Electricity

Year: 5 and 6

Term: Summer 2 Cycle A

Essential prior knowledge for topic

LKS2:

To be able to identify and name appliances that require electricity to function.
To know how to construct a series circuit.
To identify and name the components in a series circuit (including cells, wires, bulbs, switches and buzzers).
To be able to draw a circuit diagram.
To be able to predict and test whether a lamp will light within a circuit.
To be able to describe the function of a switch in a circuit.
To know the difference between a conductor and insulators; giving examples of each.
To be able to use observations and knowledge to answer scientific questions.
To draw conclusions and suggest improvements.
To be able to identify differences, similarities and changes related to an enquiry.

UKS2:

To be able to compare materials by their properties
To be able to give evidenced reasons why materials should be used for specific purposes

Key Knowledge (facts and skills) for unit

Scientific Content:

- Know that electricity is the presence or flow of charged particles.
- An electric current is the flow of electrons around a circuit. Voltage is the name for the electric force that causes electrons to flow.
- If there is a complete circuit a battery can push electrons all around the circuit. This is an electric current
- Know that insulators do not let electricity pass through e.g. plastic; conductors do, e.g. many metals.
- Know that the higher the number and voltage of cells used in the circuit the brighter the lamp, louder the buzzer, more powerful the motor will be.
- Know, 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.
- Know how to represent a simple series circuit in a diagram using correct symbols for components (cell, buzzer, wire, motor, switch).
- Know that electricity can flow through the components in a complete electrical circuit.
- Know that a circuit always needs a power source, with wires connected to both the positive (+) and negative (-) ends.
- Know that organic materials can be used to conduct electricity (e.g. lemons, potatoes, oranges) because they contain acids that contains electrolytes.
- A battery is not one cell – it is made from a collection of cells connected together.
- You can use a switch in a circuit to create a gap in a circuit. This can be used to switch electricity on and off.
- Know and understand the necessary precautions for working safely with electricity.

Working Scientifically:

- To record circuits in diagrams.
- To explain processes in words and diagrams.
- To make a prediction based on prior knowledge.
- To measure accurately using a data logger.
- To suggest conclusions based on patterns spotted.
- To assess the validity of an enquiry.
- To suggest further enquiries to prove a hypothesis.
- To plan an enquiry to answer a question.

Enquiry Outcomes

KQ1: How are circuits recorded?

Children will be shown the different components of a circuit and draw them as a diagram. They can be physically shown the circuit and draw it as a circuit diagram. Create new circuit diragrams to show other circuits.

KQ2: How do fairy lights work?

Children will explore series circuits (e.g. fairy lights/LEDS) and be able to explain the process of an electric current, what a power source and voltage is. Communicate what happens when a light bulb goes out on fairy lights.

KQ3: How can I make the buzzer louder?

Children will predit and then investigate ways to make the buzzer louder (measuring the sound with a data logger). They will conclude that more cells (more voltage) will make the buzzer louder and consider why this is the case. Consider applying this to making a fan go faster or a light be brighter.

KQ4: How valid was my enquiry?

Pupils reflect on the validy of their investigation from the previous lesson. Children should be encouraged to consider if they may have measured back ground noise. They will then suggest and conduct another enquiry question to test their conclusion (e.g. how do I make lights brighter). Communicate how to check the reliability of an enquiry.

KQ5: Can I use my scientific knowledge to design and make a fan with a switch?

Children will plan a scientific enquiry into designing a fan, deciding number of cells, thickness of wire etc. based on scientific understanding. Consider how to make the fan more energy conscious.

Area of enquiry	Expected level	Suggested questions
Enquiry	I can ask relevant scientific questions based on the outcome of a test.	Based on what I have found out, what might I ask now? Why would a scientist want to know this? How could this be useful in the real world? What is the best methodology to find the answer to this question?
Prediction	I can use the outcome of an inquiry to make predictions for other tests (and can conduct these).	Based on what you already know, what do you think the outcomes will be? Do we always need to predict when we want to find something out? Can predictions impact the validity of the investigation? What influences a scientist's predictions?
Methodology	I can plan different types of scientific enquiry. I can control variables in an enquiry and explain why these need to be controlled.	Can I follow someone else's methodology to repeat the enquiry? What are the control variables? Why do I need to control them? What is the dependent variable? What is the independent variable? How many things can we change?
Measuring	I can measure accurately and precisely using a range of equipment. Y5 and 6- m/cm/mm, kg/g and l/ml. Also to convert between metric and imperial units (including inches, pounds and pints).	What is the most appropriate unit of measure? How can I ensure that my measurements are accurate? Can you repeat your measurements to check that they are accurate? Why to scientists repeat measurements?
Classifying	I can use and create classification keys based on my understanding.	Can you design a classification key to group these based on their properties? Can you test your classification key? How can you adapt/improve your classification key? How would this key be useful to scientists? How could this be used in the wider world?
Presenting results	I can record data and results using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs. I can report findings from enquiries in a range of ways.	Is this discrete or continuous data? What is the best type of graph or table to show your results? Why? Are your results similar or dissimilar to other groups? How can you check whose results are likely to be correct? Are there any anomalies? Why might these anomalies have occurred? How might these outcomes be useful? How might these outcomes influence what people do in the future (in science)? What further investigations could you plan to test your conclusions?
Concluding	I can explain a conclusion from an enquiry. I can explain causal relationships in an enquiry. I can relate the outcome from an enquiry to scientific knowledge in order to state whether evidence supports or refutes an argument or theory.	Are there any anomalies? Why might these anomalies have occurred? How might these outcomes be useful? How might these outcomes influence what people do in the future (in science)? What further investigations could you plan to test your conclusions? Is there a cause and effect link? Is ____ the reason that this happened? Does any scientific understanding/knowledge support or refute your conclusion?
Validity (linked to methodology and conclusions)	I can discuss ways in which my enquiry may have lacked reliability and/or validity and can suggest ways in which it could have been improved. I can repeat enquires to assess the reliability and validity of my enquiry. I can identify and suggest reasons for anomalies when I have evaluated my results.	What variables do you need to control? How can you identify anomalies? What could have caused anomalies? Have you measured the independent variable? Have you measured the effect of the dependent variable? Why do we repeat measurements? What would make our results less/more valid? With the resources we had, what was difficult to control? With the resources we had, what was difficult to control? What would we need to make measurements more accurate? Are your results similar or dissimilar to other groups? What might this suggest? How can you check whose results are likely to be correct?