



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 Llwyddoant / Success Criteria

Gwaith Cartref / Homework

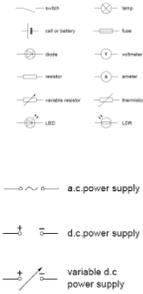
Deilliannau Dysgu Gweithgaredd 1 / Activity 1 Learning Outcomes
Learners should be able to demonstrate and apply their knowledge and understanding of the symbols of components (cell, switch, lamp, voltmeter, ammeter, resistor, variable resistor, fuse, LED, thermistor, LDR, diode) used in electrical circuits

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>Deilliannau Dysgu Gweithgaredd 3 / Activity 1 Learning Outcomes 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, $V I R$</p>		<p>Be able to draw circuit diagrams.</p> 	<p>Answer the past examination questions that have been set. See SMHW</p>
<p>Deilliannau Dysgu Gweithgaredd 4 / Activity 2 Learning Outcomes 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; $R = R1 + R2$. Power as energy transferred per unit time: $E=Pt$</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>Deilliannau Dysgu Gweithgaredd 5 / Activity 1 Learning Outcomes Learners should be able to demonstrate and apply their knowledge and understanding of power as energy transferred per unit time: $E Pt$, and that the power transferred using: power = voltage x current, $P=VI$ power = $current^2 \times resistance$</p>		<p>Know that an ammeter must be connected in series and a voltmeter must be connected in parallel.</p>	<p>Answer the past examination questions that have been set. See SMHW</p>
<p>Deilliannau Dysgu Gweithgaredd 6 / Activity 2 Learning Outcomes 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: <ul style="list-style-type: none"> • R varies with V for a lamp because temperature is not constant • R 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 y-axis and voltage on the x-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 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 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>Deilliannau Dysgu Gweithgaredd 3 / Activity 1 Learning Outcomes 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>Deilliannau Dysgu Gweithgaredd 4 / Activity 2 Learning Outcomes 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; $P = VI$</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>Deilliannau Dysgu Gweithgaredd 5 / Activity 1 Learning Outcomes 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>Deilliannau Dysgu Gweithgaredd 6 / Activity 2 Learning Outcomes 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>



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

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

SGILIAU / SKILLS

There are opportunities within this topic for learners to use models, as in the particle model of matter to develop an understanding of the different methods of the transfer of thermal energy. There are also opportunities for learners to use scientific knowledge and understanding to pose scientific questions and present scientific arguments and ideas. There are opportunities within this topic for learners to use theories, models and ideas to develop scientific explanations. For example, the use of the particle model of matter to explain the different properties and behaviour of solids, liquids and gases. There are also opportunities within this topic for learners to carry out experimental activities, using appropriate risk management.

GWYBODAETH / INFORMATION

This topic explores the idea that temperature differences can lead to the transfer of thermal energy by conduction, convection and radiation. It uses the molecular model of matter to explain the differences in the mechanism of thermal energy transfer by these three methods. It uses the ideas developed to discuss the efficiency and cost effectiveness of different methods of reducing thermal energy losses in the domestic situation.

DEALLTWRIAETH / UNDERSTANDING

There are a number of opportunities for the development of mathematical skills in this topic. These include applying the relationship between density, mass and volume; calculating the cost effectiveness and efficiency of different methods of reducing energy loss from the home. 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; to calculate areas of rectangles and volumes of cubes.

Geiriau / Termau Allweddol;

Key Terms / Words; conduction, convection and radiation

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 how temperature differences lead to the transfer of energy thermally by conduction, convection and radiation

Conduction occurs well in metals and convection occurs in fluids.

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 equation: density = mass/volume and explain the differences in density between the three states of matter in terms of the arrangements of the atoms or molecules

Be able to work in both g/cm³ and kg/m³ but no conversions will be expected.

