YEAR 10 2023-2024 AUT 1

'An ambitious curriculum that meets the needs of all'

Medium Term Planning - Topic: Energy

Curriculum Intent	**In addition to working further on objectives from Year 7 and 9, pupils will be taught, following National Curriculum guidelines, the following this topic:**
Skills/Assessment Objective Links	• Energy changes in a system involving heating, doing work using forces, or doing work using an electric current: calculating the stored energies and energy changes involved. • Power as the rate of transfer of energy. • Conservation of energy in a closed system, dissipation. • Calculating energy efficiency for any energy transfers. • Renewable and non-renewable energy sources used on Earth, changes in how these are used.
Spiritual, moral, social, and cultural development	**SMSC:** Limits to the use of fossil fuels and global warming are critical problems for this century. Physicists and engineers are working hard to identify ways to reduce our energy usage. Energy is a universal constant, but questions remain as to where, energy came from and what will happen to energy and consequently life in the universe in the future. **PSHE/British Values:** Energy is a commodity we all use. In Energy, students learn how it is produced and distributed together with the social, environmental, and economic impacts of different methods. **Skills Builder:** Development of mathematical skills, problem solving, debating advantages and disadvantages.
Numeracy	**Arithmetic and numerical computation:** Recognise and use expressions in decimal form. Recognise and use expressions in standard form. Use ratios, fractions and percentages. Make estimates of the results of simple calculations **Handling data:** Use an appropriate number of significant figures. Find arithmetic means. Construct and interpret frequency tables and diagrams, bar charts and histograms. Understand the terms mean, mode and median. Use a scatter diagram to identify a correlation between two variables. Make order of magnitude calculations. **Algebra:** Understand and use the symbols: =, <, <<, >>, >, ∝ , ~ . Change the subject of an equation. Substitute numerical values into algebraic equations using appropriate units for physical quantities. Solve simple algebraic equations. **Graphs:** Translate information between graphical and numeric form. Understand that y = mx + c represents a linear relationship. Plot two variables from experimental or other data. Determine the slope and intercept of a linear graph. Draw and use the slope of a tangent to a curve as a measure of rate of change. Understand the physical significance of area between a curve and the x-axis and measure it by counting squares as appropriate. **Geometry and trigonometry:** Use angular measures in degrees. Visualise and represent 2D and 3D forms including two dimensional representations of 3D Objects. Calculate areas of triangles and rectangles, surface areas and volumes of cubes
Literacy	**Vocabulary Tier 2:** System, conservation, efficiency, fuel, resource, capacity, constant. **Vocabulary Tier 3:** Potential, elastic, gravitational, Joule, kinetic, energy, chemical, nuclear, electrostatic, magnetic, work, power. **Reading:** Students are given opportunity to develop their skills in specified tasks that develop disciplinary literacy. Throughout the GCSE Physics and Combined Science course they develop their understanding of the requirements of exam questions and the key terminology in questions. In addition, they read practical methodology and translate this to actions in laboratory tasks. **Writing:** Students construct answers independently and through class teaching. Their answers range from single word answers to the planning and writing of 6-mark "extended writing" tasks that require linking of multiple concepts from a topic. These often develop students ability to construct written evaluations of contrasting situations, where the use of comparative connectives are required. **Oracy:** Students are regularly given the opportunity to practice their scientific vocabulary in class discussion, through choral response and in giving instruction to others during practical activities.

Becoming future ready	**Careers/Employability:** National grid and water management. Power plant operations and engineering. Plumbing and heating. Electrician and maintenance. Oil and gas industry. Infrastructure and civil engineering. Heavy industry manufacturing. Sustainability consulting.
Adaptation **QFT/SEND Provision**	Throughout this topic, quality first teaching will provide differentiation: **By product:** Assessments have opportunities for students to achieve all grades, with structured questions and opportunities for development of extended writing for all abilities. **By resource:** PowerPoints, worksheets and booklets are differentiated as appropriate and produced in conjunction with class teachers for students who would benefit from additional scaffolding of resources in order to achieve their potential. **By Intervention**: by providing different levels of supervision and support, including the specific deployment of teaching assistants within lessons. Structured intervention is planed and delivered based on summative assessment results. **By Progressive Questioning:** exploring pupils' understanding through interactive dialogue. **By Grouping:** according to prior attainment, gender, social preference. **By Task:** Pupils should be involved in the identification of targets which are meaningful to them and in the selection of an appropriate task from the given range. **By Offering Optional Activities:** In class or as homework, to extend learning. This QFT/SEND provision will be explicit within the lesson-by-lesson schemes of work.
Implementation Curriculum Delivery **Learning Outcomes (Knowledge)**	To be able to: • P.1.1.1.a - I can define a system as an object or group of objects, and I can state examples of changes in the way energy is stored in a system. • P.1.1.1.b - I can describe all the energy changes involved in an energy transfer and calculate relative changes in energy when work is done. • P.1.1.2.a - I can calculate the kinetic energy of an object by recalling and applying the equation: E_k=1/2 mv^2 • P.1.1.2.c - I can calculate the amount of gravitational potential energy gained by an object raised above ground level by applying, and recalling, the equation: E_p=mgh • P.5.2.a. - I can define and calculate work done by recalling and applying the equation: W=Fs. • P.5.2.b. - I understand that 1 Joule is equivalent to 1 Newton-metre and can describe the energy transfers involved when work is done, including that work done against friction cause a rise in temperature of the object. • P.1.1.4.a - I can define power as the rate at which energy is transferred or the rate at which work is done, and the watt as an energy transfer of 1 joule per second. • P.1.1.4.b - I can calculate power by recalling and applying the equations: P = E/t and P = W/t • P.1.1.4.c - I can explain, using examples, how two systems transferring the same amount of energy can differ in power output due to the time taken. • P.1.2.1.a - I can state that energy can be transferred usefully, stored or dissipated, but cannot be created or destroyed, and so the total energy in a closed system does not change • P.1.2.1.b (HT) - I can explain that only some of the energy in a system is usefully transferred, with the rest 'wasted', giving examples of how this wasted energy can be reduced. • P.1.2.2.a - I can calculate efficiency by recalling and applying the equations: efficiency = (useful power output)/(total power input) efficiency= (useful energy output)/(total energy input) • P.1.2.2.b (HT) - I can suggest and explain ways to increase the efficiency of an intended energy transfer. • P.1.3.a - I can list the main renewable and non-renewable energy resources, and define a renewable energy resource as one that is replenished as it is used. • P.1.3.b. - I can compare ways that different energy resources are used, including uses in transport, electricity generation and heating. • P.1.3.c. - I can explain why some energy resources are more reliable than others, explaining patterns and trends in their use. • P.1.3.d. - I can evaluate the use of different energy resources, taking into account any ethical and environmental issues which may arise. • P.1.3.e. - I can justify the use of energy resources, with reference to both environmental issues and the limitations imposed by political, social, ethical or economic considerations. • P.1.3.f. - I can compare ways that different energy resources are used and distinguish between energy resources that are renewable and energy resources that are non-renewable.

Current learning to be developed in the future within:	Energy is fundamental to all concepts in Physics and will be continually revisited and developed throughout the KS4 and KS5 Physics curriculum. Specifically, the topics of Electricity, Thermal Energy, Forces and Waves will explore the details of how energy is transferred and the effects of these transfers
Assessment	Refer to assessment maps for formative and summative assessment opportunities.
Impact	Attainment and Progress – Refer to assessment results / data review documentation.