

Key Stage 4 Long Term Planning

Year 10

Curriculum Area: Physics Trilogy Science

| Year 10 | Autumn 1 | Autumn 2 | Spring 1 | Spring 2 | Summer 1 | Summer 2 |
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| Syllabus | AQA Physics Collins - Chapter 2 Electricity | | AQA Physics Collins - Chapter 5 Forces | | AQA Physics Collins - Chapter 6 Waves | |
| Links to prior KS3 learning | Electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge Potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current Differences in resistance between conducting and insulating components (quantitative). | | Forces as pushes or pulls, arising from the interaction between two objects Using force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces moment as the turning effect of a force Forces measured in newtons, measurements of stretch or compression as force is changed work done and energy changes on deformation non-contact forces: gravity forces acting at a distance on Earth and in space, forces between magnets and forces due to static electricity. Pressure in liquids, increasing with depth; upthrust effects, floating and sinking Opposing forces and equilibrium Forces being needed to cause objects to stop or start moving, or to change their speed or direction of motion (qualitative only) Change depending on direction of force and its size. | | Frequencies of sound waves, measured in hertz (Hz); echoes, reflection and absorption of sound Sound needs a medium to travel, the speed of sound in air, in water, in solids Sound produced by vibrations of objects, in loud speakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal Auditory range of humans and animals the similarities and differences between light waves and waves in matter Light waves travelling through a vacuum; speed of light The transmission of light through materials | |

MOOR PARK HIGH SCHOOL: CURRICULUM

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| <p>Knowledge</p> | <p>Current, potential difference and resistance, Standard circuit diagram symbols, Electrical charge and current, Current, resistance and potential difference, Resistors, Series and parallel circuits, Domestic uses and safety, Direct and alternating potential difference, Mains electricity, Energy transfers, Power, Energy transfers in everyday appliances, The National Grid</p> | <p>Contact and non-contact forces Gravity, Resultant Forces, Work done and Energy Transfer, Forces and Elasticity, Forces and Motion, Acceleration, Newton's Laws, Forces and Braking, Momentum, Velocity time graphs</p> | <p>Transverse and longitudinal waves, Properties of waves, Electromagnetic Waves, Reflection, Refraction, Wavefronts</p> |
| <p>Skills</p> | <p>Plan experiments or devise procedures to make observations, produce or characterise a substance, test hypotheses, check data or explore phenomena. Apply a knowledge of a range of techniques, instruments, apparatus, and materials to select those appropriate to the experiment. Carry out experiments appropriately having due regard for the correct manipulation of apparatus, the accuracy of measurements and health and safety considerations. Make and record observations and measurements using a range of apparatus and methods. Evaluate methods and suggest possible improvements and further investigations Presenting observations and other data using appropriate methods. use circuit diagrams to construct appropriate circuits to investigate the I-V characteristics of a variety of circuit elements, including a filament lamp, a diode and a resistor at constant temperature. Use circuit diagrams to set up and check appropriate circuits to investigate the factors affecting the</p> | <p>Use scientific theories and explanations to develop hypotheses. Plan experiments or devise procedures to make observations, produce or characterise a substance, test hypotheses, check data or explore phenomena. Apply a knowledge of a range of techniques, instruments, apparatus, and materials to select those appropriate to the experiment. Carry out experiments appropriately having due regard for the correct manipulation of apparatus, the accuracy of measurements and health and safety considerations. Make and record observations and measurements using a range of apparatus and methods. Evaluate methods and suggest possible improvements and further investigations Presenting observations and other data using appropriate methods. investigate the relationship between force and extension for a spring. investigate the effect of varying the force on the acceleration of an object of constant mass, and the</p> | <p>Use scientific theories and explanations to develop hypotheses. Plan experiments or devise procedures to make observations, produce or characterise a substance, test hypotheses, check data or explore phenomena. Apply a knowledge of a range of techniques, instruments, apparatus, and materials to select those appropriate to the experiment. Carry out experiments appropriately having due regard for the correct manipulation of apparatus, the accuracy of measurements and health and safety considerations. Make and record observations and measurements using a range of apparatus and methods. Evaluate methods and suggest possible improvements and further investigations Presenting observations and other data using appropriate methods. make observations to identify the suitability of apparatus to measure the frequency, wavelength and speed of waves in a ripple tank and waves in a solid and take appropriate measurements. investigate how the amount of infrared radiation</p> |

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| | resistance of electrical circuits. | effect of varying the mass of an object on the acceleration produced by a constant force. | absorbed or radiated by a surface depends on the nature of that surface. |
| Assessment | End of unit test for Chapter 2 Electricity | End of unit test for Chapter 5 Forces | End of unit test for Chapter 6 Waves |
| Homework | GCSE past paper exam questions Analysis / Evaluation of investigations Extended answer questions. | GCSE past paper exam questions Analysis / Evaluation of investigations Extended answer questions | GCSE past paper exam questions Analysis / Evaluation of investigations Extended answer questions |
| Cultural enrichment including Trips, Visits, Experiences, Extra-curricular | <u>School and University Network Trips</u> Summer Term-UCLAN Visit (Topic to be confirmed) | | |
| Literacy | <p>Keywords:</p> <p>Alternating Potential Difference, Amperes (Amps), Attraction, Coulomb, Diode, Direct Potential Difference, Earth Wire, * Electrical Current, Electrical Work, Filament Lamp, Insulation, Light Dependent Resistor (LDR), Live Wire, Mains Electricity, Neutral Wire, Non-Contact Force, Ohmic Conductor, Ohms, Parallel, Potential Difference, Repulsion, Series, , Step-Down Transformers, Step-Up Transformers, The National Grid, Thermistor, Volt</p> | <p>Keywords:</p> <p>Acceleration, Braking Distance, Centre of Mass, Changes of Momentum, Conservation of Momentum, Contact Forces, Displacement, Distance, Elastic Deformation, Elastic Limit, Elastic Potential Energy, Equilibrium, Forces, Inertia, Inertial Mass, Limit of Proportionality, *Moment, Momentum, Newton's First Law, Newton's Second Law, Newton's Third Law, Non-Contact Forces, Deformation, Resolution of Forces, resultant Force, , Scalar Quantities, Speed, Spring Constant, Stopping Distance, Thinking Distance, Upthrust, Vector Quantities, Velocity, Weight, Work Done,</p> | <p>Keywords:</p> <p>Amplitude, Angle of Incidence, Colour Filters, Temperature, Convex Lens, Diffuse, Reflection, Electromagnetic Waves, Focal Length, Frequency, Hertz, Infrared Radiation, Ionising Radiation, Lens, Longitudinal Waves, Magnification, Microwaves, Period, Radiation Dose, Radio Waves, *Reflection, Specular Reflection, waves, Ultrasound Scanning, Ultraviolet, Visible Light, Wave Speed, Wavelength</p> |

