

# Electricity Unit Overview KS3

## About This Unit

This unit aims to give students an understanding of the world of electricity.

## Notes

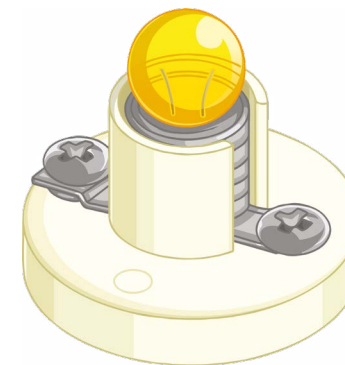
There is a homework grid that goes with this unit which lays out differentiated activities linked to each topic.

## Lessons

1. [Introduction to Circuits](#)
2. [Modelling Circuits](#)
3. [Measuring Voltage](#)
4. [Series Circuits](#)
5. [Parallel Circuits](#)
6. [Resistance](#)
7. [Magnets](#)
8. [Making Electromagnets](#)
9. [Static Electricity](#)

## Core Practicals Included

Making an Electromagnet



## Lesson Pack 1: Introduction to Circuits

Included in this Pack	Learning Objectives	Topics Covered	Main Pupil Activities
<a href="#">Introduction to Circuits PowerPoint</a> <a href="#">Teaching Ideas</a> <a href="#">Circuit Exam Questions</a> <a href="#">Drawing Circuit Diagrams HA</a> <a href="#">Drawing Circuit Diagrams MA</a> <a href="#">Drawing Circuit Diagrams LA</a> <a href="#">Electrical Circuits FAF Activity</a> <a href="#">Fault Finding Cards</a>	<p>To understand why some circuits fail to work.</p>	<p>Circuit Symbols</p>	<p>Students learn to identify the different circuit symbols and draw circuit diagrams. Using their knowledge, students must find the fault in each electrical circuit.</p>
	<h3>National Curriculum Aims</h3> <p>Electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as a flow of charge.</p>	<h3>Resources/Practical Equipment</h3> <p><a href="#">Lesson Pack</a></p>	<h3>Health and Safety</h3> <p>Students will be making an electrical circuit – ensure that the floor around the practical area is clear of obstacles to prevent injury. Keep the area free from water coming into contact with conductors.</p>



**Lesson Pack 2: Modelling Circuits**

Included in this Pack	Learning Objectives	Topics Covered	Main Pupil Activities
<b>Modelling Circuits PowerPoint</b> <b>Teaching Ideas</b> <b>Model Evaluation Activity Sheet HA</b> <b>Model Evaluation Activity Sheet MA</b> <b>Model Evaluation Activity Sheet LA</b> <b>The Jelly Bean and Rope Model HA</b> <b>The Jelly Bean and Rope Model MA</b> <b>The Jelly Bean and Rope Model LA</b>	To use an analogy to explain how electrical circuits work.	Using simple models to describe scientific ideas.	Students are asked to model several different electrical circuit models to aid their understanding and ability to explain electrical circuits using keywords.
	National Curriculum Aims	Resources/Practical Equipment	Health and Safety
	We can model voltage as an electrical push from the battery, or the amount of energy per unit of charge transferred through the electrical pathway. In a series circuit, voltage is shared between each component. In a parallel circuit, voltage is the same across each loop.	rope jelly beans masking tape	When modelling the circuits with students, keep the area free from clutter to prevent the risk of falling.

**Lesson Pack 3: Measuring Voltage**

Included in this Pack	Learning Objectives	Topics Covered	Main Pupil Activities
<b>Measuring Voltage PowerPoint</b> <b>Teaching Ideas</b> <b>Fruity Battery Investigation HA</b> <b>Fruity Battery Investigation MA</b> <b>Fruity Battery Investigation LA</b>	To investigate the best citrus fruit to make a battery from.	Potential difference, measured in volts; battery and bulb ratings; resistance, measured in ohms.	In groups, students carry out an investigation to see which citrus fruits would make the best battery to power a mobile phone. Students create a circuit using the equipment and replace the battery with a citrus fruit and measure its voltage.
	National Curriculum Aims	Resources/Practical Equipment	Health and Safety
	Present observations and data using appropriate methods, including tables and graphs. Make and record observations and measurements using a range of methods for different investigations, and evaluate the reliability of methods and suggest possible improvements.	Per student/pair of students: one piece of fruit                      one voltmeter one strip of copper                      two wires one strip of zinc two crocodile clips	Students will be making an electrical circuit – ensure that the floor around the practical area is clear of obstacles to prevent injury. Keep the area free from water coming into contact with conductors. Check students' allergy information before commencing with the practical.



**Lesson Pack 4: Series Circuits**

Included in this Pack	Learning Objectives	Topics Covered	Main Pupil Activities
<a href="#">Series Circuits PowerPoint</a> <a href="#">Teaching Ideas</a> <a href="#">Ideal Electricals Investigation Activity Sheet HA</a> <a href="#">Ideal Electricals Investigation Activity Sheet MA</a> <a href="#">Ideal Electricals Investigation Activity Sheet LA</a> <a href="#">Introduction to Series Circuits Activity Sheet</a> <a href="#">Introduction to Series Circuits Activity Sheet LA</a>	To investigate current in series circuits.	Measuring Current in Series Circuits	Students are currently completing their training to become a trainee electrician for Ideal Electricals. Students are asked to complete a practical investigation into series circuits and report their findings back to the head of the company.
	National Curriculum Aims	Resources/Practical Equipment	Health and Safety
	Ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge and experience. Make predictions using scientific knowledge and understanding.	ammeters bulbs wires crocodile clips batteries	Students will be making an electrical circuit – ensure that the floor around the practical area is clear of obstacles to prevent injury. Keep the area free from water coming into contact with conductors.

