



PROGRESSION OF KNOWLEDGE



Physics Unit: Electricity

What does progression of knowledge look like?

Year	Progression of Knowledge
2	- Electricity is a form of energy, used for lighting, heating, making sound and making machines and appliances work. - Pylons and cables carry electricity through the countryside, some electricity cables in busy cities are buried underground. - Appliances are devices that run on electricity and they should be used safely (includes, no frayed wires, avoid spillages and keep away from water, not putting objects into sockets. - Compare life in a village that has no electricity. - A circuit is a complete path around which electricity can flow. - Circuits contain components like wires, switches and bulbs.
4	- Electricity is a form of energy, used for lighting, heating, making sound and making machines and appliances work. - Some appliances run on electricity; some plug into the mains electricity and others run on batteries. - An electrical circuit consists of a cell or battery connected to a component using wires. - A series circuit is where all the components of the circuits are joined in one loop. If one part of the loop is incomplete, then the circuit will not work. - Names of components include cells, wires, bulbs/ lamps, switches and buzzers. - A cell is a single unit, and a battery is a collection of cells. - One way to test to see if a circuit is complete is to use a bulb/lamp, if the lamp turns on then the circuit is complete. - Switches open and close circuits. When a switch is open the bulb/lamp will not light up as the series circuit is incomplete. - Wires are made from metals as they are good conductors of electricity e.g., iron, copper and steel. - Insulators are materials that do not allow electricity to pass through them easily e.g., plastic, wood, rubber and glass. - Thomas Edison invented the first practical incandescent light bulb.
6	- Recognise circuit symbols in a simple circuit- identify the simple circuit used in a hand torch. - Electric current is measured in amperes, current is a flow of charge. - Associate the brightness of a lamp or volume of a buzzer with the potential difference in a circuit. - Investigate the brightness of a bulb if the PD is increased or the number of bulbs increased in a series circuit. - Investigate how the length of wire affects the brightness of a bulb. - Potential difference is measured in volts. - Resistance, measured in ohms, as the ratio of potential difference (p.d.) to current. - Differences in resistance between conducting and insulating components (quantitative). - Separation of positive or negative charges when objects are rubbed together: transfer of electrons, forces between charged objects. - The idea of electric field, forces acting across the space between objects not in contact.

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Key Stage 3 (7-9)	• Suggest why models are used to help us think about electrical circuits. • Explain why a central heating system in a home can be used to model an electric circuit. Describe how a model using a train, coal and power station can be used to help us think about electricity. Suggest the limitations in the use of models to look at electrical circuits • State what an electric current and potential difference are, draw symbols used for electrical components and describe how to use an ammeter and voltmeter • Describe what a series circuit is, describe and explain how current behaves in a series circuit, how a switch controls current in a series circuit and how potential difference behaves in a series circuit. • Describe what a parallel circuit is, describe and explain how current behaves in a parallel circuit, describe how a switch can control current in a parallel circuit and describe and explain how potential difference behaves in a parallel circuit. • State what electrical resistance is. • Explain what happens to the current when the potential difference of the supply is increased. • Explain how changing the number or types of components in a circuit can affect the current. • Compare the resistance of series and parallel circuits. • Describe the energy transfers when a current flows through a wire. • Describe what happens to a fuse when too much current flows through it. • Name the features of a 3-pin plug and describe how they are designed with safety in mind. • State what the term hazard means, name some rules for using electricity safely at home and at school and describe how our body uses electricity and how it can be harmful to us.
	• State what is meant by a force field, give the equation to calculate the weight of a mass. • Describe the shape of a magnetic field and describe methods for drawing magnetic fields around bar magnets. • Explain how an insulating material can be positively or negatively charged. • Sketch the electric fields for a negatively charged object and a positively charged object and explain the shape of an electric field. • Explain how switches can be used to control current through both series and parallel circuits. • Compare how current behaves in series and parallel circuits. • Compare how potential difference behaves in series and parallel circuits. • Describe factors that affect the resistance of a wire. • Write the equation to calculate resistance and give all units. • Describe a method to compare the voltage drop across resistors connected in series. • Compare the magnetic fields of an electromagnet, bar magnet and a current-carrying wire. • State the 3 factors that can increase the strength of an electromagnet. • Describe some applications of electromagnets. • Identify the independent, dependent and control variables when investigating how the number of coils in a wire affects the strength of an electromagnet. • Describe a method for measuring the strength of an electromagnet.