

PHYSICS - Year 10

What are the intended aims for this year's curriculum? To be able to understand the uses and dangers of radioactivity To be able to describe how we study space To be able to explain the concepts of electricity To be able to explain how particles behave when their energy level changes											
Term 1		Term 2		Term 3		Term 4		Term 5		Term 6	
Topic(s): Radioactivity	Aim of A&R	Topic(s): Electricity	Aim of A&R	Topic(s): Electrical power and static	Aim of A&R	Topic(s): Magnetism, the motor effect and electromagnetic induction	Aim of A&R	Topic(s): Particle model	Aim of A&R	Topic(s): Forces and matter	Aim of EoY exam
'Big idea(s)' / fundamental concepts	What happens to the energy in atoms?	How do I describe electricity?		What can electricity do?		How can magnets be useful?		What is the physics of particles?		What is the physics of matter?	
Knowledge to be learnt	Atomic models Background radiation Types of radiation Half-life and decay Dangers and uses of radioactivity Fission and fusion	Current, potential difference and resistance Charge and energy Transferring electrical energy		Transferring electrical energy Electrical power Electrical safety Dangers and uses of static electricity Electric fields		Magnetic fields Electromagnetism Magnetic forces Electromagnetic induction The national grid Transformers and energy		Particles and density Energy and changes of state Energy calculations (specific heat capacity/latent heat)		Gas temperature, pressure and volume Extension and energy transfers Pressure in fluids Pressure and up thrust	
Key vocabulary	Absorption spectrum Geiger-Muller tube count rate alpha beta positron unstable fission fusion activity half-life becquerel	Component conserved coulomb charge diode thermistor light-dependent resistor		watt hertz alternating national grid fuse earthed uniform point charge		Induced solenoid motor effect flux density commutator generator dynamo alternator transformer		Sublimation deposition density specific heat capacity specific latent heat kelvin		pascals absolute zero elastic non-linear spring constant	
The role of reading and comprehension	Activities could include: Interpreting questions based on the topic turning written information into summary diagrams Reading information on radiation and its use.	Activities could include: Turning descriptions about circuits into diagrams Interpreting exam questions		Activities could include: Researching electrical safety devices Reading information on uses and dangers of static Interpreting exam questions		Activities could include: Interpreting exam questions Defining key terms Turning descriptions into diagrams		Activities could include: Representing descriptions graphically Interpreting exam questions		Activities could include: Representing descriptions graphically Interpreting exam questions	
The role of independent extended writing	Activities could include: Describing the different forms of background radiation Explaining the uses of radioactivity.	Activities could include: Writing scientific conclusions Describing resistance in different components		Activities could include: Writing scientific conclusions Describing the uses and dangers of static		Activities could include: Explaining how motors and generators work Explaining the role of transformers in the National Grid		Activities could include: Explaining the patterns in graphs		Activities could include: Explaining the links between temperature, pressure and volume for a gas Describing pressure in fluids	
The role of maths/ numeracy	Calculating half-life graphically and numerically	Use of repeat readings and averages, use of graphs, identifying anomalies Calculating charge, power and resistance using equations		Use of repeat readings and averages, use of graphs, identifying anomalies		Calculating force on a conducting wire Calculating current, voltage and power in transformers		Converting units. Use of standard form. Use of graphs. Calculating energy in changes of state/increasing temperature		Converting units. Use of standard form. Use of graphs. Calculating energy transfers when stretching materials	
Links to careers/ aspirations	Power station engineer Nuclear physicist Radiographer	Electrician Electrical engineer		Mechanic Robotic engineer		Sound engineer National Grid worker		Engineering Explorer		Sports analyst. Engineering	
Core skills	To be able to: Describe the different types of radiation Describe the uses of radioactivity in the home and in industry Describe how we protect ourselves from radiation How radiation is used to detect and treat cancer Explain the advantages and disadvantages of nuclear power	To be able to: Calculate charge, power and resistance Describe components with changing resistance		To be able to: Describe electrical safety features in the home Explain how earthing works Explain the shape and size of electric fields and their effects		To be able to: Describe permanent and induced magnets Explain the size and effects of a magnetic field around a current-carrying wire Explain the role of transformers in the National Grid		To be able to: Explain different densities of substances Calculate specific heat capacity and specific latent heat		To be able to: Explain the effects of changing gas temperature on pressure and volume Describe how to calculate the spring constant and work done when stretching Describe pressure in fluids	
Home learning opportunities	Activities could include: Research the background radiation found in homes/local areas Find examples of radiation being used in the home or local area	Activities could include: Create circuits using household items		Activities could include: Find different electrical safety devices in the home Research how static is used in the local area		Activities could include: Investigate the uses of motors and generators		Activities could include: Research the specific heat capacity and latent heat of different materials		Activities could include: Find examples of elastic and inelastic objects and investigate to find their spring constant	