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

<p>Deilliannau Dysgu Gweithgaredd 3 / Activity 1 Learning Outcomes Learners should be able to demonstrate and apply their knowledge and understanding of conduction using a model of molecular motion and account for the better conduction in metals by the presence of mobile electrons, and convection in liquids and gases in terms of molecular behaviour and variations in volume and density</p>		<p>Free electrons, de-localised electrons, mobile electrons are all suitable terms to use.</p>	<p>Answer the past examination questions that have been set. See SMHW</p>
<p>Deilliannau Dysgu Gweithgaredd 4 / Activity 2 Learning Outcomes Learners should be able to demonstrate and apply their knowledge and understanding of how energy loss from houses can be restricted e.g. loft insulation, double glazing, cavity wall insulation and draught excluders</p>		<p>For example: "when a section of liquid (gas) is heated the molecules gain energy and move more vigorously. As a result this section of the liquid increases in volume and its density decreases. This less dense liquid then rises and colder more dense liquid sinks to take its place. This process continues until all of the liquid is heated." Learners need to be familiar with the term convection currents.</p>	<p>Answer the past examination questions that have been set. See SMHW</p>
<p>Deilliannau Dysgu Gweithgaredd 5 / Activity 1 Learning Outcomes Learners should be able to demonstrate and apply their knowledge and understanding of the cost effectiveness and efficiency of different methods of reducing energy loss from the home, to compare their effectiveness; use data to compare the economics of domestic insulation techniques, including calculating the payback time; the economic and environmental issues surrounding controlling energy loss</p>		<p>Link method of heat transfer reduction to each method of insulation. Loft insulation and cavity wall insulation reduce heat loss by both conduction and convection. Be able to explain about the importance of "trapped air." An awareness of the environmental benefits of house insulation is required.</p>	<p>Answer the past examination questions that have been set. See SMHW</p>
<p>Deilliannau Dysgu Gweithgaredd 6 / Activity 2 Learning Outcomes Learners should be able to demonstrate and apply their knowledge and understanding of how data can be obtained and used to investigate the cost of using a variety of energy sources for heating and transport</p>	<p>End of topic test</p>	<p>Consideration of the different costs of energy sources of vehicles and the range they allow: e.g. the fuel efficiency of cars, the cost-efficiency of oil-fired heating etc.</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

Learners can carry out experimental and investigative activities, such as the efficiency of energy transfer of an electric kettle. They will develop the skill of carrying out experiments appropriately, having due regard for the manipulation of apparatus, the accuracy of the measurements and health and safety considerations. 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 covers the functions of fuses and other devices which are designed to prevent current flow when faults develop in domestic circuits. It introduces the concept of the ring main circuit and explains the functions of the live, neutral and earth wires. It compares the cost effectiveness of using different renewable energy sources such as solar and wind energy to supplement the user's needs in the domestic situation.

DEALLTWRIAETH / UNDERSTANDING

There are a number of opportunities for the development of mathematical skills in this topic. These include applying the equations relating units used, power and time to calculate the cost of electrical energy; determining the efficiency of energy transfer, e.g. whilst using an electric kettle. 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 construct and interpret tables and diagrams.

Geiriau / Termau Allweddol;

Key Terms / Words; fuses, miniature circuit breakers (mcb) and residual current circuit breakers (rccb)

Deilliannau Dysgu / Learning Outcomes

Asesiad / Assessment

Meini Prawf Llwyddoant / 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 kilowatt (kW) as a convenient unit of power in the domestic context and the kilowatt hour (kWh) as a unit of energy. Also the cost of electricity using the equations:

$$\begin{aligned} \text{units used (kWh)} &= \text{power (kW)} \times \text{time (h)} \\ \text{cost} &= \text{units used} \times \text{cost per unit} \end{aligned}$$

1 kWh is the electrical energy converted by a 1 kW appliance used for 1 hour. Be able to convert between kWh and joules. Conversions between W and kW. Also between minutes/hours and hours/days and pence/£.

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 how data can be obtained either directly or using secondary sources (e.g. through the energy banding (A-G) and the power ratings of domestic electrical appliances) to investigate the cost of using them and the difference between alternating current (a.c.) and direct current (d.c.)

An alternating current (a.c.) is one that continuously changes direction. Mains electricity is an a.c. supply. A direct current (d.c.) has a constant direction. Cells and batteries provide d.c. Graphical representation of a.c. and d.c. voltages on CRO screens. The UK mains supply is about 230V and has a frequency of 50 cycles per second (50Hz).

