

KS4 Physics – Electricity and Magnets

In this module students will learn what magnets are made from and how magnets react with each other. Students will investigate magnetic materials and their uses in everyday life. They will also learn about electrical circuits, how electrical current flows through them and the role of each component within a circuit. Students will investigate changes in electrical current, learn about dangers of electricity and how to keep themselves safe when working with electricity.

Students will 'work scientifically' to achieve these goals, learning the key features of scientific enquiry; observing over time, pattern seeking, identifying, classifying, investigating and researching.

RRS Articles:

This unit of work is linked to Articles of the UN Convention on the Rights of the Child.

Article 13 (freedom of expression)

Article 24 (health and health services)

Article 29 (goals of education)

	<u>OU Progression Steps 5-6</u>	<u>OU Progression Steps 7-8</u>	<u>OU NC Step 1</u>	<u>OU NC Step 2</u>	<u>OU NC Step 3</u>
<u>Subject specific knowledge</u>					
<u>Magnets</u>	<p>Identifies that the 2 ends of a magnet are called north and south with gestural prompts.</p> <p>Understands that not all metals are magnetic.</p> <p>Knows that magnets do not need to touch to react after a demonstration.</p>	<p>Knows that the 2 ends of a magnet are called north and south.</p> <p>Understands that not all metals are magnetic and can name 1 magnetic metal.</p> <p>Knows that magnets do not need to touch to react.</p>	<p>Know that the 2 ends of a magnet are called north and south and that they react differently when pushed together.</p> <p>Can identify that the magnetic materials are iron and nickel from a choice of symbols.</p> <p>Knows the basic shape of the magnetic field around a magnet.</p>	<p>Uses the terms repel and attract when describing how magnets react to each other.</p> <p>Knows that the magnetic materials are iron and nickel.</p> <p>Identifies the shape of the magnetic field around a magnet from a choice of 2 with verbal prompts.</p>	<p>Describes the terms repel and attract when describing how magnets react to each other.</p> <p>Knows that the magnetic materials are iron, nickel and cobalt.</p> <p>Independently identifies the shape of the magnetic field around a magnet from a choice of 3.</p>

			Understands that you can turn an electromagnet on and off.	Explains the difference between a magnet and an electromagnet.	Explains the difference between a magnet and an electromagnet and suggests uses for both.
<u>Electricity</u>	<p>Knows the circuit symbols for wire, bulb and battery.</p> <p>Understands that all components need to connect to make a circuit work.</p> <p>Identifies 1 potential danger of electricity using images and a choice of 2 symbols.</p>	<p>Knows the circuit symbols for wire, switch, bulb and battery.</p> <p>Identifies that circuits only work when electricity can go all the way round.</p> <p>Identifies 1 potential danger of electricity using images and a choice symbols.</p>	<p>Knows the circuit symbols for wire, switch, bulb, ammeter and battery.</p> <p>Describes that circuits only work when they are 'complete'.</p> <p>Identifies potential dangers of electricity using images and verbal prompts.</p>	<p>Knows the circuit symbols for wire, switch on, switch off, bulb, ammeter and battery.</p> <p>Describes that circuits only work when the current flows all the way around.</p> <p>Describes potential dangers of electricity using images with verbal prompts.</p>	<p>Knows the circuit symbols for wire, switch on, switch off, bulb, ammeter, volt meter and battery.</p> <p>Explains that circuits only work when the current flows all the way around.</p> <p>Describes potential dangers of electricity using images and suggests safety precautions.</p> <p>Identifies the neutral, live and earth wires in a plug.</p>

