



**Yr hanner tymor hwn: Sgiliau, Gwybodaeth a Dealltwriaeth i'w ddatblygu;**

*During this half term: Skills, Information and Understanding to be developed;*

**SGILIAU / SKILLS**

The specified practical work within this topic gives learners the opportunity to plan and devise investigative approaches and methods to practical work; to safely and correctly use a range of practical equipment and materials; to keep appropriate records of experimental observations and measurements; to correctly construct circuits from circuit diagrams using d.c. power supplies, cells and a range of circuit components. There are opportunities within this topic for learners to use theories, models and ideas to develop scientific explanations. Learners can carry out experimental and investigative activities, such as the design and use of circuits to explore the variation of resistance in devices such as lamps, diodes, thermistors and LDRs, selecting techniques, instruments, apparatus and materials appropriate to the experiment. They can then make informed decisions on the use of energy saving devices in their homes. Learners can investigate electrical circuits and use this experience to learn about the risk management issues involved when handling sources of power and the safety aspects involved in the domestic use of electricity.

**GWYBODAETH / INFORMATION**

This topic explores the relationship between current and potential difference and develops the idea of resistance. It investigates how potential differences and currents are related in series and parallel circuits and how the total resistance in series and parallel circuits can be calculated. It introduces the concept of power in an electrical circuit as the energy transferred per unit time and introduces the equations which enable the power transferred by an appliance to be calculated.

**DEALLTWRIAETH / UNDERSTANDING**

There are a number of opportunities for the development of mathematical skills in this topic. These include applying the equations relating potential difference, resistance, power, energy and time to solve problems for circuits which include components in series, using the concept of equivalent resistance; using graphs to explore whether circuit elements are linear or non-linear and relate the curves produced to their function and properties. These topics afford learners the opportunity to use ratios, fractions and percentages; to change the subject of an equation; to substitute numerical values into algebraic equations using appropriate units for physical quantities; to solve simple algebraic equations; to plot two variables from experimental or other data; to interpret the slope and intercept of a linear graph; to draw and use the slope of a tangent to a curve as a measure of rate of change.

**Geiriau / Termau Allweddol;**

*Key Terms / Words; cell, switch, lamp, voltmeter, ammeter, resistor, variable resistor, fuse, LED, thermistor, LDR, diode*

**Deilliannau Dysgu / Learning Outcomes**

**Asesiad / Assessment**

**Meini Prawf Llywyddoant / Success Criteria**

**Gwaith Cartref / Homework**

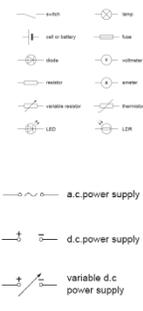
**Deilliannau Dysgu Gweithgaredd 1 / Activity 1 Learning Outcomes**  
Learners should be able to demonstrate and apply their knowledge and understanding of the symbols of components (cell, switch, lamp, voltmeter, ammeter, resistor, variable resistor, fuse, LED, thermistor, LDR, diode) used in electrical circuits

Investigation of the current-voltage (*I-V*) characteristics for a component

Answer the past examination questions that have been set. See SMHW

**Deilliannau Dysgu Gweithgaredd 2 / Activity 2 Learning Outcomes**  
Learners should be able to demonstrate and apply their knowledge and understanding of series circuits in which the current is the same throughout a circuit and voltages add up to the supply voltage; parallel circuits in which the voltage is the same across each branch and the sum of the currents in each branch is equal to the current in the supply

Answer the past examination questions that have been set. See SMHW

<p><b>Deilliannau Dysgu Gweithgaredd 3 / Activity 3 Learning Outcomes</b> Learners should be able to demonstrate and apply their knowledge and understanding of voltmeters and ammeters to measure the voltage across and current in electrical components in electrical circuits and circuits to investigate how current changes with voltage for a component e.g. for a resistor (or wire) at constant temperature, a filament lamp and a diode . Also the significance of and the relationship between current, voltage and resistance, <math>V \propto I R</math></p>		<p>Be able to draw circuit diagrams.</p> 	<p>Answer the past examination questions that have been set. See SMHW</p>
<p><b>Deilliannau Dysgu Gweithgaredd 4 / Activity 4 Learning Outcomes</b> Learners should be able to demonstrate and apply their knowledge and understanding of how adding components in series increases total resistance in a circuit; adding components in parallel decreases total resistance in a circuit . How to calculate total resistance and total current in a series circuit, a parallel circuit and circuits consisting of combinations of series and parallel connections; <math>R = R_1 + R_2</math>. Power as energy transferred per unit time: <math>E=Pt</math></p>		<p>Including appreciation of types of household circuits e.g. ring main, household lighting circuits. Can be linked to topic 1.4 - domestic electricity.</p>	<p>Answer the past examination questions that have been set. See SMHW</p>
<p><b>Deilliannau Dysgu Gweithgaredd 5 / Activity 5 Learning Outcomes</b> Learners should be able to demonstrate and apply their knowledge and understanding of power as energy transferred per unit time: <math>E Pt</math> , and that the power transferred using: power = voltage x current, <math>P=VI</math> power = <math>current^2 \times resistance</math></p>		<p>Know that an ammeter must be connected in <b>series</b> and a voltmeter must be connected in <b>parallel</b>.</p>	<p>Answer the past examination questions that have been set. See SMHW</p>
<p><b>Deilliannau Dysgu Gweithgaredd 6 / Activity 6 Learning Outcomes</b> Learners should be able to demonstrate and apply their knowledge and understanding of the design and use of circuits to explore the variation of resistance – including for lamps, diodes, ntc thermistors and LDRs</p>	<p>End of topic test</p>	<p>The circuits could include a variable resistor or a variable power supply. Including knowledge of how: • <math>R</math> varies with <math>V</math> for a lamp because temperature is not constant • <math>R</math> varies with positive (forward bias) and negative voltages (reverse bias) for a diode and that normally a diode will not conduct until a particular voltage is reached. Current plotted on the <math>y</math>-axis and voltage on the <math>x</math>-axis.</p>	<p>Revise for the end of unit test</p>



