St John's C of E (Aided) Primary School

Year 6 Science Long Term Overview

Biology	Chemistry	Physics

Term	Knowledge (Objectives)
Autumn 1/2	**Sound – 10 sessions** **Knowledge Block 1 – Describing sound** <u>Substantive Knowledge:</u> - Sounds can be produced in a variety of ways. - Sounds have the properties of **pitch** and **volume**. - When a sound is produced it spreads out from its source in all directions. **Knowledge Block 2 – How sound is made and travels** <u>Substantive Knowledge:</u> - Sound is caused by **vibration** (objects move rapidly back and forth or up and down). - When objects vibrate it makes the objects in contact with it also vibrate. This includes the air. - The vibration travels through the air and makes other objects it is in contact with vibrate including your **ear drum**. **Knowledge Block 3 – Pitch and volume changes** <u>Substantive Knowledge:</u> - Pitch and volume are caused by how the material vibrates. - The pitch of a sound is caused by how fast an object vibrates. This is called the **frequency** of vibration. Higher the frequency, higher the pitch. - Smaller objects or tighter strings tend to vibrate with a higher frequency. - The volume of sound is caused by how big each vibration is. This is called the **amplitude** of vibration. The bigger the amplitude the higher the volume. - Sounds get fainter as the distance from the sound source increases. <u>Disciplinary Knowledge (Working Scientifically):</u> - Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary. - Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate. - Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs. - 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.
Autumn 2/ Spring 1	**How Light Behaves - 7 sessions** **Knowledge Block 1: How light travels** <u>Substantive Knowledge:</u>

	- When light is emitted from a light source, it travels in straight lines until it hits an object. This can be represented by an arrow. - **Shadows** form when light hits an **opaque** object, the area behind is in darkness because light can only travel in straight lines. - Shadows have the same shape as the objects that cast them. **Knowledge Block 2: How light behaves when it hits objects** <u>Substantive Knowledge:</u> - When light hits a **transparent** object, it goes through it in a straight line so we can see a clear image through it. - When light hits a **translucent** material, it goes through it but is scattered, this means light can pass through, but we can't see an image through it. - When light hits a mirrored surface, it **reflects** off it in straight lines, so we can see an image in the reflective material. - Sometimes when light hits a material it reflects off it in many different directions (it is scattered). In this case light will be reflected but no image will be seen in the material. - Shiny surfaces are better reflectors and rough surfaces scatter light more. Opaque objects don't allow any light to pass through them. **Knowledge Block 3: How we see** <u>Substantive Knowledge:</u> - Animals see objects when light is reflected off the object and enters the eye through the **pupil.** - The pupil changes its size to allow enough, but not too much light into the eye. - Too much light damages the eye and too little results in poor quality images. <u>Disciplinary Knowledge (Working Scientifically):</u> - Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary. - Recording data and results of increasing complexity using scientific diagrams. - Identifying scientific evidence that has been used to support or refute ideas or arguments. - Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.
Spring 2/ Summer 1	**Controlling Electrical Circuits – 8 sessions** **Knowledge Block 1: Pushing electrical current** <u>Substantive Knowledge:</u> - **Current** is the flow of electricity around a circuit. - The power supply in a circuit pushes the current round the circuit. - The **voltage** of the power supply is a measure of this push. - Voltage is measure in **volts.** - Batteries have a limited store of energy and when this is gone, they can no longer push the current. **Knowledge Block 2: Electrical current** <u>Substantive Knowledge:</u> - Current is the flow of electricity through a **conductor.** - When current passes through a device it makes it work. - Increasing the voltage (the number of cells in the battery) increases the current. The larger the flow of current, the harder the device works. **Knowledge Block 3: Electrical resistance** <u>Substantive Knowledge:</u> - All parts of a circuit offer **resistance** to electrical current including the wires. - Resistance is the slowing down of electrical current. - The more devices added into a circuit the greater the resistance. - This means less current flows around the circuit.

