GCSE Science – Schemes of Work

Physics

Unit 1: Physics 1

Spec Reference	Summary of the Specification Content	Learning Outcomes *What most candidates should be able to do*	Suggested timing (hours)	*Opportunities to develop Scientific Communication skills*	Opportunities to develop and apply Practical and Enquiry skills	Self/Peer assessment Opportunities & resources *reference to past questions that indicate success*
P1.1 The transfer of energy by heating processes and the factors that affect the rate at which that energy is transferred Energy can be transferred from one place to another by work or by heating processes. We need to know how this energy is transferred and which heating processes are most important in a particular situation.						
P1.1.2 Kinetic theory						
a b	The use of kinetic theory to explain the different states of matter. The particles of solids, liquids and gases have different amounts of energy.	Draw simple diagrams to model the difference between solids, liquids and gases. Describe the states of matter in terms of the energy of their particles.	2	**Presenting and writing descriptions and explanations** Describe changes of state in terms of a particle model Explain how properties of solids liquids and gases can be explained using the ideas of particles and energy **Communication for audience and purpose** Design a poster to illustrate the arrangement, movement and energy of the particles in solids, liquids and gases. **Developing explanations using ideas and models** *Give pupils an opportunity to create their own models to explain change of state.*	**Planning an approach Selecting and managing variables** **Assessing risk and working safely** *Is toothpaste a liquid?* Plan an investigation to test this. *Does the temperature of oil affect its viscosity?* Plan a safe investigation to test this. **Working critically with secondary evidence** *Can the boiling point of a liquid be altered?* Pupils do some research to find out. Individual use/class demonstration of interactive kinetic theory modelling computer programme.	**BBC learning zone web clip "change of state" Animation of particles** P1.1.2 Kinetic theory powerpoint
P1.2.1 Energy transfers and efficiency						
a b	Energy can be transferred usefully, stored or dissipated, but cannot be created or destroyed. When energy is	Describe the energy transfers and the main energy wastages that occur in a range of situations or appliances. Interpret and draw a Sankey	3	**Presenting and writing descriptions and explanations** Drawing of Sankey diagrams, having identified major sources of "wasted" energy. Describe what a given Sankey diagram shows.	**Obtaining and presenting primary evidence** Design and build a sequence of energy transfers. eg heat water to allow steam to turn wheel to trigger movement etc.	BBC learning zone clip "energy efficiency in a leisure centre" http://www.bbc.co.uk/learningzone/clips/energy-efficiency-

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	transferred only part of it may be usefully transferred, the rest is 'wasted'.	diagram.		Use a Sankey diagram to explain how efficiency can be calculated Explain why energy is "wasted" but never lost	**Working critically with primary and secondary evidence** *How much energy is in a bread crouton?* Do some research to find out the published figures and then investigate it practically. **Planning an approach** *How much energy is "wasted" by an electric kettle?* Plan how this could be worked out.	in-a-leisure-centre/269.html Useful information on 'Heat transfer and efficiency' can be found on the BBC website at www.bbc.co.uk/schools/gcsebitesize/science/aqa/energy P1 2.1 Energy transfers and efficiency powerpoint
c	Wasted energy is eventually transferred to the surroundings, which become warmer. The wasted energy becomes increasingly spread out and so becomes less useful.	Explain the concept of efficiency and why efficiency can never be greater than 100%.		**Presenting and writing arguments** Evaluate the design of everyday appliances that transfer energy by heating, including economic considerations.		
d	To calculate the efficiency of a device using: Efficiency = useful energy out / total energy in Efficiency = useful power out / total power in	Use the equation to calculate efficiency as a decimal or percentage.		Calculations of efficiency		

