered in the unit.</p>	<p><b>REVIEWING</b></p> <p>Teachers to plan one additional week to address missing knowledge or remaining misconceptions. This lesson content and outcomes will vary between classes.</p>
Working Scientifically	Plan and carry out a scientific enquiry to answer the question: How can we separate a mixture? Report and present findings from enquiries, including conclusions, in oral and written forms.	Report using first-hand observations and findings from demonstrations in written forms.		
Organisation & Communication	Written explanation to accompany photographs of how they separated the material	Diagrams with explanation of what is happening within the balloon		
Reading & Maths Opportunities				





Unit 4 Science – Are lifecycles all the same?		
National Curriculum Links	Disciplinary Knowledge (Working Scientifically)	Key Vocabulary
<b>Living Things and their Habitats</b> <ul style="list-style-type: none"> <li>describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird</li> <li>describe the life process of reproduction in some plants and animals</li> </ul>	<ul style="list-style-type: none"> <li>Recognise when secondary sources can answer a question which cannot be answered in practical work.</li> <li>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</li> </ul>	<b>Tier 2:</b> lifecycle, natural world, expertise, observe, document, study  <b>Tier 3:</b> stages of development, sexual, asexual, reproduction, larvae, embryo, metamorphosis, naturalist, sexual/ asexual reproduction, pistal/carpel, stigma, style, ovary, stamen, anther, nectar, pollen, pollination, fertilisation, dispersal, tuber, bulb, runner, clone, vegetative propagation, sperm, egg, external/internal fertilisation
Pupil Offer	Famous People	
Life cycle observation – Stick Insects eggs	Jane Goodall Gregor Mendel	

Unit 4	Week 1	Week 2	Week 3	Week 3
	<b>Research</b> <b>Are There Any Differences Between the Lifecycles of Mammals, Amphibians, Insects and Birds?</b> <ul style="list-style-type: none"> <li>Know that reproduction of living things is either sexual or asexual.</li> <li>Know that sexual reproduction requires male and female cells to combine. Asexual reproduction refers to the fact that a male and female are not required and, instead, an identical copy is made of the 'parent'.</li> <li>Know the life cycles of a mammal, amphibian, insect and bird.</li> </ul> <b>Retrieval: Year 4 – characteristics of mammals, amphibians, birds and insects. Year 2 – lifecycle of a butterfly</b> Explore vocabulary life cycle as the different stages of life for all living things. Provide the lifecycle of a mammal, e.g. dog and discuss the different stages. Repeat with an amphibian, e.g. frog. Children to record similarities and differences between these two lifecycles. Repeat with insects e.g. butterfly. Compare similarities and differences again. Repeat for a bird, e.g. sparrow. Compare again. Share a prefilled grid and have children check the found all key areas.	<b>Research</b> <b>How Can We Behave Like Naturalists?</b> <ul style="list-style-type: none"> <li>Know that naturalists study living things in a range of worlds.</li> <li>Know David Attenborough and Jane Goodall are famous naturalists who have dedicated their lives to finding out about living things, filming them and educating us.</li> </ul> Consider term naturalist. Ask children to retrieve information about David Attenborough. Children to be told about Jane Goodall and spend a short time researching them. Children to have opportunity to raise questions about lifecycles in our own local area. Children should identify one to work on and how they intend to find the answer.	<b>Research</b> <b>What Is Sexual Reproduction in Plants?</b> <ul style="list-style-type: none"> <li>Know the process of sexual reproduction in flowering plants</li> </ul> <b>Retrieval: Year 2 plants growing from seeds and bulbs, and 3 plants of flowers including pollination</b> Consider why it is important for living things to reproduce and talk about need for species to survive. Explain terms sexual reproduction and asexual reproduction. Use a labelled diagram to talk through the process of reproduction in a flower. Children to look at which flowers bloom in the different months. This can be observed and compared to flowers in the school grounds.	<b>Working Scientifically TAPS</b>  <b>Seed Dispersal</b>  Identify an area to visit in the school grounds or local area that will have a variety of grasses and bushes/trees. Can look at seed dispersal in summer or autumn (could swap to variety of winter buds or spring flowers to consider other parts of life cycle). Recap the life cycle of flowering plants, discussing how and why seeds are dispersed. Consider what could be seen in the local area e.g. likely to be more wind or animal dispersal? Collect data about seed dispersal in the local area e.g. drawings or photos for later sorting into wind or animal dispersal. Free seasonal spotter sheets from the Woodland Trust <a href="#">here</a> (although developing an appreciation for the variety of grasses and seeds etc may be more important than naming them at this stage). Discuss and compare findings, perhaps collating results as a class in an appropriate way e.g. examples on wall display or bar charts if tallied frequencies.
Lesson Overview including Substantive knowledge				
Working Scientifically	Compare and contrast life cycles of different animals to identify similarities and differences.	Ask questions about the local area and plan different types of scientific enquiries to answer them, including recognising and controlling variables where necessary. Report and present findings from the enquiry. Understand the considerations when working as a naturalist, e.g. taking care of the area whilst researching	Plan an enquiry to monitor and observe which plants flower at different times of the year. Label diagrams using a range of scientific language related to reproduction in plants	Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables and bar graphs
Organisation & Communication	Comparison paragraphs	Research sheets or paragraphs	Labelled diagram of flower Explanation sentences	
Reading & Maths Opportunities	Literacy Shed Plus S5- Life cycle comparison (explanation text with retrieval focus)		Literacy Shed Plus S5 – Lifecycle of a flowering plant (Explanation text with	Maths- Statistics Link and different ways of recording data collected.