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

<p>Deilliannau Dysgu Gweithgaredd 3 / Activity 1 Learning Outcomes Learners should be able to demonstrate and apply their knowledge and understanding of the functions of fuses, miniature circuit breakers (mcb) and residual current circuit breakers (rccb) including calculations of appropriate fuse ratings</p>		<p>Unlike fuses, mcb circuit breakers can be easily reset and use an electromagnet to open a switch if the current goes above a certain value. rccb circuit breakers switch off the circuit when there is a difference between the currents in the live and neutral wires of the appliance. They are more sensitive than mcb breakers. mcbs protect the circuit whilst rccbs protect the user.</p>	<p>Answer the past examination questions that have been set. See SMHW</p>
<p>Deilliannau Dysgu Gweithgaredd 4 / Activity 2 Learning Outcomes Learners should be able to demonstrate and apply their knowledge and understanding of the ring main, including the functions of the live, neutral and earth wires</p>		<p>The function of the live wire is to carry current to the house/appliance at a high voltage. The neutral wire completes the circuit and carries current away at low/zero voltage. The earth wire is a safety wire that can carry current safely into the ground if a fault develops in a metal framed appliance. Appliances with metal cases are usually earthed. If the casing becomes live, a large current can flow along the low-resistance earth wire and this high current "will blow" a fuse or trip a mcb. Switches and fuses are placed into the live wire.</p>	<p>Answer the past examination questions that have been set. See SMHW</p>
<p>Deilliannau Dysgu Gweithgaredd 5 / Activity 1 Learning Outcomes Learners should be able to demonstrate and apply their knowledge and understanding of the cost effectiveness of introducing domestic solar and wind energy equipment, including fuel cost savings and payback time by using data</p>		<p>An understanding of output reliability and ability to meet domestic demand feed-in tariffs.</p>	<p>Answer the past examination questions that have been set. See SMHW</p>
<p>Deilliannau Dysgu Gweithgaredd 6 / Activity 2 Learning Outcomes Learners should be able to demonstrate and apply their knowledge and understanding of how to investigate energy transfers in a range of contexts including interpreting and analysing data; evaluation of validity of the data and methods, e.g. The energy output from a renewable source (e.g. wind turbine: construction and location) Efficiency of energy transfer (e.g. using an electric kettle)</p>	<p>End of topic test</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

Questions set on this topic will assess learners' abilities to apply scientific knowledge to practical contexts; to present data in appropriate ways; to evaluate results and draw conclusions. The specified practical work in this topic gives learners the opportunity to make and record observations; to keep appropriate records of experimental activities; to apply the cycle of collecting, presenting and analysing data. There are opportunities within this topic for learners to carry out experimental and investigative activities, including appropriate risk management, in a range of contexts.

GWYBODAETH / INFORMATION

This topic covers the basic properties of transverse and longitudinal waves and the differences between them. It introduces the wave equation and gives learners the fundamental ideas and skills they need to study both electromagnetic and sound waves.

DEALLTWRIAETH / UNDERSTANDING

There are a number of opportunities for the development of mathematical skills in this topic. These include applying formulae relating velocity, frequency and wavelength; showing how changes in velocity and wavelength in refraction from one medium to another are inter-related. These topics afford learners the opportunity to use ratios, fractions and percentages; to substitute numerical values into algebraic equations using appropriate units for physical quantities; to change the subject of an equation.

Geiriau / Termiau Allweddol;

Key Terms / Words; amplitude, wavelength, frequency and wave speed, normal, angles of incidence / reflection / refraction

Deilliannau Dysgu / Learning Outcomes

Asesiad / Assessment

Meini Prawf Llwyddoant / 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 difference between transverse and longitudinal waves and the description of a wave in terms of amplitude, wavelength, frequency and wave speed

Be able to define both types of waves with comparison of the direction of vibrations and the direction of travel of the wave included. Be able to give examples of a transverse wave and a longitudinal wave. Know that amplitude is the maximum displacement from rest. Be able to define only the term frequency i.e. the number of cycles of a wave that occur in one second.

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 graphical representation of a transverse wave, including labelling the wavelength and amplitude. Also understand diagrams showing plane wave fronts being reflected or refracted, e.g. as shown by water waves in a ripple tank

Be able to construct a wave diagram from given data. Displacement – distance and displacement – time graphs are required. Only at plane boundaries required. Knowledge of the terms normal, angles of incidence / reflection / refraction required. Should know what happens to the speed / frequency / wavelength / direction of water waves as they move from deep to shallow water (and vice versa).