**Yr hanner tymor hwn: Sgiliau, Gwybodaeth a Dealltwriaeth i'w ddatblygu;**

*During this half term: Skills, Information and Understanding to be developed;*

**SGILIAU / SKILLS**

This unit contains opportunities for learners to explain every day and technological applications of science; to evaluate personal, social, economic and environmental implications; and make decisions based on the evaluation of evidence and arguments. Learners can be helped to understand how, through the ideas of physics, physical laws and models are expressed in mathematical form. Learners can apply the conservation of energy to many different situations, including investigating data to be able to compare the efficiency of power stations and explain why transmitting energy from power stations at high voltage is an efficient way of transferring energy.

**GWYBODAETH / INFORMATION**

This topic begins by looking at the advantages and disadvantages of renewable and non-renewable technologies for the generation of electrical power. It discusses the need for the National Grid as a nationwide electrical distribution system and the use of step-up and step-down transformers in the transmission of electricity from the power station to the home.

**DEALLTWRIAETH / UNDERSTANDING**

There are a number of opportunities for the development of mathematical skills in this topic. These include expressing in quantitative form the overall redistribution of energy within a system e.g. Sankey diagrams; applying the relationship between power, voltage and current to calculate the current flowing when electrical power is transmitted at different voltages. These topics afford learners the opportunity to recognise and use expressions in decimal form; to recognise expressions in standard form; to use ratios, fractions and percentages; to change the subject of an equation; to substitute numerical values into algebraic equations using appropriate units for physical quantities.

**Geiriau / Termau Allweddol;**

*Key Terms / Words;*      hydroelectric, wind power, wave power, tidal power, waste, crops, solar and wood

*Deilliannau Dysgu / Learning Outcomes*

*Asesiad / Assessment*

*Meini Prawf Llywydoant / Success Criteria*

*Gwaith Cartref / Homework*

**Deilliannau Dysgu Gweithgaredd 1 / Activity 1 Learning Outcomes**

Learners should be able to demonstrate and apply their knowledge and understanding of the advantages and disadvantages of renewable energy technologies (e.g. hydroelectric, wind power, wave power, tidal power, waste, crops, solar and wood) for generating electricity on a national scale using secondary information. Also the advantages and disadvantages of non-renewable energy technologies (fossil fuels and nuclear) for generating electricity

Consider economic, environmental and sustainability issues as well as generating capacities and start-up time.

Answer the past examination questions that have been set. See SMHW

**Deilliannau Dysgu Gweithgaredd 2 / Activity 2 Learning Outcomes**

Learners should be able to demonstrate and apply their knowledge and understanding of the processes involved in generating electricity in a fuel based power station. Also understand how Sankey diagrams can be used to show energy transfers; energy efficiency in terms of input energy and energy usefully transferred in a range of contexts including electrical power generation and transmission

Including energy changes and the roles of turbines and generators. Including drawing Sankey diagrams to scale.

Answer the past examination questions that have been set. See SMHW

<p><b>Deilliannau Dysgu Gweithgaredd 3 / Activity 3 Learning Outcomes</b> Learners should be able to demonstrate and apply their knowledge and understanding of the need for the National Grid as an electricity distribution system including monitoring power use and responding to changing demand</p>		<p>Recognise the term base load. The role of different types of power stations in responding to changes in demand i.e. start-up times. Understand how the National Grid makes the electricity supply more reliable. Recognise power stations, step-up and step-down transformers, transmission lines and consumers on a diagram. Interpret graphs of demand through a time period. Importing and exporting of electricity to other European countries.</p>	<p>Answer the past examination questions that have been set. See SMHW</p>
<p><b>Deilliannau Dysgu Gweithgaredd 4 / Activity 4 Learning Outcomes</b> Learners should be able to demonstrate and apply their knowledge and understanding of advantages and disadvantages of using different voltages of electricity at different points in the National Grid to include transmission of electricity and use in the home, selecting and using the equation: power = voltage x current; <math>P = VI</math></p>		<p>Step-up transformers increase voltage and decrease current – reducing energy losses in transmission lines making distribution more efficient. Step-down transformers reduce voltage to safer levels for consumers.</p>	<p>Answer the past examination questions that have been set. See SMHW</p>
<p><b>Deilliannau Dysgu Gweithgaredd 5 / Activity 5 Learning Outcomes</b> Learners should be able to demonstrate and apply their knowledge and understanding of the use of step-up and step-down transformers used in the transmission of electricity from the power station to the user in qualitative terms (they should be treated as voltage changers without any reference to how they perform this function)</p>		<p>the interpretation of given data.</p>	<p>Answer the past examination questions that have been set. See SMHW</p>
<p><b>Deilliannau Dysgu Gweithgaredd 6 / Activity 6 Learning Outcomes</b> Learners should be able to demonstrate and apply their knowledge and understanding of efficiency, reliability, carbon footprint and output to compare different types of power stations in the UK including those fuelled by fossil fuels, nuclear fuel and renewable sources of energy</p>	<p>End of topic test</p>		<p>Revise for the end of unit test</p>