



# BECOMING A SCIENTIST



## Essential Characteristics:

- The ability to think independently and raise questions about working scientifically and the knowledge and skills that it brings.
- Confidence and competence in the full range of practical skills, taking the initiative in, for example, planning and carrying out scientific investigations.
- Excellent scientific knowledge and understanding which is demonstrated in written and verbal explanations, solving challenging problems and reporting scientific findings.
- High levels of originality, imagination or innovation in the application of skills.
- The ability to undertake practical work in a variety of contexts, including fieldwork.
- A passion for science and its application in past, present and future technologies.



## Subject Leaders Skills and Concepts Layering Plan for Science 2019

Throughout the science curriculum for UKS2, the following **working scientifically** key milestones will be implemented within each science topic:

- Plan enquiries, including recognising and controlling variables where necessary.
- Use appropriate techniques, apparatus, and materials during fieldwork and laboratory work.
- Take measurements, using a range of scientific equipment, with increasing accuracy and precision.
- Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, bar and line graphs, and models.
- Report findings from enquiries, including oral and written explanations of results, explanations involving causal relationships, and conclusions.
- Present findings in written form, displays and other presentations.
- Use test results to make predictions to set up further comparative and fair tests.
- Use simple models to describe scientific ideas, identifying scientific evidence that has been used to support or refute ideas or arguments.

| Key stage Two              | National Curriculum Coverage | Keys Milestones                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Key activities                                                                                                                                                                                  |
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| Year A Topics              |                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                 |
| Time Travellers            | Evolution                    | <ul style="list-style-type: none"> <li>• recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago</li> <li>• recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents</li> <li>• identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.</li> </ul> | <p>Design an animal/plant to survive in a given environment</p> <p>Study characteristics of animals/plants for adaption for given environments.</p> <p>Study of fossils -close observations</p> |
| Out of this World/Galactic | Space and the Solar system   | <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> </ul>                                                                                                                                                                                                                                                                                                                                                           | <p>Create scaled representations of the solar system</p>                                                                                                                                        |

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|                     | Forces    | <ul style="list-style-type: none"> <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> <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> | <p>Paint planets from the solar system using known images eg NASA</p> <p>study – changes in own shadows across the day. Draw on the playground and measure, redraw at key times.</p> <p>Newton measurers – weights and how many Newtons to create N of force?<br/>Friction/show investigation – which surface creates least/most friction?<br/>How many N?<br/>Parachute investigation – which size parachute creates least/most air resistance.<br/>Boat investigation – which shape boat creates least/most air resistance?</p> |
| Carnivals           | Light     | <ul style="list-style-type: none"> <li>recognise that light appears to travel in straight lines</li> <li>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</li> <li>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</li> <li>use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.</li> </ul>                                                                                                                                                                   | <p>Shadow puppet theatre – changes to shadow size when near/far from light source</p> <p>Split white light using water and bubbles – draw colours seen in bubbles</p> <p>Create a periscope – reflecting light in straight lines</p>                                                                                                                                                                                                                                                                                              |
| Year B Topics       |           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Sandbags and Sirens | Materials | <ul style="list-style-type: none"> <li>Compare and group together everyday materials on the basis of their properties, including their</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Recycling challenge – sort recycled materials into groups based on properties and uses                                                                                                                                                                                                                                                                                                                                                                                                                                            |

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|                 |                                   | <p>hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets</p> <ul style="list-style-type: none"> <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> | <p>Materials soup – separate a mixture of materials using a range of filters and sieves</p> <p>Salt evaporation – salt solution left evaporate. Study what is left behind.</p>                                                                                                                                                 |
| Wonderful World | Humans and other animals/habitats | <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> <li>• 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</li> <li>• give reasons for classifying plants and animals based on specific characteristics.</li> <li>• Describe the changes as humans develop to old age.</li> </ul>                                                                                                                                                                                                                                                                                                                                | <p>Life cycle comparisons</p> <p>Study of plants and reproduction – label parts of flowers</p> <p>Gestation gurus – research gestation periods of animals including humans</p> <p>Human timeline of 6 key stages – create visual representation</p> <p>Labelled diagrams of human body<br/>Dissection of an animal's heart</p> |

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|                   |             | <ul style="list-style-type: none"> <li>• identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood</li> <li>• recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function</li> <li>• describe the ways in which nutrients and water are transported within animals, including humans.</li> </ul>                                 | Design a healthy lifestyle                                                                                                                                                                                          |
| We can be heroes! | Electricity | <ul style="list-style-type: none"> <li>• associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit</li> <li>• 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</li> <li>• use recognised symbols when representing a simple circuit in a diagram.</li> </ul> | <p>Dragon Dens activity to be designers and create festive lights</p> <p>Carry out simple circuit challenges<br/>Draw and annotate circuits with dimmers, switches, bulbs and record findings of brightness etc</p> |