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Curriculum Planning Template

Subject: Science (Physics) Year 9 Ability ALL

Term / Date(s)

Topic	Energy	Particle Model of Matter	Electricity
Topic overview Students will learn…	to recall stores and transfers of energy and apply these to systems. how to quantify changes in energy to systems and how energy is conserved and dissipated. how energy is generated and transported.	to utilise a particle model to predict the behaviour of solids, liquids and gases and their behaviour when exposed to different temperatures and pressures. to calculate changes in thermal energy and energy required for a change in state. That the internal energy of a system and the effect of changes of state and temperature on this.	to interpret and construct circuit diagrams. to explain the different types of circuits and components and their effects on circuit behaviours. how to quantify the changes in the electrical circuits. how mains and portable electricity differ.
What Golden Knowledge will pupils learn and remember?	Students will be able to state the 8 energy stores and 4 energy transfers so that energy transfers within closed and open systems can be understood and the conservation of energy is apparent. Students will be able to identify useful and wasted energy in various scenarios so that machines can be evaluated and the concept of work done can be applied and changes in energy involved can be calculated. Students will be able to explain the concept of an efficient system and should be able to demonstrate wasted energy and how to reduce unwanted energy transfers. Students will learn different forms of energy, using an equation to show how the energy is calculated. This will enable students to calculate the amount of energy stored and use the rearranged equation to calculate other terms. Students will then be able to calculate the amount of energy transferred usefully as wasted energy. Using this knowledge students will be able to calculate the efficiency of an energy transfer using an equation. Students will know how energy is generated globally and separated into non-renewable energy resources and renewable energy resources, this will be used to	Students will understand density in different materials and how to calculate density. This will allow them to determine density of a regular and irregular object. Students will be able to compare how density is calculated from regular and irregular solids. Students should be able to apply the equation for density. Students will be able to use the particle model to describe changes of state and the energy transfers that take place using graphical interpretation. This should allow the students to explain any changes of state in terms of energy and particles. Students should understand and be able to apply their knowledge of internal energy within various systems. The students should also be able to use the term internal energy to describe thermal energy stores. Students should be able to describe and explain the changes to specific latent heat when applied to changes of state. Students should learn the differences between specific latent heat of fusion and vaporisation. They should be able to use this knowledge to distinguish between examples for each. Students should be able to interpret heating and cooling graphs within the context of specific latent heat and changes to state. Students should be able to describe the random motion of gases and how a variety of factors can change this motion.	Students will learn about different circuit symbols. This will allow them to accurately draw and interpret circuit diagrams. Students will learn to apply a number of electricity equations, this will allow them to quantify the effects of electrical components. Students will learn about the resistance of different components and this will allow them to explain how a circuit would work or to choose the correct components for a particular application. Students will learn about the relationship between potential difference, current and resistance. This will allow them to explain how resistance can change in various components and length of wire. Students will be able to identify series and parallel circuits and explain how current, potential difference and resistance behave in them. This will allow them to correctly calculate quantities in the circuit and explain which circuit is most appropriate in different applications. Students will learn about the energy transfers. This will allow them to calculate electrical power and work done. Students will learn about domestic electricity, this will allow the students to identify features of a 3 pin plug and state the importance of each component. Students will then be able to use this knowledge so that they can explain what happens during

	explain the global energy demands. They will be able to evaluate the use of renewable and non-renewable energy resources. Students will be able to use this knowledge to explain finite and renewable resources and the environmental impact these resources have vs the reliability and cost effectiveness of a sustainable energy model. Students will be able to explain the national grid to state the components of the national grid.	Students should be using this knowledge on the motion of gases to how pressure, volume and temperature have a qualitative relation to the motion of gas particles. Students should be able to describe the random motion of gases and how a variety of factors can change this motion. Students should be using this knowledge on the motion of gases to how pressure, volume and temperature have a qualitative relation to the motion of gas particles.	electrocution in terms of a potential difference between a person and a live wire.
What prior knowledge should pupils already know?	Students should be familiar with the term energy stores and transfers. (Physics Y7 energy transfer) Students should be able to explain that work done is linked to energy transfer (Physics Y8 work) Students should be able to explain the idea of energy being conserved and dissipated. (Physics Y7 energy transfer) Students should be able to apply an equation if given to them. (Physics Y7 energy costs) Students should be able to recall different renewable energy resources. (Physics Y7 energy costs) Students should be able to define the terms: renewable, non-renewable, efficiency, wasted energy. (Physics Y7 energy costs) Students should be able to explain how thermal energy is transferred through conduction, convection and radiation (Physics Y8 heating and cooling)	Students should be familiar with the ideas of materials having different properties and states of matter. (Properties and changes of materials KS2 NC) Students should be able to explain the particulate nature of matter (Chemistry Y7 Particle model) Students should be able to explain the effects of energy on changes of state. (Chemistry Y7 Particle model)	Students should be familiar with standard circuit diagram symbols and the idea of using different component in circuits. (Physics KS2 NC) Students should be familiar with the terms current, voltage and resistance and the relationship V=IR. (Physics Y7 voltage and resistance and current) Students should be able to explain how current changes in series and parallel circuits when components (Physics Y7 voltage and resistance and current)
What skills will pupils learn and apply? (disciplinary knowledge)	Students will be able to identify energy stores and energy transfers in a range of systems. This will be referred to in further units as they continue to study science and is referred to in Biology (ecosystems and respiration) and Chemistry topics (chemical reactions.) The section on energy production and resources also links with the Chemistry theme of earth and atmosphere and is revisited through Y7, 8 and into GCSE.	Students will be able to explain the particulate nature of materials. This will support them when they revisit properties of materials in Chemistry (structure and bonding, energy changes, viscosity) and Biology (cell transport – diffusion, osmosis and active transport) Students will learn to apply the density equation in this unit. This means that students will be able to apply generic skills for calculating any term in an equation and making a new subject the focus. Students will be able to convert units so they can convert into and out of SI units.	Students will be able to explain the behaviours and calculate different quantities in a range of circuits. This will support them when they revisit electricity in Y10 and link to several of their required practicals. Students will learn to apply a number of equations in this section. This means that students will be able to apply generic skills for calculating any term in an equation and making a new subject the focus. Students will be able to convert units so they can convert into and out of SI units.

