Share Multi Academy Trust

Curriculum Planning Template

Subject: Physics Year:7 Ability: All

Topic	Speed	Gravity	Energy Transfers	Energy Costs	Current	Voltage and Resistance	Sound	Light
Topic overview Students will learn…	How the speed of an object relates to the distance it travels and the time taken. Students will also learn the factors that affect the speed of an object	The difference between mass and gravity. They will also learn the effects gravity has on other objects and compare the force of gravity on Earth and other planets.	How energy can be transferred from one object to another. Students will also learn how the energy stored in an object depends on its speed, temperature, height or whether it is compressed or stretched	How electricity is generated from a range of resources and be able to calculate the cost of domestic electricity.	the definition of electrical current and how it is affected in series and parallel circuits. Students will learn how objects become charged and the effect of the electric fields these produce.	that voltage is the energy per charge that pushes electrons around a circuit. Students will learn that resistance is the restriction of this flow, and use the formula V=IR to relate the 3 together.	that sound travels as a wave and how changing pitch and volume change a wave.	how light passes through, reflects back from or is refracted by different materials
What Golden Knowledge will pupils learn and remember?	Students will understand that the speed of an object relates to the distance covered in a certain amount of time and the variety of units in which it is measured in order to apply this to everyday situations. Students will know that a resultant force causes an object to speed up, slow down or change direction in order to be able to describe the specific drag forces, how they may be affected and how this may change stopping distances. Students will know how to use the formula speed = distance/time	Students will be able to identify the difference between weight and mass in order to accurately draw and label force diagrams. Students will use the gravitational field strength value on Earth as 10N/Kg and on the Moon as 1.6N/Kg in order to calculate the weights of objects in these places. Students will be able to describe how every object exerts a gravitational force on every other object, and that this is dependent on both mass and distance. Students will be able to describe that the	Students will recall how energy can be stored in different objects in order to describe how jobs get done using an energy model Students will be able to describe the pathway of energy transfers and the mechanism by which it moves in order to be able to explain the energy transfers in a given object such as a hand crank torch and other everyday objects Students will develop and share analogies of energy transfer in order to be able to evaluate their effectiveness Students will recognise that energy cannot be created or destroyed	Students will investigate how energy is transferred from different foods and activities in order to be able to collect and present accurate data Students will investigate how electricity is generated from a combination of resources in order to be able to evaluate the advantages and disadvantages of each type Students will research renewable and non-renewable sources of energy in order to be able to justify energy choices in different situations Students will evaluate the social, economic and environmental consequences of using a resource to generate	Students will learn that electrical current is the flow of electrons through a wire, measured in amps, in order to be able to explain how this is affected by components and series/parallel circuits. Students will be able to identify the differences between series and parallel circuits in order to be able to describe that current is the same everywhere in a series circuit, and splits in a parallel circuit. This will also allow students to describe what happens to voltage in these circuits and in turn discuss the pros and cons of using either of these circuits in different applications.	Students will be able to describe voltage as the amount of energy per unit of charge transferred through an electrical pathway in order to be able to identify that this energy is what pushes electrons round a circuit. Students will be able to identify that voltage is the same across each loop of a parallel circuit and that it is split across each component in a series circuit to be able to identify the affect this would have on components such as the brightness of bulbs. Students will be able to describe how components with a resistance reduce the	Students will be understand sound in order to describe it as a longitudinal wave that travels through substances. Students will be able to use drawings in order to explain how to change the amplitude and pitch or volume of a sound wave Students will be able to interpret a wave form from an oscilloscope or diagram in order to describe the amplitude and frequency Students will carry out investigations to observe how sound is transferred, absorbed or reflected by different mediums and therefore	Students will be able to describe how light travels from a source to our eyes in order to be able to interpret ray diagrams Students will be able to use ray diagrams of eclipses in order to describe what is seen by observers in different places. Students will know that light intensity is reduced with distance from the source in order to be able to explain why distant stars are less bright Students will be able to explain that light travels in straight lines in order to use experiments to demonstrate this

