West Kirby Grammar School

# **Curriculum Map** – Year 10 - Physics

| Topic Name | Term | Skills Developed | Link to NC Subject Content | Next link in curriculum | Other Notes |
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| **Energy** | Autumn | • Use a variety of models to solve problems, make predictions and to develop scientific explanations and understanding of familiar and unfamiliar facts.<br>• Explain everyday and technological applications of science; evaluate associated personal, social, economic and environmental implications; and make decisions based on the evaluation of evidence and arguments.<br>• Evaluate risks both in practical science and the wider societal context, including perception of risk in relation to data and consequences.<br>• Use SI units (eg kg, g, mg; km, m, mm; kJ, J).<br>• Use prefixes and powers of ten for orders of magnitude (eg tera, giga, mega, kilo, centi, milli, micro and nano).<br>• Interconvert units. | • Changes in energy stores: Students should be able to describe all the changes involved in the way energy is stored when a system changes, for common situations and be able to calculate the changes in energy involved when a system is changed by heating, work done by forces and work done when a current flows.<br>• Conservation of energy: Students should be able to describe with examples where there are energy transfers in a closed system, that there is no net change to the total energy.<br>• Energy and work: Students should be able to describe the energy transfer involved when work is done.<br>• Gravitational potential, kinetic and elastic energy stores: Students should be able to calculate the amount of energy associated with a moving object, a stretched spring and an object raised above ground level.<br>• Energy dissipation: Students should be able to describe, with examples, how in all system changes energy is dissipated, so that it stored in less useful ways.<br>• Efficiency: Students should be able to describe ways to increase the efficiency of an intended energy | Links to AS/A2 **Mechanics and materials**<br><br>Autumn Year 12<br><br>Links to A-level AT a and b. | |

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| | | • Use an appropriate number of significant figures in calculation.<br><br>• Recognise and use expressions in decimal form.<br>• Use ratios, fractions and percentages.<br>• Change the subject of an equation.<br>• Substitute numerical values into algebraic equations using appropriate units for physical quantities. | transfer. Students should be able to explain ways of reducing unwanted energy transfers, for example, through lubrication.<br>• Energy and power: Students should be able to give examples that illustrate the definition of power.<br>• Thermal energy: Students should be able to explain ways of reducing unwanted energy transfers, for example, through the use of thermal insulation and be able to describe how the rate of cooling of a building is affected by the thickness and thermal conductivity of its walls.<br><br>REQUIRED PRACTICAL 1: investigation to determine the specific heat capacity of one or more materials. AT 1 and 5.<br><br>REQUIRED PRACTICAL 2: investigate the effectiveness of different materials as thermal insulators and the factors that may affect the thermal insulation properties of a material. AT 1 and 5. | | |
| **Infra-red and thermal transfers** | Autumn | • Use a variety of models to solve problems, make predictions and to develop scientific explanations and understanding of familiar and unfamiliar facts. | • Infra-red: Students should be able to explain: that all bodies (objects) emit radiation, and that the intensity of any emission depends on the temperature of the body.<br>• Perfect black bodies and radiation: Students should be able to explain how the temperature of a body is related to the balance between | Links to GCSE Space<br><br>Spring Year 11<br><br>Links to AS/A2 Waves<br><br>Spring Year 12 | |

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| | | | incoming radiation absorbed and radiation emitted, using everyday examples to illustrate this balance, and the example of the factors which determine the temperature of the Earth.<br><br>REQUIRED PRACTIACL 10: investigate how the amount of infrared radiation absorbed or radiated by a surface depends on the nature of that surface. AT 1 and 4. | Links to A-level AT a, b, i and j. | |
| **Domestic electricity** | Spring | • Use a variety of models such as representational, spatial, descriptive, computational and mathematical to solve problems, make predictions and to develop scientific explanations and understanding of familiar and unfamiliar facts.<br>• Explain everyday and technological applications of science; evaluate associated personal, social, economic and environmental implications; and make decisions based on the evaluation of evidence and arguments. | • Direct and alternating potential difference: Students should be able to explain the difference between direct and alternating potential difference.<br>• Mains electricity: Students should be able to explain that a live wire may be dangerous even when a switch in the mains circuit is open, the dangers of providing any connection between the live wire and earth.<br>• Power and energy: Students should be able to explain how the power transfer in any circuit device is related to the potential difference across it and the current through it, and to the energy changes over time.<br>• Energy transfers in everyday appliances: Students should be able to describe how different domestic appliances transfer energy from batteries or ac mains to the kinetic energy of electric motors or the energy of heating devices. Students should be able to explain how the power of a circuit device is related to | Links to GCSE Magnetism and electromagnetism<br><br>Spring Year 11<br><br>Links to AS/A2 Electricity<br><br>Autumn Year 12 | |