	Students will learn to apply a number of equations in this section. This means that students will be able to apply generic skills for calculating any term in an equation and making a new subject the focus. Students will be able to interpret data from tables and graphs and form evaluations, this will be applied to skills such as renewable and non-renewable energy.		Students can plot data so they can identify patterns in data and draw conclusion from graphs. Students will also be able to draw accurate lines of best fit so that they can describe and explain graphs. Students will know the risks involved with mains electricity, this will allow them to work safely in a science lab and at home. This also links with the Chemistry theme of reactions, specifically when electrical circuits are used to separate substances through electrolysis.
Key vocabulary pupil will know and learn	System Conservation Efficiency Dissipation Renewable Finite	State Particle Density Latent heat	Current Voltage Resistance Component Circuit
How will pupil understanding be checked &/or assessed?	Each school in the Trust follows the same assessment cycle process. All students will complete an informal key piece assessment every half term (at least) which take a variety of formats to assess golden knowledge learnt over the previous lessons. The key piece assessments are either retrieval-based questions to help students retrieve their prior golden knowledge, scientific literacy questions where students have to practice applying their golden knowledge to exam style questions in different contexts or exam style questions using a variety of command words such as describe, explain and evaluate. Students will then complete a short improvement activity based on gaps identified in the informal key piece and teachers will check these to ensure gaps have closed. In addition to these informal key piece assessments, all students complete a formal assessment at least every term which synoptically assess their retention and application of key golden knowledge learnt in Biology, Chemistry and Physics. Teachers will then use the Science Trust QLA tracker to identify gaps in knowledge; reteach accordingly and then students will complete a range of improvement style activities to close those gaps which are then checked by the teacher either through live marking or collection of books. Further details of the Science SHARE Assessment and Feedback policy can be found here: Q of E		
Resources available	Each school has their own shared area for each year group in each key stage. Lessons are planned to follow the SHARE Science lesson structure guidance document which can be found here: SCIENCE SHARE MAT lesson structure guidance.docx In summary: 1. First 5/Do Now to retrieve prior learning needed for the foundations of new learning. 2. I do/explicit instruction/guided explanation/teacher input through expert curriculum delivery. 3. We do/modelling where appropriate to show students how to remember and apply the key golden knowledge to different contexts. 4. You do/Independent practice to retrieve and practice applying the key golden knowledge to a variety of contexts. 5. Final 5 to retrieve key golden knowledge learnt in the lesson. All schools have these SHARE Science curriculum plans, delivery plans which sit underneath these to guide staff on when to deliver each section of the curriculum and then schemes of learning and lesson resource folders to adapt in order to meet the unique needs of the students and classes they teach. All shared resources which are common across all schools can be found in the SHARE Science folder here: Home (click on the documents tab at the top of the page) All QA including lesson visits, work scrutiny and student voice will prioritise the SHARE Science Q of E Non-Negotiables Checklist which can be found here: SCIENCE SHARE MAT Non negotiables Q of E QA check list.docx All lesson resources are focussed on retrieval (through the Retrieve to Remember strategy) and practice, and this is built into these curriculum plan through effective sequencing of golden knowledge components. There are also KS3 and KS4 Golden Knowledge booklets for staff which outline the key golden knowledge linked to the exam specifications and National Curriculum at KS3 and KS4. These can be found here: Golden Knowledge		

	If staff can't get access to any of the folders above, please request access through joanna.richards@sharemat.co.uk		
Notes Why this topic is important…	Energy is a fundamental aspect of Science. Nothing in the world happens without an energy transfer but the amount of energy in the universe is fixed as energy cannot be created or destroyed. This builds on the ideas of energy taught in Y7 and Y8. It underpins each module taught in physics as it embeds the idea of energy being transferred and stored in a variety of circumstances. The idea of energy transfer is also central to the ideas of chemical reactions in Chemistry and the transfer of energy in ecosystems and within organisms (interdependence and ecosystems.)	This topic underpins several aspects of chemistry and starts students in understanding the basics of materials science; how structure affects properties. It allows them to explain every day experiences and to start to make informed choices about material suitable for their applications. This builds on the ideas of matter taught at KS2 and prepares students for bonding and properties in Chemistry at GCSE.	Electricity is a fundamental aspect of Physics and in students' every day lives. They can understand from this how and why electrical equipment works and how it can be designed. This builds on the ideas of electricity taught at KS2 and in Y7 and Y8 (current and voltage and resistance and prepares students for applications of electricity in Chemistry and later in Physics (electromagnets, motors and generators.)