	in order to calculate speed. Students will be able to describe the journey of an object from the shape of a distance/time graph. They will be able to identify that a straight line indicates a constant speed and a curved line indicates acceleration. This will allow students to access velocity/time graphs in future learning. Students will be able to describe how the speed of objects varies in relation to an observer who is also moving. Students will be able to make predictions on the speed and direction of an object when forces acting upon it change which will enable them to identify if a falling object is accelerating or falling at a constant speed.	gravity and mass of an object are directly proportional whereas gravity is inversely proportional to distance. Students will be able to construct force diagrams including the force of gravity in order to describe if they are in equilibrium. Students will know the difference in contact and non-contact forces in order to compare and contrast the force of gravity with other forces.	only dissipated to the surroundings in order to be able to explain how energy can be dissipated in a range of situations Students will investigate the efficiency of different devices and calculate this in order to be able to evaluate the desirability of their use. Students will investigate how stored energy changes if the object gains speed or height in order to be able to describe the energy store changes in a roller coaster Students will investigate the motion of pendulums or bouncing balls in order to be able to explain why they cannot keep moving for ever Students will investigate how the energy store in an object that is stretched, such as an elastic band, changes the more it is stretched in order to be able to present data to illustrate the relationship. Students will research the percentages of energy wasted from renewable energy sources in order to be able to compare different types.	electricity from and use data in order to present a reasoned argument Students will research how electricity in the home is paid for in order to be able to calculate the cost of using items, using the formula: cost = power (kW) x time (hours) x price (per Kwh) Students will compare the energy usage of different home devices (fluorescent and filament bulbs) in order to be able to identify the benefits of switching to more environmentally friendly systems Students will use diagrams or models to represent energy transfers from a renewable or non-renewable resource to an electrical device from the home in order to be able to illustrate the process to others Students will research real-life energy bills in order to suggest ways to reduce costs for the home owner and present these suggestions to a given audience	Students will be able to explain how an object becomes charged due to the transfer of electrons in turn students will be able to see how objects in an electric field are affected. Students will be able to describe qualitatively the effect of components on the current in a circuit to be able to later describe how the component's resistance dictates this affect. Students will be able to evaluate models to represent current flowing from the negative to positive terminal of a battery they will therefore be able to include voltage and resistance into these models later.	current and transfer energy to the surroundings, to be able to use an analogy such as water pipes to describe this resistance. Students will be able to calculate resistance of a component using R=V/I in order to be able to use ratios to determine resistance. Students will be able to draw a circuit diagram to show how voltage is measured in order to be able to identify that voltmeters must be fitted in parallel.	be able to explain why is will not travel through a vacuum Students will investigate what sounds they can hear and use this to explain the benefits for different organisms being able to hear different ranges of sound Students will investigate the structure and function of the ear in order to consider the effects of ear problems on hearing Students will plan and carry out an investigation into an aspect of hearing in order to present their findings to others	Students will be able to explain what happens during reflection from a plane surface and use this to predict where to place mirrors to move light around a corner Students will be able to accurately draw and label the incident and reflected ray of light and calculate the angle of reflection to predict the path a ray would take Students will be able to use ray diagrams to show how light is refracted by transparent media and from this explain how lenses can be used to correct faulty vision Students will be able to explain why different coloured lights change the perceived colour of different objects and use their knowledge of wave frequency to explain this. Students will be able to use ray diagrams in order to predict how a ray of light will be reflected, refracted or dispersed from any given material such as lenses