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P1.1.3 Energy transfer by heating						
a b	The transfer of energy by conduction and convection involves particles, and how this transfer takes place. The transfer of energy by evaporation and condensation involves particles, and how this transfer takes place. The factors that affect the rate of evaporation and condensation.	Describe in simple terms how the arrangement and movement of particles. Determine whether a material is a conductor or an insulator. Explain the role of free electrons in conduction through a metal. Explain convection using the idea of particles moving apart to make a fluid less dense and to describe simple applications of convection. Explain evaporation and the cooling effect this causes using the kinetic theory.	4	**Presenting and writing descriptions and explanations** Describe applications of evaporation and condensing, eg sweating, fridges, scalds etc. **Explanation** Use the kinetic theory to explain how evaporation and condensation transfer energy **Developing argument** Survey and evaluate the advantages and disadvantages of the material used in the take-away food industry in terms of energy transfer. **Presenting and writing descriptions and explanations** Summarise the factors affecting the rate at which an object transfers energy	*What is the best conductor?* **Planning an approach** Design an experiment to compare the rate of conduction through different metal rods *What do convection currents look like?* *Are 'radiators' correctly named?* *Does heat rise in a spacecraft?* **Obtaining and presenting primary evidence** Research and design a demonstration of convection, in air or water *How can we cool off quickly?* Investigations about evaporation causing cooling, eg thermometer bulb wrapped in wet tissue.	P1.1.3 Energy transfer by heating powerpoint Video clips on heat transfer can be found on the BBC website at: http://www.bbc.co.uk/learningzone/clips/frying-an-egg-with-a-paper-pan/8762.html or http://www.bbc.co.uk/learningzone/clips/conduction-convection-and-radiation/10589.html

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				by heating.		
c	The rate at which an object transfers energy by heating depends on a number of factors.	State the factors that affect the rate at which an object transfers energy by heating : • surface area and volume • the material from which the object is made • the nature of the surface with which the object is in contact. • the temperature difference between the object and its surroundings.		Explain how machines are designed to keep cool **Applications and implications** Research and **explain** in a presentation **how** animals in cold and hot climates are adapted to their environments	*Which take-away coffee cup works best?* Investigations to compare the effectiveness of different commercially available take-away coffee cups. *How do machines cool down?* Research and find examples of parts of machinery showing cooling fins increasing surface area, eg motorbike engines, fridge cooling fins etc. Create an imaginary animal, which has evolved to deal with certain climatic conditions.	Video clips about keeping cool in the desert using evaporation to help survival. http://dsc.discovery.com/videos/planet-earth-deserts-red-kangaroos.html http://videos.howstuffworks.com/discovery/28213-man-vs-wild-staying-cool-in-the-moab-desert-video.htm
d	The bigger the temperature difference between an object and its surroundings, the faster the rate at which energy is transferred by heating.	Be able to explain the design of devices in terms of energy transfer, eg cooling fins. Be able to explain animal adaptations in terms of energy transfer, eg relative ear size of animals in cold and warm climates.				
P1.1.1 Infrared radiation						
a	All objects emit infrared radiation.	State what infrared radiation is. Describe the factors which	2	**Presenting and writing descriptions and explanations**	*Why are marathon runners wrapped in foil blankets following a race and why are*	Video clip about the discovery of infrared radiation

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b c d	The hotter an object is the more infrared radiation it radiates in a given time. Dark, matt surfaces are good emitters of infrared radiation. Light, shiny surfaces are poor emitters of infrared radiation. All objects absorb infrared radiation. Dark, matt surfaces are good absorbers of infrared radiation. Light, shiny surfaces are poor absorbers of infrared radiation. Light, shiny surfaces are good reflectors of infrared radiation.	affect the rate at which an object radiates infrared radiation Explain the difference between radiation and absorption of infrared radiation. Describe the factors which affect the rate at which an object absorbs infrared radiation.		Explain the difference between radiation and absorption of infrared Explain how various factors affect the amount of infrared radiation emitted and absorbed **Developing argument** Evaluate the use of thermographic imaging to detect tumours, or to locate bodies following natural disasters. **Reaching agreement on scientific explanations** Describe how infrared radiation was first identified beyond the visible spectrum.	*kettles light coloured? What is the best colour for an ice-cream van? Is it hot or cold in space? Would it best to use a black or white tent in an Antarctic expedition?* **Obtaining and presenting primary evidence** Investigation using Leslie's cube and infrared detector or similar apparatus.	http://www1.teachertube.com/viewVideo.php?title=Discovery_of_infrared_radiation&video_id=189860 P1.1.1 Infrared radiation success criteria items powerpoint