	Disciplinary Knowledge (Working Scientifically): - 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. - Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate. - Using test results to make predictions to set up further comparative and fair tests. - Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.**Classification and**
Summer 1/ Summer 2	**Evolution – 7 sessions** **Knowledge Block 1 – Natural selection** Substantive Knowledge: - **Evolution** is the change of physical form in a population over a long-time span. - **Natural selection** is the process which controls that change. - In any **population** there is **variation** and **competition** for resources (food, water, mates). - Within that variation, organisms that have features which make them better **adapted** at securing food, water, and mates, are more likely to survive and produce **offspring** which have **inherited** those same successful features. Those that are not well adapted will eventually go **extinct**. - Over a long enough timeline all organisms in a population will have those successful features. - This is known as the *Theory of Evolution by Natural Selection* and was developed by **Charles Darwin** in 1859. **Knowledge Block 2 – How Charles Darwin discovered the process of Evolution by Natural selection** Substantive Knowledge: - Before Darwin, **Lamarck's** Idea of acquired characteristics was proposed. (Giraffes stretch their necks in life, which made their children have longer necks). - Darwin as a young man travelled around the world on the **HMS Beagle**. On this 5-year voyage he saw lots of things and recorded down lots of evidence which allowed him to work out how organisms change over time by a different mechanism of Natural selection. Disciplinary Knowledge (Working Scientifically): - Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations. - Identifying scientific evidence that has been used to support or refute ideas or arguments. - The disciplinary knowledge of models. - 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.

Disciplinary Knowledge (Working Scientifically)				
Years	Types of enquiry that must be introduced in phase	All children should learn to	Recording and teaching that supports key learning	Statutory requirements NC
1 and 2	• Comparing differences and changes. • Describing in order to classify.	• Gather evidence to describe the differences and similarities between different organisms, habitats and objects.	Venn diagrams, bar charts. Timelines and tables showing how one and more than one	• Asking simple questions and recognising that they can be answered in different ways.

	• Surveys to identify patterns and support classification. • Describing the effect of changing things. • Using secondary sources, including the internet and *experts.* • Pupils begin to look for relationships between variables (patterns)	• Gather evidence to describe how things change over time or as a result of something happening (e.g. how some things spring back when bent and others do not, or plants will wilt when they are not watered). • Begin to gather evidence to describe the relationship between variables and patterns (cause and effect) by identifying and seeking to quantify what must be changed and what measured (*what change and what measure).*	thing changes over time, bar charts, tally charts. Results tables with the independent variable increasing in one column and the dependent variable in the other.	• Observing closely, using simple equipment. • Performing simple tests. • Identifying and classifying. • Using their observations and ideas to suggest answers to questions. • Gathering and recording data to help in answering questions.
3 and 4	• Pupils become confident in identifying relationships between variables (patterns).	• Recognise that factors other than that we are changing may have an effect and seek to control these factors (what change and what measure *and what keep same*). • Gather evidence to describe and classify patterns of behaviour, characteristics and properties of materials and make generalisations from data samples.	Results tables with independent variable increasing in one column and dependent variable in the other. Increasing use of equipment that allows for standard measure (thermometers, data loggers, measuring cylinders, force meters, digital balances).	• 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.
5 and 6	• Pupils explore more complex relationships or questions requiring greater precision; this will often require the identification of important values (e.g. biggest, smallest, optimum).	• Recognise that conclusions may be uncertain due to difficulties controlling and measuring variables accurately and that measurement always introduces some error. Understand that repeating experiments helps to identify what the true value is and that data points far from the mean are likely to be inaccurate and should be discounted when averaging. • Adapting experiments to produce more precise conclusions when the questions requires it, especially when seeking to find maximum, minimum or specific values.	Results tables with the independent variable increasing in one column and the dependent variable in the other, results tables that show pupils *choosing* to repeat experiments as appropriately and the averaging of repeated measurements, scatter graphs to identify precise relationships and important values.	• Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary. • Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate. • Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs. • Using test results to make predictions to set up further comparative and fair tests. • Reporting and presenting findings from enquiries, including conclusions, casual relationships and explanations of and degree if trust in results, in oral and written forms such as displays and other presentations.

				• Identifying scientific evidence that has been used to support or refute ideas or arguments.