What prior knowledge should pupils already know?	Students should be able to identify drag forces acting against an object's movement including air resistance and friction (KS2 NC: Forces)	Students should know the difference between a contact and non-contact forces. They should know that gravity is a non-contact force. Students should also be able to explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object (KS2 NC: Forces)	Students will have touched on energy transfers in food chains in KS2 but not necessarily used the 'energy' terminology. (KS2 NC: Animals, including humans)	Students will know how energy is transferred and will understand why it is important to reduce this energy loss (Year 7: energy transfers)	Students will know what electrons are and that they are negatively charged (Year 7: Matter) Students will know that electricity can be used to transfer energy from a battery to a component (Year 7: Energy transfers) Students should know that some forces can act at a distance as well as when objects are in contact (KS2 NC: Forces) Students should have limited experience building simple series circuits, and should be able to identify that a circuit must be complete for electricity to flow. They will also have a limited experience in drawing circuit diagrams using conventional symbols. (KS2 NC: Electricity)	Students will understand how energy is stored in different stores and transferred between these stores and objects through transfer pathways (Year 7: Energy) Students will be able to describe current as the flow of electrons or charge. (KS2 NC: Electricity) Students will be able to identify safety concerns around electricity and how to mitigate these. (KS2 NC: Electricity) Students will have used simple formula previously and be familiar with how to substitute figures to calculate missing values (KS3 Year 7 Speed) Students should be able to predict the brightness of a bulb based on the voltage provided (KS2 NC: Electricity)	Students will know how to identify how sounds are made, associating some of them with something vibrating (KS2 NC: Sound) Students will be able to recognise that vibrations from sounds travel through a medium to the ear (KS2 NC: Sound) Students will have found patterns between the pitch of a sound and features of the object that produced it. They will also have found patterns between the volume of a sound and the strength of the vibrations that produced it (KS2 NC: Sound) Students will recognise that sounds get fainter as the distance from the sound source increases (KS2 NC: Sound)	Students will be able to recognise that light appears to travel in straight lines (KS2 NC: Light) Students will be able to explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes (KS2 NC: Light) Students will have used the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them (KS2 NC: Light)
What skills will pupils learn and apply? (disciplinary knowledge)	Students will learn how to accurately plot a graph and use this to draw quantitative conclusions from their shape. Students will continue to develop skills in using simple formula, and converting units.	Students will be able to describe the difference between weight and mass which will enable them to accurately define scalar and vector quantities. Students will continue to develop skills in using simple formula, and converting units.	Students will learn how energy can be transferred in order to be able to calculate efficiency and identify energy changes in a system Students will have an understanding of energy loss to the surroundings will allow students to evaluate animal adaptations in hot and cold countries as well as exothermic and endothermic reactions in chemistry.	Students will be able to use their knowledge of renewable and no-renewable energy resources will allow them to make reasoned judgements about energy production and also link to emissions and global climate change in geography and chemistry at KS4 Being able to calculate the cost of running an appliance will allow students to be able to link this to calculating power end energy at GCSE	Students will develop key skills in building electric circuits. Students will develop skills of drawing circuits and interpreting circuit diagrams which will be utilised in the rest of this big idea and beyond. Students will develop their evaluation skills to evaluate models for current. This will be used throughout Biology, Chemistry and Physics.	Students will continue to develop skills of using formula to calculate missing values. Students will also use ratios to determine values. Students will know that voltage is the amount of energy that is transferred by a current and that resistance is the restriction against the flow of that current. Students will use their scientific knowledge to make predictions.	Students will know the wave characteristics of a longitudinal wave and be able to identify the wavelength and frequency on a wave diagram Students will understand that waves can be reflected, transmitted or absorbed depending on the material they are passing through	Students will be able to draw and interpret ray diagrams to explain how light reacts with different media Students will understand how different frequencies of light are absorbed or reflected to help explain why some substances reflect or absorb heat and plants appear green. Students will understand why light is refracted and so explain how lenses are