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P1.1.4 Heating and insulating buildings						
a	U-values measure how effective a material is as an insulator.	State what a U-value is and what it tells us about the material as an insulator.	2	**Presenting and writing descriptions and explanations** Describe how the U value relates to a material's effectiveness as an insulator.	**Obtaining and presenting primary evidence** *Do solar panels provide free hot water? How can a solar panel work in England?*	P1.1.4 Heating and insulating buildings success criteria items powerpoint.
b	The lower the U-value, the better the material is as an insulator.	Be able to evaluate the effectiveness of different types of material used for insulation, including U-values and economic factors including payback time.		Describe how a solar panel works. **Presenting and writing arguments** Evaluate the effectiveness of different types of material used for insulation, including U-values and economic factors including payback time.	Demonstration of model/real solar panel water heater. Plan and carry out an investigation by constructing a model house, using sensors and data logger to measure temperatures with and without various types of insulation.	
c	Solar panels may contain water that is heated by radiation from the Sun. This water may then be	Be able to evaluate the efficiency and cost effectiveness of methods used to reduce 'energy consumption'.		Evaluate the efficiency and cost effectiveness of methods used to reduce 'energy consumption' e.g. by using solar panels		

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	used to heat buildings or provide domestic hot water.			Applications and implications *How should I insulate my home?* Research U-values of common insulating materials, and their costs.		
d	The specific heat capacity of a substance is the amount of energy required to change the temperature of one kilogram of the substance by one degree Celsius. $E = m \times c \times \theta$	Define specific heat capacity. Evaluate different materials according to their specific heat capacities, eg water, which has a very high specific heat capacity; oil filled radiators and electric storage heaters containing concrete.		Explain why the filling in hot pies feels hotter than the pastry when removed from the oven, or similar example. Calculations involving specific heat capacity.	*Why do some foods with a filling of differing specific heat capacity sometimes warn about the filling being hot?* Practical calculation of the specific heat capacity using small immersion heaters to heat blocks of metal/containers of water.	

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P1.2 Energy and efficiency Appliances transfer energy but they rarely transfer all of the energy to the place we want. We need to know the efficiency of appliances so that we can choose between them, including how cost effective they are, and try to improve them. **P1.3 The usefulness of electrical appliances** We often use electrical appliances because they transfer energy at the flick of a switch. We can calculate how much energy is transferred by an appliance and how much the appliance costs to run. **P1.4 Methods we use to generate electricity** Various energy sources can be used to generate the electricity we need. We must carefully consider the advantages and disadvantages of using each energy source before deciding which energy source(s) it would be best to use in any particular situation. Electricity is distributed via the National Grid.						
P1.3.1 Transferring electrical energy						
a	Examples of energy transfers that everyday electrical appliances are designed to bring about.	Describe the energy transfers that occur in electrical appliances.	2	**Presenting and writing descriptions and explanations** Use a Sankey diagram to describe the energy transfers that occur in electrical appliances.	**Obtaining and presenting primary evidence** *How much power does a device use?* Using an electrical joulemeter, measurement of energy transferred by electrical items such as low voltage bulbs of different powers, low voltage motors and low voltage immersion heaters. *How much does it cost to use an electrical device? What are we paying for when we use electricity?* Find out the power of several electrical appliances in the home; estimate the cost of using these appliances in a typical week Or Keep a diary of the numbers on	P1.3.1 Transferring electrical energy success criteria items powerpoint
b	The amount of energy an appliance transfers depends on how long the appliance is switched on and its power.					
c	To calculate the amount of energy transferred from the mains using the equation: $E = P \times t$	Use the equation to calculate the energy transferred from the mains to an electrical appliance, either in joules or kilowatt-hours.		Calculation Calculate of energy transferred and cost using typical power values of common household appliances. Explanation Explain some consequences of using		

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d	To calculate the cost of mains electricity given the cost per kilowatt-hour (kWh).	Calculate the cost of using individual appliances and also to interpret electricity meter readings to calculate total cost over a period of time.		lower power devices in terms of cost or the environment. .	your electricity meter for a week. Why are there two sets of numbers? What does your electricity provider charge per kWh?	
P1.4.1 Generating electricity						
a	In some power stations an energy source is used to heat water. The steam produced drives a turbine that is coupled to an electrical generator.	Describe the purpose of the main parts of a power station. Relate the different energy sources which heat the water. These include: ▪ the fossil fuels (coal, oil and gas) which are burned to heat water or air ▪ uranium and plutonium, when energy from nuclear fission is used to heat water	4	**Presenting and writing descriptions and explanations** Describe the structure and purpose of the main parts of a power station Explain the advantages and disadvantages of the different energy sources used to heat the water Draw a map of the country and mark on it the power stations showing what energy source they use, relating that to the geographical features	**Working critically with primary evidence** *Can we get electricity for nothing?* Design and build a model water/wind turbine linked to a generator. Investigate the factors that will affect the voltage produced.	P1.4.1 Generating electricity success criteria items powerpoint BBC learning zone video clip on renewable energy sources http://www.bbc.co.uk/learningzone/clips/renewable-energy-sources/474.html