Unit 4	Week 4	Week 5	Week 6	Week 7
Lesson Overview including Substantive knowledge	<p><b>Problem Solving</b> <b>Observation over time</b> <b>Can Plants Reproduce Without Seeds?</b></p> <ul style="list-style-type: none"> <li>Know that in asexual reproduction, only one parent is needed to reproduce a copy of the parent.</li> <li>Know that some plants can grow new plants from bulbs, runners and tubers.</li> <li>Know that in asexual reproduction, the plants are a clone of their parents.</li> </ul> <p>Show images of different plants below the soil level, e.g. onion bulb and potato plant tuber. Compare asexual reproduction to sexual reproduction. Children to learn more about asexual reproduction by discussing cuttings of plants. Children to start experiments to see if they can grow new plants from different parts of the parent plant and will need to observe these over the next weeks.</p>	<p><b>Observation over time</b> <b>Do All Animals Reproduce in The Same Way?</b></p> <ul style="list-style-type: none"> <li>Know that sexual reproduction is the fertilisation of female sex cells (eggs) by male sex cells (sperm).</li> <li>Fish, amphibians, birds and reptiles produce eggs.</li> <li>Mammals produce live young.</li> <li>Some animal groups (fish and amphibians) reproduce through external fertilisation.</li> <li>Some animal groups (mammals, birds, reptiles) reproduce through internal fertilisation</li> </ul> <p>Explain that fertilisation is essential for the living things to grow; and briefly state that it will gain characteristics from both parents. Sometimes fertilisation happens internally and sometimes externally. Children to think of animals for each type of fertilisation, and could research this further. Discuss reasons for each.</p>	<p><b>BIG QUESTION ANSWER</b></p> <p>Pupils will compare life cycles using Venn Diagrams. They will be given life cycles to compare from different animal groups. They can then use this to answer the question by identifying areas that are the same and those that are different. Children can be extended by offering research opportunities into whether lifecycles are the same in different climates.</p>	<p><b>REVIEWING</b></p> <p>Teachers to plan one additional week to address missing knowledge or remaining misconceptions. This lesson content and outcomes will vary between classes.</p>
Working Scientifically	<p>Plan a scientific enquiry to answer questions about which parts of a plant will lead to asexual reproduction. Form a hypothesis and then try to grow new plants from different parts of the parent plant, using knowledge of how plants grow and reproduce. Control variables e.g. amount of water and location of pots. Choose how to record findings – this does not need to be in a table and could be photos, diagrams, measurements. Use measurements and observation to record data and results through diagrams or accurate measurements. Devise a conclusion about asexual reproduction in plants</p>	<p>Build a classification diagram Use scientific language to write a description of a scientific process.</p>		
Organisation & Communication	Paragraph to explain sexual reproduction, with diagram	Classification key for external and internal fertilisation, with accompanying explanation sentences	Venn diagrams Research findings in notes	
Reading & Maths Opportunities			Venn diagram – sorting and classifying	

Unit 5 Science – How do humans change throughout their life?		
National Curriculum Links	Disciplinary Knowledge (Working Scientifically)	Key Vocabulary
<b>Animals, Including Humans</b> <ul style="list-style-type: none"> <li>Describe the changes as humans develop to old age</li> </ul>	<ul style="list-style-type: none"> <li>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</li> </ul>	<p><b>Tier 2:</b> toddler, stages, lifecycle, puberty, pubic hair, breasts, periods, womb, chemical, mass</p> <p><b>Tier 3:</b> embryo, foetus, adolescent, hormones, genes, DNA, oestrogen, testosterone, pituitary gland, reproduction, menstruation, gestation period, viviparous, zygote</p>
Pupil Offer		Famous People
		Rosalind Franklin Alexander Fleming

