

## Cunningham Hill Junior School - Science Overview

### 'Working Scientifically' Science Skill Progression for Lower school and Upper school.

#### Year 3

#### Year 4

#### Year 5

#### Year 6

##### Lower key stage 2 programme of study (statutory requirements)

- During years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:
- asking relevant questions and using different types of scientific enquiries to answer them
- setting up simple practical enquiries, comparative and fair tests
- making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
- gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
- recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
- reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
- identifying differences, similarities or changes related to simple scientific ideas and processes
- using straightforward scientific evidence to answer questions or to support their findings.

##### **Notes and guidance (non-statutory)**

Pupils in years 3 and 4 should be given a range of scientific experiences to enable them to raise their own questions about the world around them. They should start to make their own decisions about the most appropriate type of scientific enquiry they might use to answer questions; recognise when a simple fair test is necessary and help to decide how to set it up; talk about criteria for grouping, sorting and classifying; and use simple keys. They should begin to look for patterns and decide what data to collect to identify them. They should help to make decisions about what observations to make, how long to make them for and the type of simple equipment that might be used. They should learn how to use new equipment, such as data loggers, appropriately. They should collect data from their own observations and measurements, using notes, simple tables and standard units, and help to make decisions about how to record and analyse this data. With help, pupils should look for changes, patterns, similarities and differences in their data in order to draw simple conclusions and answer questions. With support, they should identify new questions arising from the data, making predictions for new values within or beyond the data they have collected and finding ways of improving what they have already done. They should also recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations. Pupils should use relevant scientific language to discuss their ideas and communicate their findings in ways that are appropriate for different audiences. These opportunities for working scientifically should be provided across years 3 and 4 so that the expectations in the programme of study can be met by the end of year 4. Pupils are not expected to cover each aspect for every area of study.

##### During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- 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
- recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, and bar and line graphs
- using test results to make predictions to set up further comparative and fair tests
- using simple models to describe scientific ideas
- reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of 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.

##### **Notes and guidance (non-statutory)**

Pupils in years 5 and 6 should use their science experiences to: explore ideas and raise different kinds of questions; select and plan the most appropriate type of scientific enquiry to use to answer scientific questions; recognise when and how to set up comparative and fair tests and explain which variables need to be controlled and why. They should use and develop keys and other information records to identify, classify and describe living things and materials, and identify patterns that might be found in the natural environment. They should make their own decisions about what observations to make, what measurements to use and how long to make them for; choose the most appropriate equipment to make measurements and explain how to use it accurately. They should decide how to record data from a choice of familiar approaches; look for different causal relationships in their data and identify evidence that refutes or supports their ideas. They should use their results to identify when further tests and observations might be needed; recognise which secondary sources will be most useful to research their ideas and begin to separate opinion from fact. They should use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas and should talk about how scientific ideas have developed over time. These opportunities for working scientifically should be provided across years 5 and 6 so that the expectations in the programme of study can be met by the end of year 6. Pupils are not expected to cover each aspect for every area of study.

### Topics Covered in each year group:

#### Year 3

#### Year 4

#### Year 5

#### Year 6

##### **Plants**

- I can identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers
- I can explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant
- I can investigate the way in which water is transported within plants
- I can explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.

##### **Living things and their habitats**

- I can identify and name a variety of living things (plants and animals) in the local and wider environment, using classification keys to assign them to groups
- I can recognise that environments can change and that this can sometimes pose dangers to living things.

##### **Living things and their habitats**

- I can explain the differences in the life cycles of a mammal, an amphibian, an insect and a bird
- I can describe the life process of reproduction in some plants and animals.

##### **Living things and their habitats**

- I can describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals
- I can give reasons for classifying plants and animals based on specific characteristics.

##### **Animals, including humans**

- I can identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat
- I can identify that humans and some other animals have skeletons and muscles for support, protection and movement.

##### **Animals, including humans**

- I can describe the simple functions of the basic parts of the digestive system in humans
- I can identify the different types of teeth in humans and their simple functions
- I can construct and interpret a variety of food chains, identifying producers, predators and prey.

##### **Animals, including humans**

- I can describe the changes as humans develop to old age.

##### **Animals, including humans**

- I can identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood
- I can recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function
- I can describe the ways in which nutrients and water are transported within animals, including humans.

<p><b>Rocks</b></p> <ul style="list-style-type: none"> <li>I can compare and group together different kinds of rocks on the basis of their appearance and simple physical properties</li> <li>I can describe in simple terms how fossils are formed when things that have lived are trapped within rock</li> <li>I can recognise that soils are made from rocks and organic matter.</li> </ul>	<p><b>States of matter</b></p> <ul style="list-style-type: none"> <li>I can compare and group materials together, according to whether they are solids, liquids or gases</li> <li>I can observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C)</li> <li>I can identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.</li> </ul>	<p><b>Properties and changes of materials</b></p> <ul style="list-style-type: none"> <li>I can 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>I can understand that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution</li> <li>I can use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating</li> <li>I can give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic</li> <li>I can demonstrate that dissolving, mixing and changes of state are reversible changes</li> <li>I can 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><b>Evolution and inheritance</b></p> <ul style="list-style-type: none"> <li>I can 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>I can recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents</li> <li>I can identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.</li> </ul>
<p><b>Light</b></p> <ul style="list-style-type: none"> <li>I can notice that light is reflected from surfaces</li> <li>I can find patterns in the way that the size of shadows change.</li> </ul>	<p><b>Sound</b></p> <ul style="list-style-type: none"> <li>I can identify how sounds are made, associating some of them with something vibrating</li> <li>I can find patterns between the pitch of a sound and features of the object that produced it</li> <li>I can find patterns between the volume of a sound and the strength of the vibrations that produced it</li> </ul>	<p><b>Earth and Space</b></p> <ul style="list-style-type: none"> <li>I can describe the movement of the Earth, and other planets, relative to the Sun in the solar system</li> <li>I can describe the movement of the Moon relative to the Earth</li> <li>I can describe the Sun, Earth and Moon as approximately spherical bodies</li> <li>I can use the idea of the Earth's rotation to explain day and night.</li> </ul>	<p><b>Light</b></p> <ul style="list-style-type: none"> <li>I can understand that light appears to travel in straight lines</li> <li>I can 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>I can 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>I can use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them, and to predict the size of shadows when the position of the light source changes.</li> </ul>
<p><b>Forces and magnets</b></p> <p>I can notice that some forces need contact between two objects, but magnetic forces can act at a distance</p> <ul style="list-style-type: none"> <li>I can observe how magnets attract or repel each other and attract some materials and not others</li> <li>I can 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</li> <li>I can describe magnets as having two poles</li> <li>I can predict whether two magnets will attract or repel each other, depending on which poles are facing.</li> </ul>	<p><b>Electricity</b></p> <ul style="list-style-type: none"> <li>I can identify common appliances that run on electricity</li> <li>I can construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers</li> <li>I can identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery</li> <li>I can recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit</li> <li>I can recognise some common conductors and insulators, and associate metals with being good conductors.</li> </ul>	<p><b>Forces</b></p> <ul style="list-style-type: none"> <li>I can explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object</li> <li>I can identify the effects of air resistance, water resistance and friction, that act between moving surfaces</li> <li>I can understand that force and motion can be transferred through mechanical devices such as gears, pulleys, lever and springs</li> </ul>	<p><b>Electricity</b></p> <ul style="list-style-type: none"> <li>I can 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>I can 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>I can use recognised symbols when representing a simple circuit in a diagram.</li> </ul>