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		▪ biofuels that can be burned to heat water. State that, of the fossil fuel power stations, gas-fired have the shortest start-up time.		**Communication for audience and purpose** **Applications and implications** *How is mains electricity always available?* Research into different types of power stations for booklet or presentation on generating electricity.		
b	Water and wind can be used to drive turbines directly.	Explain the advantages of pumped storage systems in order to meet peak demand, and as a means of storing energy for later use. Describe the basic principles by which wind turbines operate. State the ways that water can be used to drive turbines. These include, but are not limited to, waves, tides and the falling of water in hydroelectric schemes.		**Presenting and writing descriptions and explanations** Describe how a pumped storage system works. Explain the advantages of pumped storage systems Describe how wind and water can be used to turn turbines to generate electricity Explain the advantages and disadvantages of the different ways that water sources are used to generate electricity		Video clips of renewable energy sources can be found at www.brainpop.com by searching for 'biofuels'. BBC GCSE Bitesize revision material can be found at www.bbc.co.uk/schools/gcsebitesize/science/aqa/energy
d	In some volcanic areas hot water and steam rise to the surface. The steam can be tapped and used to drive	Describe the basic principles of how geothermal energy is used.		Describe the basic principles of how geothermal energy is used. Explain the advantages and disadvantages of the using geothermal energy to generate electricity		An interactive game called 'Enercities', can be found at www.enercities.eu

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	turbines. This is known as geothermal energy.					
c	Electricity can be produced directly from the Sun's radiation.	State that solar cells can be used to generate electricity.		Explain the advantages and disadvantages of using solar cells to generate electricity especially related to applications in different circumstances	*How can we get the most from the sunshine?* Investigate the factors affecting the output of a solar cell.	
e	Small-scale production of electricity may be useful in some areas and for some uses, eg hydroelectricity in remote areas and solar cells for roadside signs.	Describe the advantages and disadvantages of the use of solar cells in generating electricity.				
f	Using different energy resources has different effects on the environment.	Describe effects on the environment such as: • the release of substances into the atmosphere • the production of waste materials • noise and visual pollution • the destruction of wildlife habitats. Explain how carbon-capture and storage is a rapidly evolving technology.		Explain how the use of different energy resources to generate electricity can have effects on the environment. **Developing argument** Evaluate different methods of generating electricity **Applications and implications** *How is my electricity generated?* Research to find out what power		BBC learning zone video clip about the best way to provide energy in the future http://www.bbc.co.uk/learningzone/clips/what-is-the-best-way-to-provide-energy-in-the-future/1446.html

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		Explain that to prevent carbon dioxide building up in the atmosphere we can catch and store it; some of the best natural containers are old oil and gas fields, such as those under the North Sea. Evaluate different methods of generating electricity given data including start-up times, costs of electricity generation and the total cost of generating electricity when factors such as building and decommissioning are taken into account. The reliability of different methods should also be understood.		sources are used by pupils' domestic energy providers.		
P1.4.2 The National Grid						
a b	Electricity is distributed from power stations to consumers along the National Grid. For a given power, increasing the voltage reduces the current	Identify and label the essential parts of the National Grid.	2	**Presenting and writing descriptions and explanations** Use a diagram to identify and describe the function of the essential parts of the national grid	**Working critically with primary evidence** *Why do we need to change the*	P1.4.2 The National Grid success criteria items powerpoint BBC learning zone video clip about working to maintain the National Grid http://www.bbc.co.uk/l

