

ACET Junior Academies'

Scheme of Work for Science

Big Idea – Electricity, Sound & Light

Year 6 – Electricity



About this unit:

PoS – Electricity

This unit builds on what the students learnt in Y4. They should know that electricity needs a complete circuit in order to flow and make components work. They should also know that adding more components, e.g. lamps, leads to them being dimmer, but adding more cells leads to components, e.g. lamps, being brighter. They should be able to draw pictures of circuits.

In Y6, students will learn that there are symbols for different components, and that scientists draw circuit diagrams in a specific way, rather than as pictures. We will take what they learnt in Y4, and try and apply it more closely to real life electrical circuits and appliances.

Getting used to scientific terms – one 'battery' is called a cell. Only say 'battery' when you have more than one cell joined together. 'Lamp' should be used instead of 'bulb'. These are the terms that should be used right from the beginning.

Students should NOT be taught parallel circuits – it leads to confusion when they have not really consolidated knowledge about series circuits. Most students arrive at KS3 with poor understanding of electricity and circuits.

PhET simulations are excellent to really show students what's going on in circuits – but only as an **addition** to exploring real equipment.

<https://phet.colorado.edu/en/simulation/circuit-construction-kit-dc-virtual-lab>

Unit structure

This unit is structured around four science enquiries:

1. What do you remember about electricity?
2. What symbols would you use?
3. Can you protect a KitKat from your teacher?
4. Can you draw like a scientist?

Links to previous and future National Curriculum units

Y4 Electricity

- KS3&4 Physics

Enquiry 1: What do you remember about electricity?			
Links to previous learning	Scientific skills	Assessment criteria	Curricular links
Y4 Electricity	EA – Problem solving	Can your children: - Identify whether a circuit is complete or not - State what different components do	Horizontal: Art Vertical: KS3&4 Physics
	Asking questions Making predictions		
	Key concepts:		
	Electricity needs a circuit to be complete in order for it to work.		
Key terms		Common misconceptions	
Circuit, complete, incomplete, flow, cell, motor, lamp, buzzer			
Suggested activities		Resources	Useful links
Use pictures (not diagrams) and wool, thread etc to make different circuits like a collage. Make circuits that use cells, motors, lamps and buzzers. Say what will happen. Look at various complete/incomplete circuits – would they work or not? Keep the collages for use in the next lesson.		Demonstration - Simple circuit with one cell and a lamp - Simple circuit with one cell and a buzzer - Simple circuit with one cell and a motor (see link) Materials for making collages – including coloured threads and wool Pictures of complete and incomplete circuits	https://www.youtube.com/watch?v=mDyBT5qr_UI – simple circuit with a motor.

Enquiry 2: What symbols would you use?			
Links to previous learning	Scientific skills	Assessment criteria	Curricular links
Y4 Electricity	Interpreting & communicating data	Can your children: - Recall the symbols for components - Draw a circuit diagram of a picture or physical circuit	Horizontal: Art – comparison of art & science Vertical: KS3&4 Physics
	Key concepts:		
	Electrical components are represented by specific symbols. Scientists draw circuits with straight lines, right angles, and circuit symbols. The circuits must be complete.		
Key terms		Common misconceptions	
Symbol, diagram, lamp, buzzer, motor, wire, straight, right angle			
Suggested activities		Resources	Useful links
Look at examples of where symbols are used instead of drawings - e.g. road, safety, exit signs. Discuss why we use symbols instead of drawings. Circuit symbol bingo Can the students <i>describe</i> how to draw the symbols? Sit back to back and try and describe them to your partner well enough that they can draw them. Use the collages from the previous lesson, and develop the skill of drawing circuits. Use this as an opportunity to use rulers, measure etc.		Pictures of standard symbols Demonstration - Simple circuit with one cell and a lamp - Simple circuit with one cell and a buzzer - Simple circuit with one cell and a motor (see link) Pictures of complete circuits	https://www.stem.org.uk/resources/elibrary/resource/26916/electricity#&gid=undefined&pid=8 Circuit symbol bingo

Enquiry 3: Can you protect a KitKat from your teacher?			
Links to previous learning	Scientific skills	Assessment criteria	Curricular links
Y4 - Electricity	EA – Problem solving Asking questions Making predictions Evaluating	Can your children: - Make a circuit that can be turned on and off as a box is opened - Describe how a burglar alarm works, in terms of completing a circuit	Horizontal: D&T Vertical: KS3&4 Physics
	Key concepts:		
	Applying knowledge of electrical circuits in a new situation. When a burglar alarm is triggered, a circuit is completed, which allows a buzzer to work.		
Key terms		Common misconceptions	
Circuit, complete, switch, alarm			
Suggested activities		Resources	Useful links
Making a burglar alarm Burglar alarm could be a 'keep safe box' – see links for a challenge to hide a Kit Kat from the teachers. <i>GD students could make design tweaks to make the box more secure – making the opening small enough that a hand can't get inside.</i> Evaluating – how good is their burglar alarm? Can they identify any issues with it that they would like to improve? Can they suggest how they could improve it (even if that is not possible with the equipment we have in the classroom)? Making more complex alarms – can the students design an alarm to buzz when a door is opened? Or when someone steps on a mat? Be aware that most 'real' burglar alarms work on more complex circuits – look at the examples of 'door alarms' in the links – a circuit is completed when a door is opened. The focus should be on the electricity being in a series circuit (one loop), and that the circuit needs to be completed in order to make the buzzer sound.		See links for more details – Shoeboxes Wires Buzzers or lamps 9V cell Paperclips Tape (electrical tape or duct tape is good) Pegs Aluminium foil Crocodile clips or some other way (wire strippers) of connecting wires to components and each other.	https://www.youtube.com/watch?v=JaMjH8zDuyc Students could use a second paperclip, or other metal object, instead of the clip. https://www.katherinesemar.co.uk/sparks-fly-as-year-6-make-burglar-alarms/ KitKat alarms

Enquiry 4: Can you draw like a scientist?			
Links to previous learning	Scientific skills	Assessment criteria	Curricular links
Y4 - Electricity	EA – Problem solving	Can your children: - Draw the circuit from their burglar alarm - Explain how a door opening alarm might work	Horizontal: D&T Vertical: KS3&4 Physics
	Asking questions Making predictions Observing & measuring		
	Key concepts:		
	We can draw any circuit as a diagram. Problem solving – making real life circuits.		
Key terms		Common misconceptions	
Circuit, complete, switch, alarm			
Suggested activities		Resources	Useful links
Can you draw a circuit diagram and give an explanation of how your burglar alarm works?		Burglar alarms from the previous lesson 9V cells Wires Buzzers or lamps 9V cell Paperclips Tape (electrical tape or duct tape is good) Pegs Aluminium foil	https://www.gorsleygoffprimary.co.uk/creating-an-electrical-burglar-alarm/ Door alarms
How would you make your burglar alarm louder? Are three cells three times louder? Students can investigate this. <i>More cells should make the buzzer louder – but students should consider that the buzzer has a limit to how loud it can be.</i>			
Making more complex alarms – can the students design an alarm to buzz when a door is opened? Or when someone steps on a mat? Be aware that most 'real' burglar alarms work on more complex circuits – look at the examples of 'door alarms' in the links – a circuit is completed when a door is opened.			
The focus should be on the electricity being in a series circuit (one loop), and that the circuit needs to be completed in order to make the buzzer sound.			