



Subject: Year 9 P.2 Electricity

Overarching Topic: Electricity													
<p>Why is this topic being studied at this time?</p> <p>How does it fit into the wider subject curriculum?</p>	<p>Electric charge is a fundamental property of matter everywhere. Understanding the difference in the microstructure of conductors, semiconductors and insulators makes it possible to design components and build electric circuits. Many circuits are powered with mains electricity, but portable electrical devices must use batteries of some kind. Electrical power fills the modern world with artificial light and sound, information and entertainment, remote sensing and control. The fundamentals of electromagnetism were worked out by scientists of the 19th century. However, power stations, like all machines, have a limited lifetime. If we all continue to demand more electricity this means building new power stations in every generation – but what mix of power stations can promise a sustainable future?</p> <p>Having studied Electricity at KS3 students will be able to analyse circuits and how they impact our lives. In doing so they should be able to identify the types and uses of components and why we need electrical safety measures.</p>												
	<table border="1"> <thead> <tr> <th>Essential</th> <th>Core</th> <th>Ambitious</th> </tr> </thead> <tbody> <tr> <td> <p>The Big Questions (What questions will students be able to answer upon mastery of the topic?)</p> <p>Can you identify and draw the basic circuit symbols? What is an electric current? Does the current vary if the ammeter is placed either side of a component? How can the resistance of a component be calculated using the current and potential difference? What components are ohmic conductors? Can you describe the differences between series and parallel circuits? What is the difference between direct and alternating potential difference? What energy transfers take place in electrical appliances? How does electricity get from the power station to our homes?</p> <p>TRIPLE ONLY QUESTIONS How do objects become charged? Do charged objects only attract other charged objects?</p> </td> <td> <p>What happens to the energy store of a cell/battery when it is connected into a circuit? What makes the particle move? Can you explain why the current at each point in a series circuit must be the same in terms of electrons not being lost from the wire? Why are materials with low resistance chosen for power cables? How does the type of metal used for a wire affect its resistance? Why does adding more lamps in series cause the current to decrease? What are common sources of direct and alternating potential difference? A large potential difference is dangerous. Why is the electricity sent at a high potential difference rather than a low p.d.?</p> <p>TRIPLE ONLY QUESTIONS What causes lightning? What effect does a charged object have on other objects placed near it – both charged and uncharged?</p> </td> <td> <p>How can you describe and explain why an electric current will flow in a circuit? What are superconductors? Why do expensive scart leads have gold plating on them? Why is Ohm's law not valid when the temperature of the conductor increases? Why are decorative lights for Christmas trees connected in parallel and not series? How does the earth wire help prevent electrocution? How does the amount of electrical energy transferred depends on the time the appliance is on for and the power of the appliance? How is the National Grid system an efficient way to transfer energy?</p> <p>TRIPLE ONLY QUESTIONS Why do people struck by lightning often have a burn mark at the ankle? How does the strength of the electric field vary with the distance from the charged object?</p> </td> </tr> </tbody> </table>	Essential	Core	Ambitious	<p>The Big Questions (What questions will students be able to answer upon mastery of the topic?)</p> <p>Can you identify and draw the basic circuit symbols? What is an electric current? Does the current vary if the ammeter is placed either side of a component? How can the resistance of a component be calculated using the current and potential difference? What components are ohmic conductors? Can you describe the differences between series and parallel circuits? What is the difference between direct and alternating potential difference? What energy transfers take place in electrical appliances? How does electricity get from the power station to our homes?</p> <p>TRIPLE ONLY QUESTIONS How do objects become charged? Do charged objects only attract other charged objects?</p>	<p>What happens to the energy store of a cell/battery when it is connected into a circuit? What makes the particle move? Can you explain why the current at each point in a series circuit must be the same in terms of electrons not being lost from the wire? Why are materials with low resistance chosen for power cables? How does the type of metal used for a wire affect its resistance? Why does adding more lamps in series cause the current to decrease? What are common sources of direct and alternating potential difference? A large potential difference is dangerous. Why is the electricity sent at a high potential difference rather than a low p.d.?</p> <p>TRIPLE ONLY QUESTIONS What causes lightning? What effect does a charged object have on other objects placed near it – both charged and uncharged?</p>	<p>How can you describe and explain why an electric current will flow in a circuit? What are superconductors? Why do expensive scart leads have gold plating on them? Why is Ohm's law not valid when the temperature of the conductor increases? Why are decorative lights for Christmas trees connected in parallel and not series? How does the earth wire help prevent electrocution? How does the amount of electrical energy transferred depends on the time the appliance is on for and the power of the appliance? How is the National Grid system an efficient way to transfer energy?</p> <p>TRIPLE ONLY QUESTIONS Why do people struck by lightning often have a burn mark at the ankle? How does the strength of the electric field vary with the distance from the charged object?</p>						
Essential	Core	Ambitious											
<p>The Big Questions (What questions will students be able to answer upon mastery of the topic?)</p> <p>Can you identify and draw the basic circuit symbols? What is an electric current? Does the current vary if the ammeter is placed either side of a component? How can the resistance of a component be calculated using the current and potential difference? What components are ohmic conductors? Can you describe the differences between series and parallel circuits? What is the difference between direct and alternating potential difference? What energy transfers take place in electrical appliances? How does electricity get from the power station to our homes?</p> <p>TRIPLE ONLY QUESTIONS How do objects become charged? Do charged objects only attract other charged objects?</p>	<p>What happens to the energy store of a cell/battery when it is connected into a circuit? What makes the particle move? Can you explain why the current at each point in a series circuit must be the same in terms of electrons not being lost from the wire? Why are materials with low resistance chosen for power cables? How does the type of metal used for a wire affect its resistance? Why does adding more lamps in series cause the current to decrease? What are common sources of direct and alternating potential difference? A large potential difference is dangerous. Why is the electricity sent at a high potential difference rather than a low p.d.?</p> <p>TRIPLE ONLY QUESTIONS What causes lightning? What effect does a charged object have on other objects placed near it – both charged and uncharged?</p>	<p>How can you describe and explain why an electric current will flow in a circuit? What are superconductors? Why do expensive scart leads have gold plating on them? Why is Ohm's law not valid when the temperature of the conductor increases? Why are decorative lights for Christmas trees connected in parallel and not series? How does the earth wire help prevent electrocution? How does the amount of electrical energy transferred depends on the time the appliance is on for and the power of the appliance? How is the National Grid system an efficient way to transfer energy?</p> <p>TRIPLE ONLY QUESTIONS Why do people struck by lightning often have a burn mark at the ankle? How does the strength of the electric field vary with the distance from the charged object?</p>											
<p>The Key Skills/ Techniques</p>	<p>The sophistication and application of skills will become more advanced as students' progress through the critical, core and pinnacle knowledge.</p> <table border="1"> <thead> <tr> <th>Skill/Technique</th> <th>How will this skill be developed?</th> </tr> </thead> <tbody> <tr> <td>1. Graphing & Drawing</td> <td>Draw graphs with suitable scales, axes and units. Correct line of best fit. Appreciation of anomalies and processed data. Scientific drawing of cells, concepts and scientific equipment.</td> </tr> <tr> <td>2. Variables</td> <td>Identify independent, dependent and control variables and devise experiments to include these to ensure valid results. Appreciation of uncertainty.</td> </tr> <tr> <td>3. Data Analysis</td> <td>Describe, explain and predict trends. Graph and table data interpretation. Identify links and patterns within and between topics. Statistical analysis of data to include mode/median/mean/range determination. Drawing justified conclusions from presented data.</td> </tr> <tr> <td>4. Application</td> <td>Apply known and taught theory in unfamiliar contexts. Making links to taught theory and extracting key ideas. Communicating using correct scientific terminology.</td> </tr> <tr> <td>5. Working Scientifically</td> <td>Identify hazards and planning to limit risk. Describe how to improve accuracy/precision/repeatability/reproducibility/validity. Evaluate reliability of methods and investigations, taking in to account data analysis.</td> </tr> </tbody> </table>	Skill/Technique	How will this skill be developed?	1. Graphing & Drawing	Draw graphs with suitable scales, axes and units. Correct line of best fit. Appreciation of anomalies and processed data. Scientific drawing of cells, concepts and scientific equipment.	2. Variables	Identify independent, dependent and control variables and devise experiments to include these to ensure valid results. Appreciation of uncertainty.	3. Data Analysis	Describe, explain and predict trends. Graph and table data interpretation. Identify links and patterns within and between topics. Statistical analysis of data to include mode/median/mean/range determination. Drawing justified conclusions from presented data.	4. Application	Apply known and taught theory in unfamiliar contexts. Making links to taught theory and extracting key ideas. Communicating using correct scientific terminology.	5. Working Scientifically	Identify hazards and planning to limit risk. Describe how to improve accuracy/precision/repeatability/reproducibility/validity. Evaluate reliability of methods and investigations, taking in to account data analysis.
Skill/Technique	How will this skill be developed?												
1. Graphing & Drawing	Draw graphs with suitable scales, axes and units. Correct line of best fit. Appreciation of anomalies and processed data. Scientific drawing of cells, concepts and scientific equipment.												
2. Variables	Identify independent, dependent and control variables and devise experiments to include these to ensure valid results. Appreciation of uncertainty.												
3. Data Analysis	Describe, explain and predict trends. Graph and table data interpretation. Identify links and patterns within and between topics. Statistical analysis of data to include mode/median/mean/range determination. Drawing justified conclusions from presented data.												
4. Application	Apply known and taught theory in unfamiliar contexts. Making links to taught theory and extracting key ideas. Communicating using correct scientific terminology.												
5. Working Scientifically	Identify hazards and planning to limit risk. Describe how to improve accuracy/precision/repeatability/reproducibility/validity. Evaluate reliability of methods and investigations, taking in to account data analysis.												

