SBSP PROGRESSION OF COMPONENT KNOWLEDGE THROUGH SCIENCE UNITS

PHYSICS – ELECTRICITY

Year 4 NC links:

- construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers
- 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
- recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit
- recognise some common conductors and insulators, and associate metals with being good conductors
- identify common appliances that run on electricity

Year 4 Component Knowledge

- Identify common appliances that run on electricity
- Understand the dangers of using electrical appliances
- Understand how to keep safe when using electrical appliances
- Identify electrical components
- Create a simple electrical circuit
- Explain how a simple electrical circuit works
- Create a simple electrical circuit
- Predict if a simple electrical circuit will work
- Know the difference between a complete and an incomplete circuit
- Understand how a switch works
- Explain how an electrical switch works
- Apply knowledge of how a switch works to create a switch
- Pose an investigation question and make a prediction
- Set up an investigation to prove or disprove a prediction
- Set up an investigation to prove or disprove a prediction and provide a detailed conclusion

Working Scientifically Component Knowledge

- Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- Using straightforward scientific evidence to answer questions or to support their findings
- Setting up simple practical enquiries and 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
- Asking relevant questions and using different types of scientific enquiries to answer them

Key Vocabulary

- electricity, mains electricity, appliance, socket, batteries
- series circuit, voltage, cell, circuit, component
- power, current, bulb, wire, battery
- control, complete circuit, incomplete circuit, switch
- non-renewable energy, wind turbines, solar panels, hydropower, renewable energy

Year 6 NC links:

- associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit
- 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
- use recognised symbols when representing a simple circuit in a diagram

Year 6 Component Knowledge

- Create a simple electrical circuit
- Identify components from their symbol and definition
- Create an accurate circuit diagram
- Create more complex electrical circuits
- Use a voltmeter to measure voltage
- Describe how the brightness of a bulb is affected by the voltage/number of cells in the circuit
- Identify problems in a circuit
- Use technology to create online circuits
- Explain how to fix issues in a circuit
- Identify possible variables for an investigation
- Design and conduct an investigation
- Explain what affects the output of a circuit
- Create a switch
- Design and create a set of traffic lights
- Explain how their traffic lights work
- Identify electrical conductors and insulators
- Follow instructions to create a loop and wire game
- Explain how the loop and wire game works

Working Scientifically Component Knowledge

- Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs and bar and line graphs
- 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
- Reporting and presenting findings from enquiries - including conclusions, causal relationships and explanations of and a degree of trust in results - in oral and written forms such as displays and other presentations
- Using test results to make predictions to set up further comparative and fair tests

Key Vocabulary

- circuit, circuit diagram, symbol, battery, wires
- voltage, voltmeter, brightness, electricity, current
- blown, variable resistor, resistor, LED, dimmer switch
- fair test, variable, output, systematically, control test
- timer-based, sensor, synchronised, signal, traffic light
- closed electric circuit, conductor, insulator, indicating

KS3 NC links:

The similarities and differences between light waves and waves in matter. Light waves travelling through a vacuum; speed of light. The transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface. Use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eye. Light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras. Colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection.