# Learning Journey – P2 Electricity – Triple Science

| What have I done previously in my learning journey? | |
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| **Previously….** | You have learnt previously about current electricity. This has involved learning about:<br>• Electric current, measured in amperes, in circuits.<br>• Series and parallel circuits.<br>• Potential difference, measured in volts, in circuits.<br>• Battery and bulb ratings.<br>• Resistance, measured in ohms, as the ratio of potential difference (p.d.) to current.<br>• Differences in resistance between conducting and insulating components (quantitative)<br>You have also learnt about static electricity. This has involved learning about:<br>• Separation of positive or negative charges when objects are rubbed together.<br>• Transfer of electrons.<br>• Forces between charged objects<br>• The idea of electric field.<br>• Forces acting across the space between objects not in contact. |
| **In this topic…** | You will learn that 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. |

| We will develop our learning by studying the following each lesson: | RAG | Skills in Science checklist |
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| **P2.01 Circuit Symbols and Current**<br>• Recall simple circuit symbols and their use<br>• Define current and describe what is needed for a current to flow<br>• Calculate current from flow of charge<br>• Evaluate models which represent electricity | | ☐ Scientific Methods<br>☐ Practical<br>☐ Number Skills<br>☐ Application<br>☐ Communication |
| **P2.02 Resistance and potential Difference**<br>• Define potential difference<br>• Calculate potential difference and resistance<br>• Explain what happens when many resistors are connected in series | | ☐ Scientific Methods<br>☐ Practical<br>☐ Number Skills<br>☐ Application<br>☐ Communication |
| **P2.03 Resistance in a Length of Wire RP**<br>• Recall the equation linking current, resistance and p.d.<br>• Build a simple circuit to measure resistance<br>• Plot a graph to show the effect of length on resistance | | ☐ Scientific Methods<br>☐ Practical<br>☐ Number Skills<br>☐ Application<br>☐ Communication |
| **P2.04 Series and Parallel Circuits**<br>• State the difference between series and parallel circuits<br>• Predict the current and p.d. in series and parallel circuits | | ☐ Scientific Methods<br>☐ Practical<br>☐ Number Skills<br>☐ Application<br>☐ Communication |
| **P2.05 Resistance in Series and Parallel Circuits**<br>• Explain how the total resistance changes with series and parallel circuits<br>• Explain how to interpret resistance from graphs | | ☐ Scientific Methods<br>☐ Practical<br>☐ Number Skills<br>☐ Application<br>☐ Communication |
| **P2.06 Bulbs**<br>• Describe and explain the I-V characteristics of a resistor, filament bulb and a diode<br>• Describe what happens to the resistance of each component as the current through it changes | | ☐ Scientific Methods<br>☐ Practical<br>☐ Number Skills<br>☐ Application<br>☐ Communication |
| **P2.07 Diodes**<br>• Describe and explain the I-V characteristics of a resistor, filament bulb and a diode<br>• Describe what happens to the resistance of each component as the current through it changes | | ☐ Scientific Methods<br>☐ Practical<br>☐ Number Skills<br>☐ Application<br>☐ Communication |

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| **P2.08 Other Resistors**<br>• Describe how thermistors behave when they become hotter<br>• Describe how LDRs behave when they are exposed to more light<br>• Describe some practical applications for each component | | ☐ Scientific Methods<br>☐ Practical<br>☐ Number Skills<br>☐ Application<br>☐ Communication |
| **P2.09 Energy Transfers**<br>• Describe the power of everyday appliances<br>• Recall and rearrange equations of power using current, voltage and resistance<br>• Identify the correct formula to use from a question | | ☐ Scientific Methods<br>☐ Practical<br>☐ Number Skills<br>☐ Application<br>☐ Communication |
| **P2.10 Mains Electricity**<br>• Describe the difference between AC and DC<br>• Explain the function of each wire in a plug<br>• Explain the safety considerations when dealing with mains electricity | | ☐ Scientific Methods<br>☐ Practical<br>☐ Number Skills<br>☐ Application<br>☐ Communication |
| **P2.11 National Grid**<br>• Describe what is meant by the National Grid<br>• Explain why electricity is transmitted at a high voltage<br>• Calculate the voltage (and current) produced by transformers (**HT only**) | | ☐ Scientific Methods<br>☐ Practical<br>☐ Number Skills<br>☐ Application<br>☐ Communication |
| **P2.12 Static Charge (Physics only)**<br>• Describe the production of static electricity, and sparking, by rubbing surfaces<br>• Describe evidence that charged objects exert force of attraction or repulsion on one another when not in contact<br>• Explain how the transfer of electrons between objects can explain the phenomena of static electricity | | ☐ Scientific Methods<br>☐ Practical<br>☐ Number Skills<br>☐ Application<br>☐ Communication |
| **P2.13 Electric Fields (Physics only)**<br>• Draw the electric field pattern for an isolated charged sphere<br>• Explain the concept of an electric field<br>• Explain how the concept of an electric field helps to explain the non-contact force between charged objects as well as other electrostatic phenomena such as sparking | | ☐ Scientific Methods<br>☐ Practical<br>☐ Number Skills<br>☐ Application<br>☐ Communication |

**Key Vocabulary**

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| **Component** | **Current** | **Charge** | **Potential difference** | **Electron** | **Ampere** | **Coulomb** | **Resistance** | **Ohms** |
| **Slope** | **Intercept** | **Relationship** | **Directly proportional** | **Series** | **Parallel** | **Current** | **Voltage** | **Resistance** |
| **Gradient** | **Bulb** | **Diode** | **Resistor** | **Thermistor** | **Light dependent resistor (LDR)** | **Power rating** | **Watt** | **Kilowatt** |
| **Alternating current (AC)** | **Direct current (DC)** | **Step up transformer** | **Step down transformer** | **Static electricity** | **Insulator** | **Charged** | **Force** | **Repel** |
| **Attract** | **Non-contact force** | **Sparking** | **Electric field** | | | | | |

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| **Future Learning** | Continued study to AS level Physics builds on and develops earlier study from GCSE. It provides opportunities for the development of practical skills at an early stage in the course and lays the groundwork for later study of the many electrical applications that are important to society |
| **In careers** | 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? |