**Lesson Pack 5: Parallel Circuits**

Included in this Pack	Learning Objectives	Topics Covered	Main Pupil Activities
<a href="#">Parallel Circuits PowerPoint</a> <a href="#">Teaching Ideas</a> <a href="#">Dream House HA</a> <a href="#">Dream House MA</a> <a href="#">Dream House LA</a>	To investigate current in parallel circuits.	Constructing Parallel Circuits	Students are asked to imagine that they are currently the site manager for a local eco-friendly housing development project. The houses are in the early planning phases and will provide luxury accommodation to executives that work in the city. Students are tasked with designing, building and electrically wiring each house using their knowledge of parallel circuits.
	National Curriculum Aims	Resources/Practical Equipment	Health and Safety
	Ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge and experience. Make predictions using scientific knowledge and understanding.	sticky tape a cardboard box or shoe box circuit wires batteries buzzer	Students will be making an electrical circuit – ensure that the floor around the practical area is clear of obstacles to prevent injury. Keep the area free from water coming into contact with conductors.



**Lesson Pack 6: Resistance**

Included in this Pack	Learning Objectives	Topics Covered	Main Pupil Activities
<a href="#">Resistance PowerPoint</a> <a href="#">Teaching Ideas</a> <a href="#">Resistance Investigation HA</a> <a href="#">Resistance Investigation MA</a> <a href="#">Resistance Investigation LA</a>	To investigate resistance in circuits.	The resistance in different lengths of wire.	Students are asked to imagine that they are working for a local farming company as an electrical engineer fitting electric fences. Students are asked to test the resistance of five different lengths of wire with the aim of finding the length of wire that has the lowest resistance. The results of the test will help the company to select the lengths of wire they will use for animal pens on the farm.
National Curriculum Aims		Resources/Practical Equipment	Health and Safety
Differences in resistance between conducting and insulating components (quantitative).		power pack five different lengths of copper wire (20cm, 40cm, 60cm, 80cm, 100cm) crocodile clips three circuit wires ammeter graph paper	Students will be making an electrical circuit – ensure that the floor around the practical area is clear of obstacles to prevent injury. Keep the area free from water coming into contact with conductors.



**Lesson Pack 7: Magnets**

Included in this Pack	Learning Objectives	Topics Covered	Main Pupil Activities
<a href="#">Magnets PowerPoint</a> <a href="#">Teaching Ideas</a> <a href="#">Magnetism Questions</a> <a href="#">Magnet Investigation</a>	To investigate magnets.	Magnets and Magnetic Field Lines	Students are asked to imagine that they are taking part in an around the world sailing competition, unfortunately, a storm has blown them off course and their boat has crashed into the rocks off the coast of a tiny island in the South Pacific. Students are asked to make a compass using a selection of material they find in a washed-up box.
	National Curriculum Aims	Resources/Practical Equipment	Health and Safety
	Magnetic pole attraction and repulsion. Drawing magnetic field lines by plotting with a compass. The idea of electric field forces acting across space between objects, not in contact.	<div>             whiteboards              aluminium can              iron nail              paperclip              tweezers              pencil              tennis ball              screw              magnet           </div> <div>             sewing needle              bar magnet              wax paper              scissors              bucket (Petri dish)              water              A3 paper              pen              plotting compass           </div>	Iron fillings – avoid contact with the eyes.



**Lesson Pack 8: Making Electromagnets**

Included in this Pack	Learning Objectives	Topics Covered	Main Pupil Activities
<a href="#">Making Electromagnets PowerPoint</a> <a href="#">Teaching Ideas</a> <a href="#">Making Electromagnets Core Practical HA</a> <a href="#">Making Electromagnets Core Practical MA</a> <a href="#">Making Electromagnets Core Practical LA</a>	To construct an electromagnet.	Constructing an electromagnet using students' knowledge of circuits and magnets.	Students are currently working as a mechanical engineer for the local scrapyard company. News has just come in that the electromagnet used for lifting the cars into the scrap machine has broken down. Students are asked to complete a practical investigation into making an electromagnet and report their findings back to the head of the company.
	National Curriculum Aims	Resources/Practical Equipment	Health and Safety
	The magnetic effect of a current, electromagnets, DC motors (principles only).	nail 30cm insulated copper wire wires crocodile clips paperclips power pack graph paper	Students will be making an electrical circuit – ensure that the floor around the practical area is clear of obstacles to prevent injury. Keep the area free from water coming into contact with conductors.

**Lesson Pack 9: Static Electricity**

Included in this Pack	Learning Objectives	Topics Covered	Main Pupil Activities
<a href="#">Static Electricity PowerPoint</a> <a href="#">Teaching Ideas</a> <a href="#">Static Electricity Investigation Questions</a> <a href="#">Static Electricity Investigation Stations</a>	To investigate static electricity.	The Atom The movement of charges from one object to another.	Students are asked to carry out a hands-on carousel of static electricity practical experiments.
	National Curriculum Aims	Resources/Practical Equipment	Health and Safety
	Separation of positive or negative charges when objects are rubbed together: Transfer of electrons, forces between charged objects.	mixing bowl salt ground black pepper mass balance weighing boat wool cloth plastic comb PVC pipe aluminium can bubble solution straw polycarbonate sheet balloon plastic bags	Avoid placing other electronic equipment nearby as it may become damaged by static discharges or electromagnetic fields.