MOOR PARK HIGH SCHOOL: CURRICULUM

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| <p>Numeracy</p> | <p>Equation for electric current as the rate of flow of charge should be known</p> <p>Equation linking potential difference, current and resistance should be known.</p> <p>Current-potential difference graphs for electrical components</p> <p>Formula for working out the resistance in a series and parallel circuit Equations for electrical power should be known Equations for energy transfer should be known</p> <p>.</p> | <p>Identify the limit of proportionality on a graph showing the force applied against extension.</p> <p>Rearrange the equation to find the two other unknowns.</p> <p>Calculate the speed of an object given the distance travelled and the time taken.</p> <p>Rearrange the equation to find either unknown quantity.</p> <p>Draw and interpret distance – time graphs.</p> <p>Draw and interpret Velocity – time graphs.</p> <p>Calculate the acceleration of a vehicle when given the initial and final speed and the time taken for the change in speed to occur.</p> <p>Calculate the resultant force acting on an object calculate the force that acts on an object when the momentum of that object changes</p> <p>Find patterns between the speed of a vehicle and the thinking distance</p> <p>Give the correct units of weight and mass.</p> | <p>Calculate the wavelength of a wave from a labelled diagram of a wave.</p> <p>Equation linking the wave speed, frequency and wavelength should be known.</p> <p>Calculate the speed of a wave.</p> <p>Rearrange the equation to find any unknown given the other two values.</p> <p>Perform calculations on ultrasound scans using the equation: distance = speed x time</p> <p>Draw conclusions from given data about the risks and consequences of exposure to radiation.</p> |
| <p>CIAG</p> | <p>What workplace skills does physics develop?</p> <p>Critical thinking: The ability to scrutinise information you're presented with is important not only for scientists but for lawyers, police, medics, journalists and more.</p> <p>Data analysis: From actuaries and financial advisors to social media specialists and market researchers, data analysis is one of the most sought after skills.</p> <p>Problem solving: Complex problem solving is vital for engineers, researchers, marketers, social workers, designers, and even customer service workers.</p> <p>Attention to detail: From nurses and scientists to accountants and writers, attention to detail is vital to carrying out many roles safely and effectively.</p> | | |

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| Syllabus | AQA Physics Collins - Chapter 7 Electromagnetism | | | | |
| Links to prior KS3 learning | Magnetic poles, attraction and repulsion Magnetic fields by plotting with compass, representation by field lines Earth's magnetism, compass and navigation | | | | |
| Knowledge | Permanent and induced magnetism, magnetic, forces and fields The motor effect | | | | |
| Skills | Test hypotheses, check data or explore phenomena. Apply a knowledge of a range of techniques, instruments, apparatus, and materials to select those appropriate to the experiment. Carry out experiments appropriately having due regard for the correct manipulation of apparatus, the accuracy of measurements and health and safety considerations. Evaluate methods and suggest possible improvements and | | | | |

MOOR PARK HIGH SCHOOL: CURRICULUM

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| | further investigations | | | | |
| Assessment | End of unit test for Chapter 7 Electromagnets | | | | |
| Homework | GCSE past paper exam questions Analysis / Evaluation of investigations Extended answer questions | | | | |
| Cultural enrichment including Trips, Visits, Experiences, Extra- curricular | <u>School and University Network</u> | | | | |
| Literacy | Keywords: Alternator, Attraction, Current- Carrying Wires, Dynamo, Electric Motor, Electromagnet, Fleming's Left-Hand Rule Induced Magnet, Magnetic Compass, Magnetic Field Lines, Magnetic Field, Magnetic Materials, Magnetic Poles, Microphone, Motor Effect, Permanent Magnet, Solenoid, Step-Down Transformer, Step-Up Transformer, Tesla, Transformer | | | | |
| Numeracy | Recall and use Fleming's left- hand rule. | | | | |
| CIAG | <p>What workplace skills does physics develop?</p> <p>Critical thinking: The ability to scrutinise information you're presented with is important not only for scientists but for lawyers, police, medics, journalists and more.</p> <p>Data analysis: From actuaries and financial advisors to social media specialists and market researchers, data analysis is one of the most sought after skills.</p> <p>Problem solving: Complex problem solving is vital for engineers, researchers, marketers, social workers, designers, and even customer service workers.</p> <p>Attention to detail: From nurses and scientists to accountants and writers, attention to detail is vital to carrying out many roles safely and effectively.</p> | | | | |