Unit 5	Week 1	Week 2	Week 3	Week 3
Lesson Overview including Substantive knowledge	<p style="text-align: center;"><b>Research</b> <b>How Do Humans Change Over Time?</b></p> <ul style="list-style-type: none"> <li>Know that the human life cycle has many stages: embryo, foetus, toddler, child, adolescent, adult, older adult</li> </ul> <p style="text-align: center;"><b>Retrieval: Children to organise photos of adults in order from youngest to oldest.</b></p> <p>Show lifecycle of human and ask children to name the following stages. Provide children with rough ages. Children to be shown a timeline, and ask children to create their own which correctly shows that some of the stages last longer than others. Children to add a table underneath, or labels, to add information about what a human can do in the stages. Ask children how they can find out what people can do in the stages of life they have not reached personally yet. Children to write questions they would like to find out the answers to about the different life stages and provide children with opportunities to find these out in person. Key information to be given to children to be added at the end if missed through interviews. These people to be added to their timelines, and information added to their tables.</p>		<p style="text-align: center;"><b>Fair / Comparative Testing</b> <b>Pattern seeking</b> <b>How Can We Investigate Changes as We Progress Through the Lifecycle?</b></p> <ul style="list-style-type: none"> <li>Know some of the ways that humans will change as they pass through the different stages of their life cycle.</li> </ul> <p>Ask children 'If you are older, do you have a bigger head circumference?' How could we find out the answer to this? Children to conduct the experiment and record the results. When comparing at the end of the lesson, children to look for patterns and unexpected results. Line graphs to be drawn and analysed. Note that this will be more lead that the TAPs activity this week – to enable TAPs to be fully independent.</p>	<p style="text-align: center;"><b>Working Scientifically TAPS</b> <i>Growth Survey</i></p> <p>What could we measure to show how humans develop as they grow older? Groups decide e.g. forearm length, arm span, foot length, etc. Discuss how we could measure this and the number of children/adults we would need to measure. How accurate do our measurements need to be? Decide on how many decimal places or unit. Ensure that children understand that they also need to record the age of the person. Children go to different year groups to measure specified number of children. Bring data together to create class table. Ask groups to create scatter graphs to present the data, can use ICT to do this.</p>
	Working Scientifically	<p>Know that scientists may have to use interviews to find out information. Decide which questions to ask that will give them the information that they need. Record and summarise interview responses</p>		<p>Know that scientists ask questions to prove hypothesis and plan enquiries so that results can be analysed: ask questions about changes in humans over time. Plan a scientific enquiry, deciding own method and way of recording. Take measurement with accuracy using appropriate equipment. Take repeat readings when appropriate. Record data and produce a line graph to display the results. Identify causal relationships and present findings from investigations about how we grow</p>
Organisation & Communication	Timeline and grid of activities Research notes		Line graphs and paragraph to explain findings	
Reading & Maths Opportunities	Literacy Shed Plus-Stages if Human Life (Information Text)		Line Graph	Measurements using decimals and recording statistics

Unit 5	Week 4	Week 5	Week 6	Week 7
Lesson Overview including Substantive knowledge	<p style="text-align: center;"><b>Research</b></p> <p style="text-align: center;"><b>What Happens to Us During Puberty?</b></p> <ul style="list-style-type: none"> <li>Know the physical and emotional changes that occur during puberty</li> </ul> <p>Discuss, and use appropriate videos, what puberty is. Children to make notes. As they will already have information about this, they could make pre and post discussion mind maps. Children to compare changes to boys and girls in a Venn diagram. Discuss why there is a need to go through puberty.</p>	<p style="text-align: center;"><b>Pattern seeking</b></p> <p style="text-align: center;"><b>What Can the Size of Animals Tell Us About Gestation Periods?</b></p> <ul style="list-style-type: none"> <li>Know the human gestation period is 9 months.</li> <li>Know that all mammals have gestation periods because they give birth to live young.</li> <li>Generalise that the larger the animal, the longer the gestation period</li> </ul> <p style="text-align: center;"><b>Retrieval: Prior Unit Mammal Lifecycle</b></p> <p>Introduce term gestation. Watch age-appropriate video of humans developing in the womb to allow children to explain the term in their own words. Children to share thoughts about gestation periods in other animals. Present children with the idea that an elephant has a longer gestation because it is larger. Provide children with a table that they can fill in with research about the elephant and other animals. Children to explain why this information is important to scientists.</p>	<p style="text-align: center;"><b><u>BIG QUESTION ANSWER</u></b></p> <p>Pupils will be producing a short documentary film to share the different stages of the human life cycle. Within this film, they will share information about what a human does at this point, as well as information about the growth of body parts and puberty. They should include facts about the gestation of different animals. Children will need to use some pictures to talk about, but can act out some of the different age ranges.</p>	<p style="text-align: center;"><b><u>REVIEWING</u></b></p> <p>Teachers to plan one additional week to address missing knowledge or remaining misconceptions. This lesson content and outcomes will vary between classes.</p>
	Working Scientifically	<p>Categorise changes according to whether they happen to males or females. Understand that scientists classify in this way to help them understand how living things work, how they are related and how knowledge can be applied to unknowns. Use venn diagrams to show similarities and differences</p>	<p>Know that scientists often look for patterns in data to come up with rules which helps them to understand unknowns. This involves collecting data and identifying patterns. Know that scientists can monitor gestation periods. They can also use secondary sources to find out information. Know that scientists can use patterns to estimate. Pupils will research, record findings in the form of data and analyse them to come up with rules to support estimations</p>	
Organisation & Communication	Venn Diagrams	Annotated drawings Force tables		
Reading & Maths Opportunities				