<p>Lessons and learning objectives</p>	<p>Lesson 1 – Atomic models LO: Describe how our model of the atom has changed over time Stretch LO: Explain the use of different investigations in the evolution of the atomic model</p> <p>Lesson 2 – Inside atoms LO: Describe the structure of the atom Stretch LO: Explain what an isotope is</p> <p>Lesson 3 – Electrons and orbits LO: Describe electron orbits and ionisation Stretch LO: Explain the link between energy, the emission of light and electron orbits.</p> <p>Lesson 4 – Background radiation LO: Explain what background radiation is, where it comes from and how it is measured Stretch LO: Explain why taking background radiation measurements is important</p> <p>Lesson 5 – Types of radiation LO: Describe the structure and properties of ionising radiation Stretch LO: Explain differences in the properties of the types of ionising radiation.</p> <p>Lesson 6 – Radioactive decay LO: Describe the different ways an unstable atom can decay Stretch LO: Use nuclear equations to represent radioactive decays</p> <p>Lesson 7 – Half-life LO: Describe half-life and how to calculate it Stretch LO: Use graphical and table methods for calculating half-life and decay</p> <p>Lesson 8 – Using radioactivity LO: Describe the uses of ionising radiation Stretch LO: Link characteristics of radioactive sources to their use</p> <p>Lesson 9 – Dangers of radioactivity LO: Describe the dangers of ionising radiation and precautions taken Stretch LO: Explain the differences between contamination and irradiation</p> <p>Lesson 10 – Radioactivity in medicine</p>	<p>Lesson 1 – Electric circuits LO: Describe series and parallel circuits and how to draw the components within them Stretch LO: Explain the link between atomic structure and flow of current</p> <p>Lesson 2 – Current and potential difference LO: Describe current and potential difference and how you measure them Stretch LO: Explain what happens to current and potential difference at a junction</p> <p>Lesson 3 – Current, charge and energy LO: How to calculate charge, energy transferred and potential difference Stretch LO: Rearrange and apply the charge equation</p> <p>Lesson 4 – Resistance LO: Describe electrical resistance and use an equation to calculate it Stretch LO: Rearrange and apply the resistance equation</p> <p>Lesson 5 – More about resistance LO: Describe how different electrical components affect resistance Stretch LO: Explain why resistance is affected by different components</p> <p>Lesson 6 – Investigating resistance in a filament lamp LO: Investigate the effect of changing potential difference and current on resistance in a filament lamp Stretch LO: How to create or extend a given investigation to consider other variables</p> <p>Lesson 7 – Investigating resistance in series and parallel LO: Investigate the effect of series and parallel circuits on resistance in a filament lamp Stretch LO: How to create or extend a given investigation to consider other variables</p>	<p>Lesson 1 – Transferring energy LO: Describe the transfer of energy in electrical circuits and how to calculate it Stretch LO: Explain how unwanted energy transfers are reduced in wires</p> <p>Lesson 2 – Electrical Power LO: How to calculate power and electrical power Stretch LO: Rearrange and apply the charge equations</p> <p>Lesson 3 – Transferring energy by electricity LO: Describe how energy is transferred by different devices and power supplies Stretch LO: Explain the advantages and disadvantages of different power supplies</p> <p>Lesson 4 – Electrical safety LO: Describe the electrical safety features found in the home Stretch LO: Explain how and when to use different electrical safety features</p> <p>Lesson 5 – Charges and static electricity LO: Explain how different objects become charged Stretch LO: Apply knowledge of static electricity to unknown situations</p> <p>Lesson 6 – Dangers of static electricity LO: Describe the dangers of static electricity Stretch LO: Explain earthing and why it is needed</p> <p>Lesson 7 – Uses of static electricity LO: Describe the uses of static electricity Stretch LO: Apply knowledge of static electricity to unknown uses</p> <p>Lesson 8 – Electric fields LO: Describe electric fields in different situations Stretch