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

<p>Deilliannau Dysgu Gweithgaredd 3 / Activity 1 Learning Outcomes Learners should be able to demonstrate and apply their knowledge and understanding of refraction in terms of the speed of waves on either side of a refracting boundary and the effect on the wavelength of the waves. The term "radiation" may be applied to both electromagnetic waves and to energy given out by radioactive materials</p>		<p>Changes in wavelength are proportional to changes in wave speed.</p>	<p>Answer the past examination questions that have been set. See SMHW</p>
<p>Deilliannau Dysgu Gweithgaredd 4 / Activity 2 Learning Outcomes Learners should be able to demonstrate and apply their knowledge and understanding of the characteristics of radioactive emissions and short wavelength parts of the electromagnetic spectrum (ultraviolet, X-ray and gamma ray) as ionising radiation, able to interact with atoms and to damage cells by the energy they carry. The difference between the different regions of the electromagnetic spectrum [radio waves, microwaves, infra-red, visible light, ultraviolet, X-rays and gamma rays] in terms of their wavelength and frequency and know that they all travel at the same speed in a vacuum</p>		<p>Be able to name the 7 regions of the EM spectrum. Have knowledge of the order in which the regions are arranged in terms of wavelength, frequency or energy.</p>	<p>Answer the past examination questions that have been set. See SMHW</p>
<p>Deilliannau Dysgu Gweithgaredd 5 / Activity 1 Learning Outcomes Learners should be able to demonstrate and apply their knowledge and understanding of the fact that all regions of the electromagnetic spectrum transfer energy and certain regions are commonly used to transmit information. A description of waves in terms of their wavelength, frequency, speed and amplitude</p>		<p>Higher frequencies transmit higher energies. Awareness of the uses of the different regions of the EM spectrum. Including the relationship between wavelength and frequency i.e. inversely proportional and between amplitude and energy.</p>	<p>Answer the past examination questions that have been set. See SMHW</p>
<p>Deilliannau Dysgu Gweithgaredd 6 / Activity 2 Learning Outcomes Learners should be able to demonstrate and apply their knowledge and understanding of the equations: $\text{wave speed} = \text{wavelength} \times \text{frequency}; \text{ and}$ $\text{distance} = \text{speed} \times \text{time}$ applied to the motion of waves, including electromagnetic waves. An understanding of communication using satellites in geosynchronous/geostationary orbit</p>	<p>End of topic test</p>	<p>Understand that satellite communication requires the use of microwaves to pass through the atmosphere. The use of more than 1 satellite is required. A geosynchronous satellite has an orbit time of 24 h however the object in this orbit only returns to exactly the same position in the sky after a period of one day. A geostationary orbit is a particular type of geosynchronous orbit. The distinction being that while an object in geosynchronous orbit returns to the same point in the sky at the same time each day, an object in geostationary orbit never leaves that position.</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

Questions set on this unit will assess learners' abilities to explain every day and technological applications of science; to process and analyse data using appropriate mathematical skills; to present data in appropriate ways. There are opportunities within this topic for learners to consider applications and implications of science and to evaluate their associated risks.

GWYBODAETH / INFORMATION

This topic studies the conditions necessary for the total internal reflection of light. It introduces both medical and communications applications of total internal reflection using optical fibres.

DEALLTWRIAETH / UNDERSTANDING

Learners should be prepared to apply the knowledge, understanding and skills specified in a range of theoretical, practical, industrial and environmental contexts.

Geiriau / Termau Allweddol;

Key Terms / Words; Endoscopy, optical fibres, CT scans and X-rays.

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 conditions for total internal reflection of light

Definition of the critical angle and knowledge of what it is, is required. Know the conditions required for TIR to occur: i.e. angle of incidence is greater than the critical angle, movement from a more dense to a less dense material. Know the typical values for critical angle

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 how optical fibres rely on total internal reflection for their operation

Be able to interact with simple TIR ray diagrams. Knowledge of monomode optical fibres.

