'An ambitious curriculum that meets the needs of all'

Medium Term Planning - Topic: Energy Costs and Transfers

Curriculum Intent	**In addition to working further on objectives from Year __, pupils will be taught, following National Curriculum guidelines, the following this topic:**
Skills/National Curriculum Links	- Calculation of fuel uses and costs in the domestic context - comparing energy values of different foods (from labels) (kJ) - comparing power ratings of appliances in watts (W, kW) - comparing amounts of energy transferred (J, kJ, kW hour) - domestic fuel bills, fuel use and costs fuels and energy resources. - simple machines give bigger force but at the expense of smaller movement (and vice versa): product of force and displacement unchanged - other processes that involve energy transfer: changing motion, dropping an object, completing an electrical circuit, stretching a spring, metabolism of food, burning fuels.
Spiritual, moral, social, and cultural development	**SMSC:** Safe working and using the forces model. The importance of energy in real life. Students will reflect on their experiences and apply their understanding to a range of issues. Students will be encouraged to be reflective about their own beliefs and those of others and compare different people's faiths, feelings and values in order to develop their own perspective on life. Students will explore how Science influences the next stage of their education and/or employment. **PSHE/British Values:** learn about everyday stores of energy and apply this to calorie intake and generating electricity **Skills Builder:** Listening (Receiving, retaining and processing info), Speaking (The oral transmission of info and ideas), Problem solving (Find a solution to a situation or challenge), Creativity (imagination and generation of new ideas), Staying positive (The ability to use tactics and strategies to overcome setbacks), aiming high (Set clear and tangible goals), Leadership and teamwork
Numeracy	drawing and interpreting graphs, using a formula.
Literacy	**Vocabulary Tier 2:** Compare, generate, advantages, disadvantages, concepts, justify, domestic appliance, predict, requirement, consumption, scenarios, energy bill, **Vocabulary Tier 3:** Fuel, energy, renewable, non-renewable, electricity, energy demand, power, conservation of energy, dissipation, wasted energy, useful energy, lubrication, streamlining, efficiency **Reading** Following a written method and read risk assessments. Students may be directed to the textbook; this could be in lesson or at home on Kerboodle. **Writing:** Describing and explaining scientific phenomenon, free response writing for describing precautions taken, use of word mat to promote sentence formation. **Oracy:** inclusion of BEST resources which are research evidence on common misunderstandings in science, effective diagnostic questioning and formative assessment, constructivist approaches to building understanding, and effective sequencing of key concepts that promote metacognitive talk and dialogue.
Becoming future ready	**Careers/Employability:** - *Engineer* - *Architect* - *Builder* - *Chef*
Adaptation	Throughout this topic, quality first teaching will provide differentiation:

QFT/SEND Provision	**By product:** Linear assessments and differentiated practical work. **By resource:** Lessons are differentiated per class and students, worksheets are coloured blue if support and assessments are linear. **By Intervention**: by providing different levels of supervision and support **By Progressive Questioning:** exploring pupils' understanding through interactive dialogue. **By Grouping:** according to prior attainment, gender, social preference, preferred learning style. **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 (Core Knowledge)**	To be able to: *Know* *- Identify energy values for food and fuels.* *- Describe energy requirements in different situations.* *- Interpret data on food intake for some activities.* *Apply* *- Compare the energy values of food and fuels.* *- Compare the energy in food and fuels with the energy needed for different activities.* *- Explain data on food intake and energy requirements for a range of activities.* *Extend* *- Calculate energy requirements for various situations, considering diet and exercise.* *- Suggest different foods needed in unusual situations, for example, training for the Olympics.* *- Explain why an athlete needs more energy from food using data provided.* *Know* *- Name renewable and non-renewable energy resources.* *- State one advantage and one disadvantage of fossil fuels.* *- Use one source of information.* *- Name a renewable resource used to generate electricity.* *Apply* *- Describe the difference between a renewable and a non-renewable energy resource.* *- Describe how electricity is generated using a fossil fuel or a renewable resource.* *- Choose an appropriate source of secondary information.* *- Explain the advantages and disadvantages of different energy resources.* *Extend* *- Compare renewable and non-renewable resources.* *- Explain how a range of resources generate electricity, drawing on scientific concepts.* *- Justify the choice of secondary information.* *- Suggest actions a government or communities could take in response to rising energy demand.* *Know* *- State how work is calculated.* *- State that machines change the size of forces or distances.* *- State one way the experiment can be improved.* *Apply* *- Calculate work done.* *- Apply the conservation of energy to simple machines.* *- Evaluate results from the practical.* *Extend* *- Compare the work done in different scenarios and by different machines.* *- Explain how conservation of energy applies in one example.* *- Evaluate results (including random and systematic errors) and suggest how the experiment can be improved.* *Know* *- State the definitions of energy and power.* *- State that power, fuel used, and cost are linked.* *- Predict which equipment is more powerful when given a selection of appliances.* *Apply* *- Explain the difference between energy and power.* *- Describe the link between power, fuel use, and cost of using domestic appliances.* *- Predict the power requirements of different home devices, and compare their energy usage and how much they cost to run.* *Extend* *- Compare the power consumption of different appliances.* *- Calculate and compare energy costs in different scenarios.*

	- Predict the effect on energy bills of changing the power of equipment.
	Know *- State the definition of the conservation of energy.* *- State how energy is transferred.* *- Present simple observations of energy transfers.* *Apply* *- Describe energy stores before and after a change, including stores relating to an object's speed, temperature, height or shape.* *- Explain what brings about transfers in energy between stores.* *- Present observations of energy transfers in a table.* *Extend* *- Apply ideas about stores and transfers to a range of unfamiliar situations.* *- Compare energy transfers to energy conservation.* *- Present detailed observations of energy transfers in a table, explaining changes to the physical system, and how that relates to the ways in which energy is stored.*
	Know *- State what dissipation means.* *- Do simple calculations of wasted energy from input and useful energies.* *- State what lubrication and streamlining mean.* *Apply* *- Explain how energy is dissipated in a range of situations.* *- Calculate useful energy and wasted energy from input and output energies.* *- Describe how dissipated energy can be reduced.* *Extend* *- Account for all energy transfers in a range of situations.* *- Calculated a useful energy and wasted energy, and efficiency.* *- Evaluate methods of reducing energy dissipation.*
Current learning to be developed in the future within:	***Before**: At KS2 you may have learnt that energy can be transferred and heat is an example of a form of energy and can be transferred. You may have also learnt some common conductors and insulators, and associate metals with being good conductors.* ***Future:** At GCSE you will learn Energy can be transferred usefully, stored or dissipated, but cannot be created or destroyed.* *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*
Assessment	Refer to assessment maps for formative and summative assessment opportunities.
Impact	Attainment and Progress – Refer to assessment results / data review documentation.