Science Year 9 Physics Long Term Map

Subject Intent/Aims

Expose all students to a broad range of learning opportunities to deepen their knowledge and understanding of themselves and the world around them and to build a solid foundation of Science knowledge and skills.We believe in developing curiosity and understand that science is an active process with many questions to be answered and still to be asked. We provide an understanding of how knowledge was derived, discovered and came to be accepted by the scientific community. By focusing on thinking, interpreting and evaluating rather than simply memorising scientific fact we intend to enable our students to use the skills that they need to answer their own scientific questions.

Our focus on the scientific process as a way of thinking and working will allow our students to develop their own ideas, attitudes and interpretations.

Topic: Particle model of matter	**Topic: Energy**
National Curriculum: Particle model of matter The structure of matter • relating models of arrangements and motions of the molecules in solid, liquid and gas phases to their densities • melting, evaporation, and sublimation as reversible changes • calculating energy changes involved on heating, using specific heat capacity; and those involved in changes of state, using specific latent heat • links between pressure and temperature of a gas at constant volume, related to the motion of its particles (qualitative).	**National Curriculum:** Energy • 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
Composition	**Composition**
Describe the particle model of matter and the role of particles when thinking about density, changes between states of matter, pressure and volume.	Describe and analyse the energy changes in a system before and after such changes.
Components	**Components**
Component 1: Know and recognise/draw simple diagrams to model the difference between solids, liquids and gases. To know the differences in density between the different states of matter in terms of the arrangement of atoms or molecules. Component 2: Required practical activity 5: use appropriate apparatus to make and record the measurements needed to determine the densities of regular and irregular solid objects and liquids. Component 3: To know how particles behave in closed systems of solids, liquids and gases with a particular focus on internal energy, specific heat capacity and latent heat. Component 4: Know particle model of motion to understand some macroscopic behaviours. Component 5: Know the effects of latent heat and how matter changes state from one phase to the other. Component 6: Know the fundamental theory behind the gas laws. Component 7: Know how particle theory of pressure affects volume and how temperature affects volume, while solving problems for both relationships. Component 8: Know how to use a top pan balance to measure mass. Component 9: Know how to use a measuring cylinder to measure volume Component 10: To know how to record mass and volume in a table or results and process it to calculate density. Component 11: To know how to use a displacement can and measuring cylinder to collect valid data.	Component 1: Know the energy changes in a system, and the ways energy is stored before and after such changes. Component 2: Know what a Sankey diagrams is and the formula to calculate efficiency of electrical appliances. Component 3: Know how energy is conserved and dissipated Component 4: Know how to calculate work done and power Component 5 Know the factors that affect work done. Component 6: Know how to calculate energy efficiency for any energy transfer. Component 7: Know the different energy resources and their advantages and disadvantages. Component 8: Use equipment to take measurements.

Higher Order Knowledge	**Higher Order Knowledge**
Pressure in Gases SEPARATES only Component 8: To know how increasing the volume in which a gas is contained, at constant temperature, can lead to a decrease in pressure. Component 9: To know how to calculate the change in the pressure of a gas or the volume of a gas (a fixed mass held at constant temperature) when either the pressure or volume is increased or decreased. Component 10: To know that doing work on an enclosed gas leads to an increase in the temperature of the gas.	Component 9: Describe ways to increase the efficiency of an intended energy transfer. Component 10: Know how to investigate the effectiveness of different materials as thermal insulators and the factors that may affect the thermal insulation properties of a material.
Key terms	**Key terms**
density, internal energy, latent heat, physical change, pressure, specific latent heat of fusion, specific latent heat of vaporisation, gas pressure, hydraulics	Energy Dissipation Conservation Transformation National grid, Temperature, renewable, finite
Final Composition/Deliberate Practice	**Final Composition/Deliberate Practice**
Required practical activity 5: use appropriate apparatus to make and record the measurements needed to determine the densities of regular and irregular solid objects and liquids.	Planning, carrying out and analysing an investigation: investigate the effectiveness of different materials as thermal insulators and the factors that may affect the thermal insulation properties of a material.
Summative/Formative assessment	**Summative/Formative assessment**
RRR, quick quizzes and Century nuggets. 6 mark question on density required practical method. Learner check particle model of matter. End of Unit Test exam questions on particle model of matter, density required practical, specific latent heat and gas pressure.	RRR, quick quizzes and Century nuggets. Teacher assessment in the form of a QWC set at the end of each unit. PPQs in booklet on efficiency. End of topic test on energy changes, efficiency, energy transfers, renewable and non-renewable energy resources.
Numeracy and literacy	**Numeracy and literacy**
Numeracy skills – Plotting points on a graph. Applying formula. Recognise and use expressions in decimal form. Calculating means. Using prefixes. Substitute numerical values into algebraic equations using appropriate units for physical quantities **Literacy skills** – focusing onkeywords, tier 3 vocabulary, connectives, SPAG, synonyms, Use of prefixes. Word root-therm. Spelling of meter- a device and metre- a distance.	**Numeracy skills** – Drawing scale diagrams. Calculating percentages. Collating information in tables. Calculating means and ranges. Using a scale to measure. Changing the subject of the formula. **Literacy skills –** focusing onkeywords, tier 3 vocabulary, connectives, SPAG, synonyms. Key term work and its meaning in physics vs everyday life. Reading, scanning and translating information on renewable energy sources.
Cross curricular links	**Cross curricular links**

Chemistry – Measuring specific latent heat. **Maths** – Rearranging and applying formula. **Food Prep-** Specific heat capacity of different food stuffs. Why is the jam in a jam tart hotter for longer than the pastry? Boiling an egg and gas use. **Art**- Drawing accurate particle diagrams.	**Maths**-Scale diagrams, percentages. **Geography:** Renewable energy resources and their impact on the environment. Location of geothermal powerstations. **PE:** Power and efficiency of the human body when doing 'work'. **Drama:** Role play different viewpoints about renewable energy choices.

SMSC	British Value	RSHE
There will be multiple opportunities for students develop spiritually; being creative in their learning and a range of activities. *The high expectations placed on the student from the school and department mean that pupils will regularly be made aware of the right and wrong morally.* *Pupils are expected to share the views morally on the different topics but also show respect and appreciate others in the classroom.* *The students have the opportunity to develop their social skills by working in groups to complete the specific latent heat required practical.* *Pupils will learn about renewable and non-renewable energy resources and technologies.* *Climate change and its impact on the environment and society/economy.*	*Democracy: Students work together practically in groups which encourages them to share views and opinions and take instructions from others. Practical's include, measuring density and specific heat capacity. Students can share their opinions and listen to the views of others on the issues surrounding the generation of electricity and climate change.* *The rule of law: Students follow laboratory rules for the safety of all. Opportunities to discuss laws relating to energy sources.* *Individual liberty;* *There are opportunities for students to work independently and make choices in a safe environment when carrying out investigations.* *Mutual respect and tolerance: Students work together practically in groups which encourages teamwork and respect for others. Students will have the opportunity to explore different viewpoints of renewable energy and non-renewable energy usage.* *Students will be taught the importance of selecting valid information from reliable sources for any presentation tasks that they do.* *Students are taught how to contribute to life in modern Britain by learning about the history of scientific discovery.*	*They will be taught about the need for tolerance of other people's viewpoints.* *Safe us of the internet when carrying out research.*