


Department	SCIENCE Physics	 HeathPark EVERY PUPIL ALWAYS IN FOCUS
Key Stage	KEY STAGE 4	
Course Level	YR 9 GCSE	
Exam Board	AQA	

Dates Delivered	Unit Title	End Points	Substantive Knowledge What will they learn about in this topic?	Disciplinary Knowledge What subject concepts will be developed through this topic?	Assessment Method	Key Course Guides & Reading
Year 9 Autumn term	ENERGY	<p>Students should be able to describe all the changes involved in the way energy is stored when a system changes, for common situations</p> <p>Students should be able to calculate the amount of energy associated with a moving object, a stretched spring and an object raised above ground level.</p> <p>Students should be able to: consider the</p>	<p>Energy stores and types</p> <p>Specific heat capacity</p> <p>Law of conservation of energy</p> <p>Energy resources</p>	<p>Different types of energy.</p> <p>Application of knowledge to different life scenarios Required practical activities</p> <p>Identification of control variables in experimental design</p> <p>Graph and data analysis</p> <p>describe the environmental impact arising from the use of different energy resources</p>	<p>End of topic tests at the end of topic (identified in substantive knowledge)</p>	<p>AQA website for unit</p> <p>https://filestore.aqa.org.uk/resources/physics/specifications/AQA-8463-SP-2016.PDF</p>

ELECTRICITY

environmental issues that may arise from the use of different energy resources

Students should be able to draw and interpret circuit diagrams.

Students should be able to use graphs to explore whether circuit elements are linear or non-linear and relate the curves produced to their function and properties.

Students should be able to explain the difference between direct and alternating potential difference.

Students should be able to describe, with

Trends in energy

Circuit diagrams

$$\text{charge flow} = \text{current} \times \text{time}$$

$$\text{potential difference} = \text{current} \times \text{resistance}$$

I-V characteristics

$$R_{\text{total}} = R_1 + R_2 (\text{series and parallel circuits})$$

Domestic use and safety

show that science has the ability to identify environmental issues arising from the use of energy resources but not always the power to deal with the issues because of political, social, ethical or economic considerations.

For electrical charge to flow through a closed circuit the circuit must include a source of potential difference.

Students should be able to rearrange the equation and recall all the units.

Graph and data analysis

End of topic tests at the end of topic (identified in substantive knowledge)

examples, the relationship between the power ratings for domestic electrical appliances and the changes in stored energy when they are in use.

Students should be able to explain why the National Grid system is an efficient way to transfer energy.

Students should be able to:

- describe the production of static electricity, and sparking, by rubbing surfaces
- describe evidence that charged objects exert forces of attraction or repulsion on one another when not in contact
- explain how the transfer of electrons between objects can explain the phenomena of static electricity.

Students should be able to:

- draw the electric field pattern for an

Mains electricity

Power calculations:
 $\text{power} = \text{potential difference} \times \text{current}$

$\text{power} = \text{current}^2 \times \text{resistance}$

Energy Transfer: $ET = P \times T$

National Grid

Static electricity

Investigate the relationship between the resistance of a thermistor and temperature. Investigate the relationship between the resistance of an LDR and light intensity.

Students should be able to recall and apply both equations.

The construction and operation of transformers is covered Transformers

<https://www.bbc.co.uk/bitesize/guides/z3xv97h/revision/1>

<https://www.bbc.co.uk/bitesize/guides/z9s4qhv/revision/1>

Spring term	Particle model of matter	isolated charged sphere			
		<ul style="list-style-type: none"> explain the concept of an electric field 			
		Students should be able to recognise/draw simple diagrams to model the difference between solids, liquids and gases.	The density of a material is defined by the equation: density = mass / volume	Students should be able to recall and apply this equation to changes where mass is conserved.	This equation and specific heat capacity are also included in Energy changes in systems
		Students should be able to explain the differences in density between the different states of matter in terms of the arrangement of atoms or molecules.	Changes of state are physical changes which differ from chemical changes because the material recovers its original properties if the change is reversed.	Students should be able to apply this equation, which is given on the Physics equation sheet, to calculate the energy change involved when the temperature	
		Students should be able to describe how, when substances change state (melt, freeze, boil, evaporate, condense or sublimate), mass is conserved.	Internal energy is the total kinetic energy and potential energy of all the particles (atoms and molecules) that make up a system.		End of topic tests at the end of topic (identified in substantive knowledge)
			The following equation applies: change in thermal energy = mass × specific heat capacity × temperature change $\Delta E = m c \Delta \theta$		https://www.bbc.co.uk/bitesize/guides/zsqngdm/revision/1
					https://www.bbc.co.uk/bitesize/

Students should be able to interpret heating and cooling graphs that include changes of state. Students should be able to distinguish between specific heat capacity and specific latent heat.