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

<p>Deilliannau Dysgu Gweithgaredd 3 / Activity 1 Learning Outcomes</p> <p>Learners should be able to demonstrate and apply their knowledge and understanding of a comparison of the advantages and disadvantages of optical fibres and geosynchronous satellites for long range communication</p>		<p>Thorough interpretation of data contained within a question. The use of more than 1 satellite is required. Know which types of em waves are used in optical fibres and by satellites.</p>	<p>Answer the past examination questions that have been set. See SMHW</p>
<p>Deilliannau Dysgu Gweithgaredd 4 / Activity 2 Learning Outcomes</p> <p>Learners should be able to demonstrate and apply their knowledge and understanding of a comparison of the advantages and disadvantages of optical fibres and geostationary satellites for long distance communication</p>			<p>Answer the past examination questions that have been set. See SMHW</p>
<p>Deilliannau Dysgu Gweithgaredd 5 / Activity 1 Learning Outcomes</p> <p>Learners should be able to demonstrate and apply their knowledge and understanding of the use of optical fibres for remote imaging, including endoscopic medical examinations</p>			<p>Answer the past examination questions that have been set. See SMHW</p>
<p>Deilliannau Dysgu Gweithgaredd 6 / Activity 2 Learning Outcomes</p> <p>Learners should be able to demonstrate and apply their knowledge and understanding of a comparison of endoscopy with CT scans for obtaining medical information</p>	<p>End of topic test</p>	<p>Endoscopy uses optical fibres and CT scans use X-rays. Endoscopy is used to investigate specific areas of the body and it is less harmful than CT scans. CT scans are used to generate more overall images of the body and are a higher risk than endoscopes. CT scans are 3D.</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

There are opportunities within this topic for learners to use models to explain the passage of P and S waves through the Earth and to deduce the epicentre of an earthquake by using seismic records. There are also opportunities for learners to use scientific knowledge and understanding to pose scientific questions and to present scientific arguments and ideas. There are opportunities within this topic for learners to use theories, models and ideas to develop scientific explanations. For example, how the existence of the S wave shadow zone has led geologists to a model of the Earth with a solid mantle and a liquid core.

GWYBODAETH / INFORMATION

This topic explores the properties of seismic P, S and surface waves and how these properties enable seismic records to locate the epicentres of earthquakes.

DEALLTWRIAETH / UNDERSTANDING

There are a number of opportunities for the development of mathematical skills in this topic. These include applying formulae relating speed, distance and time to calculate the lag time between the arrival of P and S waves from the epicentre of an earthquake. These topics afford learners the opportunity to use ratios, fractions and percentages; to substitute numerical values into algebraic equations using appropriate units for physical quantities; to change the subject of an equation.

Geiriau / Termau Allweddol;

Key Terms / Words; seismic P waves, S waves and surface waves.

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 properties of seismic P waves, S waves and surface waves, in terms of their nature, speed and ability to penetrate different materials

The different materials refer to solid rock and liquid /molten rock. Surface waves are the slowest, longitudinal, travel along the surface and cause the most damage. Detailed knowledge of surface waves e.g. Love and Rayleigh waves is not required. Note that the mantle can be assumed to be solid in the context of S waves travelling through it.

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 fact that P waves are longitudinal and S waves are transverse

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

<p>Deilliannau Dysgu Gweithgaredd 3 / Activity 1 Learning Outcomes</p> <p>Learners should be able to demonstrate and apply their knowledge and understanding of simplified seismic records, to allow for the identification of the lag time between the arrival of the P and S waves to occur and to use the seismic records from several stations to locate the epicentre of an earthquake.</p>		<p>Be able to interact with data contained within a question. This could include a seismogram. Knowledge about the focus of an earthquake is required.</p>	<p>Answer the past examination questions that have been set. See SMHW</p>
<p>Deilliannau Dysgu Gweithgaredd 4 / Activity 2 Learning Outcomes</p> <p>Learners should be able to demonstrate and apply their knowledge and understanding of the path of P and S waves through the Earth.</p>		<p>Knowledge and understanding of terms such as crust, mantle, inner core and outer core will be referred to. Assumption that the outer core is liquid. Appreciate that curved paths occur due to refraction.</p>	<p>Answer the past examination questions that have been set. See SMHW</p>
<p>Deilliannau Dysgu Gweithgaredd 5 / Activity 1 Learning Outcomes</p> <p>Learners should be able to demonstrate and apply their knowledge and understanding of how existence of the S wave shadow zone as shown on seismic records has led geologists to a model of the Earth with a solid mantle and a liquid core</p>			<p>Answer the past examination questions that have been set. See SMHW</p>
<p>Deilliannau Dysgu Gweithgaredd 6 / Activity 2 Learning Outcomes</p> <p>Learners should prepare for the end of unit test.</p>	<p>End of topic test</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