Subject specific skills

<u>Magnets</u>	Observes and identifies how the 2 poles of a magnet react when they are pushed together.	<p>Investigates how the 2 poles of a magnet react when they are pushed together.</p> <p>Is able to use a magnet to test materials and</p>	Investigates how the 2 poles of a magnet react when they are pushed together and describes what happens using a bank of symbols.	Investigates how the 2 poles of a magnet react when they are pushed together and describes what happens using the terms repel and attract with verbal prompts.	Investigates how the 2 poles of a magnet react when they are pushed together and independently describes what happens using the terms repel and attract.
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	<p>Is able to use a magnet to test materials.</p> <p>Is able to use iron fillings and a magnet to create a pattern of the magnetic field with gestural prompts.</p> <p>Demonstrates the effect of turning an electromagnet on and off with verbal prompts.</p>	<p>record the information in a simple table.</p> <p>Is able to use iron fillings and a magnet to create a pattern of the magnetic field with verbal prompts.</p> <p>Demonstrates the effect of turning an electromagnet on and off independently.</p>	<p>Is able to use a magnet to test materials and record the information in a simple table by describing results.</p> <p>Is able to use a template and a compass to plot the magnetic field with verbal prompts.</p> <p>Investigates the strength of electromagnets and records the results in a simple table.</p>	<p>Is able to use a magnet to test materials and record the information in a table by analysing results.</p> <p>Is able to use a template and a compass to plot the magnetic field with pictorial or written instructions.</p> <p>Investigates the strength of electromagnets and creates a simple table to record results.</p>	<p>Is able to use a magnet to test materials, record the information in a table and identify trends or unusual results.</p> <p>Is able to use a compass to plot and draw the magnetic field around a magnet.</p> <p>Creates an investigation into the strength of electromagnets.</p>
Electricity	<p>Is able to make circuits using equipment identified by symbols.</p> <p>Identifies changes in a circuit when more batteries are added.</p> <p>Identifies the difference between a safe piece of electrical equipment and a dangerous piece of equipment.</p>	<p>Is able to make series circuits using circuit diagrams, with verbal and gestural prompts.</p> <p>Identifies changes in a circuit when more batteries or bulbs are added.</p> <p>Identifies hazards for an electrical danger in given examples.</p>	<p>Is able to confidently make series circuits using circuit diagrams.</p> <p>Uses an ammeter to measure current in circuits with differing numbers of batteries.</p> <p>Identifies hazards for an electrical danger and suggests examples.</p>	<p>Is able to confidently make series circuits using circuit diagrams, identify errors, and correct them with verbal prompts.</p> <p>Uses an ammeter to measure current in circuits with differing numbers of batteries and bulbs.</p> <p>Identifies hazards for an electrical danger and identifies the correct precaution from given options.</p>	<p>Is able to confidently make series circuits using circuit diagrams, identify errors, and correct them independently.</p> <p>Independently uses an ammeter to measure, and record, current in circuits with differing numbers of batteries and bulbs.</p> <p>Identifies hazards for an electrical danger and suggests precautions.</p>

<p><u>Suggested activities</u></p>	<p>Repel/Attract magnets What is magnetic investigation? Kahoot quiz Making a magnetic field using iron fillings Testing electromagnets.</p>	<p>Matching circuit symbols to pictures. Matching circuit symbols names. Practicing circuit symbol karate. Making circuits using equipment. Changing numbers of batteries in a circuit. Making circuits using diagrams. Solving circuit problems Measuring current. Making fruity batteries. Wiring a plug correctly. <u>See RA.</u></p>
<p><u>Personal development</u></p>	<p><u>Problem solving</u> Investigations and matching exercises <u>Communication skills</u> Working as pairs in investigations, asking and answering questions <u>Self-belief</u> Learning new skills, practising them and demonstrating them. <u>Self-management</u> Working with new equipment <u>Teamwork</u> Working as groups to solve problems or find out new information</p>	
<p><u>Online resources</u> twinkl CLEAPPS for risk assessments BBC bitesize for video resources.</p>		
<p><u>Evidencing Work</u> All work / evidence sheets need to be printed off, annotated by staff, self-assessed by pupils and stored in student folders.</p>		