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	required and this reduces the energy losses in the cables.				*voltage up, only to change it back down?* Demonstration model of overhead transmission lines.	earningzone/clips/working-to-maintain-the-national-grid/7407.html video clip about model transmission lines http://www.nationalstemcentre.org.uk/elibrary/resource/2085/power-lines
c	The uses of step-up and step-down transformers in the National Grid.	Explain why transformers are an essential part of the National Grid.		Explain the role that transformers play in distributing electricity		
P1.5 The use of waves for communication and to provide evidence that the universe is expanding. Electromagnetic radiations travel as waves and move energy from one place to another. They can all travel through a vacuum and do so at the same speed. The waves cover a continuous range of wavelengths called the electromagnetic spectrum. Sound waves and some mechanical waves are longitudinal, and cannot travel through a vacuum. Current evidence suggests that the universe is expanding and that matter and space expanded violently and rapidly from a very small initial 'point', ie the universe began with a 'Big Bang'.						
P1.5.2 Reflection						
a	The 'normal' is a construction line perpendicular to the reflecting surface at the point of incidence.	Draw diagrams showing rays of light being reflected from a plane mirror, labelling incident and reflected rays, angles of incidence and reflection, and the normal.	2	**Presenting and writing descriptions and explanations** Draw accurate and labelled ray diagrams to describe reflection	**Obtaining and presenting primary evidence** *Is there a law of reflection?* Investigation to confirm the law of reflected light at different angles off a plane mirror.	P1.5.2 Reflection success criteria items powerpoint A video clip on wave reflection can be found on the BBC website at http://www.bbc.co.uk/learningzone/clips/wave-reflection/4554.htm
b	The angle of incidence is equal to the angle of reflection.					

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c	The image produced in a plane mirror is virtual.	Explain how an image is formed by a plane mirror, and why it is virtual.		Use a ray diagram **to explain** the nature of a reflected image	*Can we be fooled by mirrors?* Illustrative experiment showing how "Pepper's ghost works"	l
P1.5.1 General properties of waves						
a b c d	Waves transfer energy. Waves may be either transverse or longitudinal. Electromagnetic waves are transverse, sound waves are longitudinal and mechanical waves may be either transverse or longitudinal. All types of electromagnetic waves travel at the same speed through a vacuum (space).	 Describe that in a transverse wave the oscillations are perpendicular to the direction of energy transfer. Describe that in a longitudinal wave the oscillations are parallel to the direction of energy transfer. Explain the terms 'compression' and 'rarefaction' and how they are formed.	3	**Presenting and writing descriptions and explanations** Use diagrams to identify and describe the essential features of transverse and longitudinal waves List the waves of the electromagnetic spectrum in the correct order and **describe** their basic properties. Make up an illustrated mnemonic or acronym to help you remember the order of the electromagnetic spectrum.	**Working critically with primary evidence** *What do waves look like?* Demonstration of transverse and longitudinal waves using slinky springs or other equipment.	P1.5.1 General properties of waves success criteria items powerpoint BBC learning zone clip about transverse and longitudinal waves http://www.bbc.co.uk/learningzone/clips/transverse-and-longitudinal-waves/10674.html BBC learning zone clip about the electromagnetic spectrum http://www.bbc.co.uk/learningzone/clips/the-electromagnetic-spectrum/10676.html

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e f i	Electromagnetic waves form a continuous spectrum. Longitudinal waves show areas of compression and rarefaction. The terms 'frequency', 'wavelength' and 'amplitude'.	Explain the terms 'frequency', 'wavelength' and 'amplitude' and be able to annotate a diagram to show these terms. State the order of electromagnetic waves within the spectrum, in terms of energy, frequency and wavelength.		**Developing explanations using ideas and models** *Is there more than just light?* Research into properties and uses of electromagnetic waves.		
g h	Waves can be reflected, refracted and diffracted. Waves undergo a change of direction	Describe the circumstances where a wave is reflected, refracted or diffracted. Complete wave-front diagrams for reflection, refraction and		**Presenting and writing descriptions and** explanations Use a ray diagram to describe what happens during refraction Use a wave-front diagram to explain how refraction might occur.	*What do waves do?* Demonstration of properties of waves using a ripple tank. Demonstration of refraction effects such as a bent pencil	A video clip on wave refraction can be found on the BBC website at http://www.bbc.co.uk/learningzone/clips/