There are opportunities within this topic for learners to use models, as in the particle model of matter to develop the idea that differences between pressure and temperature are the drivers of change. There are also opportunities for learners to use scientific knowledge and understanding to pose scientific questions and to present scientific arguments and ideas. There are opportunities within this topic for learners to use theories, models and ideas to develop scientific explanations. For example, the use of the particle model of matter to explain the variation of pressure in gases with volume and temperature. There are also opportunities within this topic for learners to carry out experimental activities, using appropriate risk management.

GWYBODAETH / INFORMATION

This topic introduces the concept of pressure and uses this to discuss the behaviour of a fixed mass of gas under different conditions of pressure, volume and temperature. It develops the idea of absolute zero and how this can define an absolute scale of temperature. The equations relating heat transfer to changes in temperature and state are also introduced.

DEALLTWRIAETH / UNDERSTANDING

There are a number of opportunities for the development of mathematical skills in this topic. These include applying the relationship between pressure and volume for a fixed mass of gas at constant temperature and in other circumstances where one of the other variables remains constant; using the equations relating heat transfer to changes of temperature and state. 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; to calculate areas of rectangles.

Geiriau / Termau Allweddol;

Key Terms / Words; Pressure, Force and area

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 concept of pressure qualitatively and select and use the relationship:

$$\text{Pressure} = \frac{\text{force}}{\text{area}}$$

1 Pascal (Pa) is equivalent to 1 N/m².

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 behaviour of a fixed quantity of gas under conditions of varying pressure, volume and temperature

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

<p>Deilliannau Dysgu Gweithgaredd 3 / Activity 1 Learning Outcomes</p> <p>Learners should be able to demonstrate and apply their knowledge and understanding of how the behaviour of gases leads to the concepts of absolute zero and an absolute scale of temperature</p>		<p>The ability to analyse data or information displayed graphically.</p>	<p>Answer the past examination questions that have been set. See SMHW</p>
<p>Deilliannau Dysgu Gweithgaredd 4 / Activity 2 Learning Outcomes</p> <p>Learners should be able to demonstrate and apply their knowledge and understanding of temperatures in kelvin and use the relationship:</p> $\frac{pV}{T} = \text{constant}$ <p>for gases including circumstances in which one of the three variables remains constant</p>		<p>Temperature (K) = Temperature (°C) + 273</p> $\frac{p_1 V_1}{T_1} = \frac{p_2 V_2}{T_2}$	<p>Answer the past examination questions that have been set. See SMHW</p>
<p>Deilliannau Dysgu Gweithgaredd 5 / Activity 1 Learning Outcomes</p> <p>Learners should be able to demonstrate and apply their knowledge and understanding of the variation of the pressure of gases with volume and temperature qualitatively by applying a model of molecular motion and collisions</p>		<p>Explanations using molecular model theory are expected.</p> <p>No knowledge of the assumptions of kinetic theory is required.</p>	<p>Answer the past examination questions that have been set. See SMHW</p>
<p>Deilliannau Dysgu Gweithgaredd 6 / Activity 2 Learning Outcomes</p> <p>Learners should be able to demonstrate and apply their knowledge and understanding of the equations:</p> $Q = mc \Delta\theta \quad \text{and} \quad Q = mL$ <p>relating the heat transfer to changes of temperature and state respectively. Also the explanation of changes in temperature and state of a substance, resulting from heat transfer, in terms of the behaviour of molecules</p>	<p>End of topic test</p>	<p>Appreciation that latent heat does not increase the temperature of matter – the energy supplied is used for the change of state to take place. Define specific heat capacity as the amount of heat energy required to increase the temperature of 1 kg of a substance by 1 °C. Define specific latent heat of fusion as the amount of heat energy needed to change a mass of 1 kg of the substance from a solid at its melting point into a liquid at the same temperature.</p>	<p>Revise for the end of unit test</p>