			Students will have an understanding that work is done when energy is transferred which will link to their future learning of electrical power and calculations at GCSE. Students will know that energy is never created or destroyed. This will underpin future learning in Biology, Chemistry and Physics. Students will begin to use analogies to explain difficult concepts will develop their scientific literacy and allow them to approach new and unusual circumstances in the future	Using diagrams and models to illustrate a difficult concept will allow students to explain more complex process and understand more complex situations Students should be able to make systematic and careful observations and take accurate measurements using appropriate equipment Students will have evaluated data to reach a valid conclusion as to the best choice to make in a given situation. This skill will be used throughout their scientific learning.	Students will develop ideas around lab safety and specifically safety around electrical equipment, in order to be able to assess safety risks from voltage and current data.	Students will use data and their own knowledge to draw conclusions on potential safety issues.		used to correct eyesight problems
Key vocabulary pupil will know and learn	Speed Distance Time Acceleration	Gravity Weight Mass Field Gravitational field strength Non-contact	Dissipated Created Thermal Chemical Kinetic Store	Renewable Non-renewable Resource Fossil fuel Wasted	Current Electron Charge Attract Repel Circuit	Voltage Resistance Charge Restriction Voltmeter Ohms	Vibration Longitudinal Transverse Amplitude Frequency Wavelength	Incident ray Reflected ray Normal line Refraction Absorption Scattering
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…	This topic will allow students to understand the fundamentals of motion and linking an objects motion to the forces acting upon an object. This will lead to understanding more complex 3-dimensional forces in later topics. Students will develop graph drawing and data analysis skills which they will continue to use throughout science. Knowledge of speed and its relation to resultant forces will help students understand and calculate acceleration of objects. Students will know that a more massive object will require a higher resultant force to accelerate or decelerate which will enable them to access ideas of momentum in future topics.	Students will be able to differentiate their understanding of the word 'weight' in terms of forces compared to the use of weight in everyday language. Students will understand what causes the force of weight and how it is changed to enable them to apply this to their future learning of pressure caused by objects. Students will continue to use simple equations to calculate unknown quantities which will allow students to access more easily these in the future. Students will be able to identify the forces acting on a falling object which will enable them to access the ideas of terminal velocity in the future.	This is the first introduction for students to energy stores and identification of the different ways it can be stored will allow them to begin to be able to explain why some systems work Understanding that energy can be dissipated as it transfers from one store to another will allow students to evaluate the efficiency of different methods of energy generation and transport. Students will continue to calculate efficiency in terms of energy and power in KS4 physics.	This topic begins to relate energy use to personal and environmental cost. It allows students to compare different appliances and make valid judgements of their use. Linking this to the energy transfers from food will allow students to consider other aspects of science and remind them of the dietary choices they investigated before By linking this to global energy demands as well as in the home, students will begin to understand how it relates to one another and how sometimes choices for a greener planet can have real-life consequences for individuals.	This topic introduces the basics of electric circuits which will form the foundation of this Big Idea as well as multiple topics at GCSE. Students will continue to use the idea of current throughout their science study. Students will use this knowledge of current to help describe the relationship between current, resistance and voltage. They will also use the idea of current to predict changes in electromagnet strength. This topic also builds on skills relating to drawing and building circuits which, again, relates in further study in this Big Idea and GCSE. This will support students in accessing related required practicals.	Students will develop the idea that electricity is used to transfer energy, this will enable them to access the concept of power in future learning. Students will also go on to use this idea of energy transfers to calculate the efficiency of appliances and calculate energy transferred by electrical circuits. Students will use their knowledge of energy dissipation due to resistance when explaining the high voltages electricity is transported at through the National Grid. Students will use their knowledge of current and voltage to assess dangers of electricity in future study, and describe the safety features in place on appliances and plugs. An understanding of resistance will allow students to access other resistive components such as LDRs and	Students will develop the idea that waves are a method of transferring energy, in this case as sound. Understanding how they pass more easily through some substances will allow students to begin to understand the differences between states of matter Being able to identify the features of waves will help students understand how transverse waves can vary and so perform calculations in KS4 Investigating some ways hearing can be affected will allow students to make healthy lifestyle choices Students will also be able to link this topic to units in music for the nature of sound and in ICT when evaluating the effectiveness of sound cancelling devices.	Students will develop their understanding of how waves transfer energy and constructing ray diagrams will allow them to predict the pathway through different media Accurate drawing of ray diagrams will allow students to progress to calculation of focal length at KS4 in Physics and therefore predict the best corrective lenses for a vision defect

						thermistors and describe their properties. By understanding the relationship between the ratio of current and voltage, students will be able to identify components from I/V curves at KS4.		