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	when they are refracted at an interface.	diffraction. State that waves are not refracted if travelling along the normal.			and/or disappearing coin. Illustrative experiment to create a ray diagram of refraction of light using ray boxes and glass blocks.	wave-refraction/4555.html
l j	The terms frequency, wavelength and amplitude All waves obey the wave equation: $v = f \times \lambda$	Use the equation, knowing that v is speed in metres per second (m/s) f is frequency in hertz (Hz) and λ is wavelength in metres (m).		**Applications and implications** Explain why various waves are appropriate for their use in communication Research frequencies of local and national radio stations.	*What does wavelength depend on?* Illustrative experiment using transverse waves along a length of rope to show the relationship between frequency and wavelength.	Interactive video clip can be found on BBC GCSE Bitesize 'An introduction to waves' at www.bbc.co.uk/schools/gcsebitesize/science/aqa/radiation
k	Radio waves, microwaves, infrared and visible light can be used for communication.	Describe situations in which waves are typically used for communication, eg: ▪ radio waves – TV and radio (including diffraction effects) ▪ microwaves – mobile phones and satellite television ▪ infrared – remote controls ▪ visible light – photography.		Research into using waves for communication, including the concerns surrounding possible risks related to mobile phones. **Developing argument** mini debate regarding the siting of a mobile phone mast.	Demonstration of microwave properties using microwave transmitter and detector. Investigate the range of Bluetooth or infrared communications between mobile phones and laptops	'Sending Information' can be found on BBC GCSE Bitesize at www.bbc.co.uk/schools/gcsebitesize/science/aqa/radiation

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P1.5.3 Sound						
a	Sound waves are longitudinal waves and cause vibrations in a medium, which are detected as sound.	Explain how sound waves are produced.	2	**Presenting and writing descriptions and explanations** Describe the basic properties of sound waves and the relationships between pitch and frequency	**Working critically with primary evidence** *Why can nobody hear you scream in space? What does sound look like?* Demonstration of properties of sound using signal generator, loudspeaker and Cathode Ray Oscilloscope (CRO).	P1.5.3 Sound success criteria items powerpoint Video clip on echoes and their use in sonar can be found on the BBC website at www.bbc.co.uk/learningzone/clips by searching for clip '14'.
b	The pitch of a sound is determined by its frequency and loudness by its amplitude.	State the relationship between the pitch of a sound and the frequency of the sound wave.			Demonstration of waveforms of sound from musical instruments using a CRO.	
c	Echoes are reflections of sounds.	Describe how echoes are formed.		Use the kinetic theory to suggest and explain how the speed of sound might vary according to the state of the medium or its temperature.	Demonstration of 'electric bell in bell jar' type apparatus to show the need for a medium. Demonstration of echoes from an outside wall. **Planning an approach**	

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					Will sound travel faster in hot air or cold? Plan an investigation to measure the speed of sound in air of different temperatures.	
P1.5.4 Red-shift						
a	If a wave source is moving relative to an observer there will be a change in the observed wavelength and frequency. This is known as the Doppler effect.	Explain the Doppler effect. Describe that when the source moves away from the observer, the observed wavelength increases and the frequency decreases; when the source moves towards the observer, the observed wavelength decreases and the frequency increases. Explain the term 'red- shift'.	2	**Presenting and writing descriptions and explanations** Describe the Doppler shift in the context of sound and light Describe the "Big Bang" theory Explain how the Doppler effect provides evidence for the movement of stars and galaxies Explain how CMBR relates to the big bang theory	**Obtaining and presenting primary evidence** Demonstration of Doppler effect using sound eg length of tubing swung in a circle.	P1.5.4 Red-shift success criteria items powerpoint Video clips of 'red-shift', the 'Big Bang' theory, and CMBR can be found at www.pbs.org/wgbh/nova/programs/ht/qt/3114_01.html
b	There is an observed increase in the wavelength of light from most distant galaxies. This effect is called the 'red-shift'.	State that the further away the galaxies are, the faster they are moving, and the bigger the observed increase in wavelength.		**Developing explanations using ideas and models** **Reaching agreement on scientific explanations** Research into the development of theories of the origins of the universe		BBC learning zone clip on the Big Bang http://www.bbc.co.uk/learningzone/clips/the-big-bang/12236.html
c	How the observed 'red-shift' provides evidence that the universe is expanding and supports the 'Big Bang' theory.	Explain how 'red-shift' provides evidence that the universe is expanding. Explain that the 'Big Bang' theory indicates that the universe began from a very				

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d e	Cosmic microwave background radiation (CMBR) is a form of electromagnetic radiation filling the universe The 'Big Bang' theory is currently the only theory that can explain the existence of CMBR.	small initial point. Explain that CMBR comes from radiation that was present shortly after the beginning of the universe.				