LO: Describe how electric fields help to explain static electrical effects</p>	<p>Lesson 1 – Magnets and magnetic fields LO: Describe the shape of magnetic fields and how they are plotted Stretch LO: Explain how we know the Earth has a magnetic field</p> <p>Lesson 2 – Electromagnetism LO: Describe the magnetic field around current carrying wires Stretch LO: Describe the factors that affect the strength of a magnetic field around a wire</p> <p>Lesson 3 – Magnetic forces LO: Describe how electricity and magnetism combine to produce forces Stretch LO: Describe how to calculate the force produced by a current in a magnetic field</p> <p>Lesson 4 – Electric motors LO: Describe simple electric motors and how they work Stretch LO: Describe that factors that affect power of a motor</p> <p>Lesson 5 - Electromagnetic induction LO: Explain how to produce a current using a magnet and conductor Stretch LO: Describe that factors that affect power of a generator</p> <p>Lesson 6 – The national grid LO: Explain how electricity is moved around the country Stretch LO: explain the role of transformers in the national grid</p> <p>Lesson 7 – Transformers and energy LO: How to calculate power, current and potential difference produced by transformers Stretch LO: Explain the advantage of transmitting electricity at high voltages</p>	<p>Lesson 1 – Particles and density LO: Describe kinetic theory and how to calculate density Stretch LO: Rearrange and apply the density equation</p> <p>Lesson 2 – Investigating density LO: Investigate the density of different solids and liquids Stretch LO: How to create or extend a given investigation to consider other variables</p> <p>Lesson 3 – Energy and changes of state LO: Explain the effect of heating on a substance Stretch LO: Explain heating and cooling curves for different substances</p> <p>Lesson 4 – Energy calculations LO: How to calculate specific heat capacity and specific latent heat Stretch LO: Rearrange and apply the specific heat capacity and latent heat equations</p> <p>Lesson 5 – Investigating melting ice LO: Investigate the temperature of ice as it melts Stretch LO: How to create or extend a given investigation to consider other variables</p> <p>Lesson 6 – investigating specific heat capacity LO: Investigate the specific heat capacity of water Stretch LO: How to create or extend a given investigation to consider other variables</p>	<p>Lesson 1 – Gas temperature and pressure LO: Describe how temperature of a gas affects pressure Stretch LO: Explain the differences between the Kelvin and Celsius temperature scales</p> <p>Lesson 2 – Gas pressure and volume LO: Describe how volume and pressure of a gas affect each other Stretch LO: Explain the effect of doing work on the temperature of a gas</p> <p>Lesson 3 – Bending and stretching LO: Describe elastic and inelastic distortions Stretch LO: Explain the link between force and extension in different materials</p> <p>Lesson 4 – Extension and energy transfers LO: How to calculate the spring constant of a spring Stretch LO: Rearrange and apply the spring constant equation</p> <p>Lesson 5 – Investigating springs LO: Investigate the work done when stretching a spring Stretch LO: How to create or extend a given investigation to consider other variables</p> <p>Lesson 6 – Pressure in fluids LO: How to calculate pressure Stretch LO: Explain how pressure in a liquid changes with depth</p> <p>Lesson 7 – Pressure and upthrust LO: How to calculate pressure in a liquid and explain floating and sinking Stretch LO: Rearrange and apply the pressure in a liquid equation</p>
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LO: Describe the uses of radioactive substances in the detection and treatment of diseases
Stretch LO: Explain why some isotopes need to be produced near where they are used

Lesson 11 – Nuclear energy
LO: Describe the use of nuclear energy in generating electricity
Stretch LO: Explain the advantages and disadvantages of nuclear energy

Lesson 12 – Nuclear fission
LO: Describe the process of nuclear fission
Stretch LO: Explain how nuclear fission can be controlled

Lesson 13 – Nuclear fusion
LO: Describe the process of nuclear fusion
Stretch LO: Explain why practical fusion in power stations hasn't happened yet