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| | | • Evaluate risks both in practical science and the wider societal context, including perception of risk in relation to data and consequences.<br>• Interconvert units.<br>• Change the subject of an equation.<br>• Substitute numerical values into algebraic equations using appropriate units for physical quantities. | the potential difference across it and the current through it, the energy transferred over a given time. Students should be able to describe, with examples, the relationship between the power ratings for domestic electrical appliances and the changes in stored energy when they are in use.<br>• National grid: Students should be able to explain why the National Grid system is an efficient way to transfer energy. | | |
| **Energy resources** | Spring | • Appreciate the power and limitations of science and consider any ethical issues which may arise.<br>• Explain everyday and technological applications of science; evaluate associated personal, social, economic and environmental implications; and make decisions based on the evaluation of evidence and arguments.<br>• Interpreting observations and other data (presented in verbal, diagrammatic, graphical, symbolic or | • National and global energy resources: Students should be able to describe the main energy sources available, distinguish between energy resources that are renewable and energy resources that are non-renewable, compare ways that different energy resources are used and understand why some energy resources are more reliable than others, describe the environmental impact arising from the use of different energy resources and explain patterns and trends in the use of energy resources. Students should also be able to consider the environmental issues that may arise from the use of different energy resources and show that science has the ability to identify environmental | Links to GCSE<br>Magnetism and electromagnetism<br><br>Spring Year 11<br><br>Links to AS/A2<br>Electricity<br><br>Autumn Year 12 | |

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| | | numerical form), including identifying patterns and trends, making inferences and drawing conclusions<br>• Use prefixes and powers of ten for orders of magnitude (eg tera, giga, mega, kilo, centi, milli, micro and nano).<br>• Use ratios, fractions and percentages<br>• Construct and interpret frequency tables and diagrams, bar charts and histograms<br>• Translate information between graphical and numeric form | issues arising from the use of energy resources but not always the power to deal with the issues because of political, social, ethical or economic considerations. | | |
| **Atomic Structure** | Summer | • Understand how scientific methods and theories develop over time.<br>• Use a variety of models such as representational, spatial, descriptive, computational and mathematical to solve problems, make predictions and to develop scientific explanations and understanding of familiar and unfamiliar facts. | • The structure of the atom: Students should be able to describe the basic structure of an atom.<br>• Mass number, atomic number and isotopes: Students should be able to relate differences between isotopes to differences in conventional representations of their identities, charges and masses.<br>• The development of the model of the atom: Students should be able to describe why the new evidence from the scattering experiment led to a change in the atomic model and the difference between the plum pudding | Links to GCSE **Fission and fusion.**<br><br>Autumn Year 11<br><br>Links to GCSE **Space**<br><br>Spring Year 11<br><br>Links to AS/A2 **Particles and radiation** | |

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| | | • Explain everyday and technological applications of science; evaluate associated personal, social, economic and environmental implications; and make decisions based on the evaluation of evidence and arguments.<br>• Evaluate risks both in practical science and the wider societal context, including perception of risk in relation to data and consequences.<br>• Recognise the importance of peer review of results and of communicating results to a range of audiences.<br>• Use scientific vocabulary, terminology and definitions.<br>• Use prefixes and powers of ten for orders of magnitude (eg tera, giga, mega, kilo, centi, milli, micro and nano).<br><br>• Recognise and use expressions in standard form<br>• Use ratios, fractions and percentages<br>• Substitute numerical values into algebraic equations using | model of the atom and the nuclear model of the atom.<br>• Radioactive decay and nuclear radiation: Students should be able to apply their knowledge to the uses of radiation and evaluate the best sources of radiation to use in a given situation.<br>• Nuclear equations: Students should be able to use the names and symbols of common nuclei and particles to write balanced equations that show single alpha (α) and beta (β) decay.<br>• Half-lives and the random nature of radioactive decay: Students should be able to explain the concept of half-life and how it is related to the random nature of radioactive decay. Students should also be able to determine the half-life of a radioactive isotope from given information and be able to calculate the net decline, expressed as a ratio, in a radioactive emission after a given number of half-lives.<br>• Radioactive contamination: Students should be able to compare the hazards associated with contamination and irradiation. Students should understand that it is important for the findings of studies into the effects of radiation on humans to be published and shared with other scientists so that the findings can be checked by peer review.<br>• Hazards and uses of radioactive emissions and of background radiation: Students should be able to | Summer Year 12 | |

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| | | appropriate units for physical quantities<br>• Solve simple algebraic equations<br>• Translate information between graphical and numeric form | describe background radiation and explain why the hazards associated with radioactive material differ according to the type or radiation and the half-life involved.<br>• Uses of nuclear radiation: Students should be able to describe and evaluate the uses of nuclear radiations for exploration of internal organs, and for control or destruction of unwanted tissue and evaluate the perceived risks of using nuclear radiations in relation to given data and consequences. | | |