



Holly Park Learning Organiser

Year 6 - Science

Electricity- How does the voltage in a circuit affect the loudness of a buzzer?



Prior Knowledge:

- Identify common appliances that run on electricity.
- 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.

Essential Knowledge:

Children should build circuits alongside their drawings to understand how the pictorial representation links to the physical example

children are introduced to the terms “current” and “voltage”. They should understand that current is the flow of electricity and voltage causes the current to flow.

They should understand that the current cannot flow when the circuit is incomplete.

Children should identify that when more bulbs or buzzers are added to a circuit, the components dim or get quieter, even if the voltage remains the same.

Key Questions:

- What is a series circuit? • What are circuit symbols? • What is the symbol that represents a bulb/cell? • What are the rules for drawing circuits and symbols? • What is current? • What is voltage? • What would happen if the cells or batteries were removed from the series circuit? • Why will this bulb not light up in this series circuit?
- What is a complete/incomplete circuit? • Why does this circuit work? Give reasons. • Why does this circuit not work? Give reasons. • Why is it important to connect the wires properly in a circuit? • What is the role of a switch in a circuit? • What happens to the current in an incomplete circuit?
- What do you notice about the brightness of the bulb when more components are added to the circuit? • Why does the brightness of a bulb and loudness of a buzzer decrease when more components are added to the circuit?

National Curriculum Objectives:

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

Key Vocabulary

series circuit	– a circuit where all the components are connected in one single loop	
cell	a portable store of energy	
bulb	a component that produces light	
current	– the flow of electricity in a circuit	
voltage	causes the current to flow	
buzzer	a component that makes a buzzing or beeping sound	
independent variable	(what will change) – the voltage, or the number of cells	
dependent variable	(what will be measured) – the loudness of the buzzers	
controlled variables	(what is kept the same) – the type of cells used and the number of components in the circuit	

symbol	Component		
	ammeter		motor
	battery		resistor
	bulb		Switch open
	buzzer		Switch closed
	cell		

Working Scientifically:

- Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, 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.
- Using test results to make predictions to set up further comparative and fair tests.

SEND Core Knowledge:

- children build on their understanding of circuits to construct and draw series circuits using circuit symbols. Children should build circuits alongside their drawings to understand how the pictorial representation links to the physical example.
 - They explore reasons why a circuit may be incomplete.
- , children explore variations within circuits and the effects of having fewer or more components.

Common Misconceptions:

- Children may draw pictorial representations of circuit components rather than symbols when drawing circuits. • When drawing circuits, children may think that wires should be drawn as “wiggly” lines. State to children that wires should be drawn as straight lines using a pencil and a ruler.
- Children may think that if all the components are in place, then the circuit is complete. Explain that even if all the components are in place, if the switch is open then the circuit is incomplete.
- Children may confuse the variables when planning the experiment. They may need reminding of what each variable is and discussing this as a class or in small groups.
- Children might not use correct circuit symbols. Remind them to use a pencil to draw the correct symbols and to draw wires as straight lines using a ruler.

Cross Curricular Links

Blackout (John Rocco)

LINKS TO THE WORLD OF WORK -Personal Development. The Yes Program - Science - robot programmer (electrical circuits)

Possible Practical Activities:

Construct and draw a series circuits using symbols



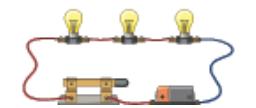
Put children into pairs or groups. Give them a range of electrical components – cells, wires, bulbs, switches and buzzers. Ask them to construct different series circuits. How many circuit variations can they make? Ask children to draw the different circuits that they have made using the correct symbols for each component. Children then compare their circuit diagrams with other groups.

Complete and incomplete circuits

Ask children to work in pairs or small groups to create complete and incomplete circuits. Children explain why their circuits are complete or incomplete, giving their reasons. • Set up several stations around the room. Place a complete or incomplete circuit at each station. Children visit each station in pairs or groups and draw the circuits using pencils and rulers. Children then record whether the circuits are complete or incomplete and give reasons why.

Variations within circuits

Children should work in pairs or groups. They begin by creating a circuit with one cell, a switch and a bulb. Ask children to observe the brightness of the bulb. They then add one more bulb to the circuit, observing the brightness. They then add another bulb, again observing the brightness of the bulbs. Ask children what they noticed each time they added a bulb. Children should repeat this process using buzzers rather than bulbs. They increase the number of buzzers within a circuit, making observations about any changes in the loudness of buzzers each time.



Plan Voltage experiment

Equipment :rechargeable cells (at least three per group) • wires • switches (one per group) • buzzers (one per group) **Practical activity** • Put children in small groups. Give each group the equipment needed for the experiment. Children should identify what the equipment is and why it is used within the experiment.

Investigate

1. Create a series circuit with one cell, one buzzer and one switch. 2. Make sure all the components are connected properly. 3. Turn the switch on and record the loudness of the buzzer. 4. Add another cell to the circuit, keeping the buzzer and switch the same. 5. Note the loudness of buzzer when the voltage has increased. 6. Add a third cell to the circuit, keeping the buzzer and switch the same. 7. Note the loudness of the buzzer now the voltage has increased. 8. Repeat steps 1–7 to provide the opportunity to identify any possible anomalous results.