Students should be able to:

- explain how the motion of the molecules in a gas is related to both its temperature and its pressure
- explain qualitatively the relation between the temperature of a gas and its pressure at constant volume.

Students should be able to use the particle model to explain how increasing the volume in which a gas is contained, at constant temperature, can lead to a decrease in pressure.

Students should be able to explain how, in a

energy for a change of state = mass \times specific latent heat

$$E = m L$$

The molecules of a gas are in constant random motion. The temperature of the gas is related to the average kinetic energy of the molecules.

Changing the temperature of a gas, held at constant volume, changes the pressure exerted by the gas

For a fixed mass of gas held at a constant temperature: pressure \times volume = constant

Perform an experiment to measure the latent heat of fusion of water.

Reading and graph and data

[guides/zqrqh39/revision/1](#)

Summer term	ATOMIC STRUCTURE	<p>given situation eg a bicycle pump, doing work on an enclosed gas leads to an increase in the temperature of the gas.</p> <p>Students should be able to relate differences between isotopes to differences in conventional representations of their identities, charges and masses.</p> <p>Students should be able to describe:</p> <ul style="list-style-type: none"> -why the new evidence from the scattering experiment led to a change in the atomic model - the difference between the plum pudding model of the atom and the nuclear model of the atom. 	<p>Work is the transfer of energy by a force. Doing work on a gas increases the internal energy of the gas and can cause an increase in the temperature of the gas.</p> <p>All atoms of a particular element have the same number of protons. The number of protons in an atom of an element is called its atomic number. The total number of protons and neutrons in an atom is called its mass number.</p> <p>Details of experimental work supporting the Bohr model are not required.</p>	<p>Students should be able to apply this equation which is given on the Physics equation sheet.</p>	<p>End of topic tests at the end of topic (identified in substantive knowledge)</p>	<p>https://www.bbc.co.uk/bitesize/guides/zqrgq39/revision/1</p> <p>https://www.bbc.co.uk/bitesize/guides/zpjpb82/revision/1</p>
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Students should be able to apply their knowledge to the uses of radiation and evaluate the best sources of radiation to use in a given situation

Nuclear equations are used to represent radioactive decay.

Students should be able to explain the concept of half-life and how it is related to the random nature of radioactive decay

Students should be able to compare the hazards associated with contamination and irradiation.

Required knowledge of the properties of alpha particles, beta particles and gamma rays is limited to their penetration through materials, their range in air and ionising power.

Alpha decay equation

Beta decay equation

The half-life of a radioactive isotope is the time it takes for the number of nuclei of the isotope in a sample to halve, or the time it takes for the count rate (or activity) from a sample containing the isotope to fall to half its initial level

Students should understand that it is important for the findings of studies into the effects of radiation on humans to be published and shared with other scientists so that the findings can be checked by peer review.

Students are not required to recall these two examples

Should be able to recall equation for alpha and beta decay

Interpreting graphs and data to find out half life.

<https://www.bbc.co.uk/bitesize/guides/z3tb8mn/revision/1>

<https://www.bbc.co.uk/bitesize/guides/zx86y4j/revision/1>

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Background radiation is around us all of the time. It comes from:

- natural sources such as rocks and cosmic rays from space
- man-made sources such as the

Students should be able to:

- describe and evaluate the uses of nuclear radiations for exploration of internal organs, and for control or destruction of unwanted tissue

Nuclear fission: Students should be able to draw/interpret diagrams representing nuclear

Students should be able to compare the hazards associated with contamination and irradiation.
WS 1.5 Suitable precautions must be taken to protect against any hazard that the radioactive source used in the process of irradiation may present.

Background radiation.

Evaluate the perceived risks of using nuclear radiations in relation to given data and consequences.

The chain reaction is controlled in a nuclear reactor to control the energy released. The explosion

Students should be able to use data presented in standard form.

Graph skills and mean calculation

fission and how a chain reaction may occur.

Nuclear fusion is the joining of two light nuclei to

caused by a nuclear weapon is caused by an uncontrolled chain reaction.

Nuclear fusion-. In this process some of the mass may be converted into the energy of radiation.

Chain reaction diagrams