Secondary Curriculum Information Pro-Forma

Subject: Physics

Subject Leader: Mrs S Julka

Examination Board and Specification Title & Number: Edexcel GCSE Science

Recommended reading/preparation:
EDEXCEL GCSE Core Science
EDEXCEL GCSE Additional Science
EDEXCEL GCSE Extension Science
CGP GCSE Physics Revision Guide
CGP GCSE Physics Workbook
http://www.bbc.co.uk/education/subjects/zpm6fg8
To download physics exam specification:
http://qualifications.pearson.com/content/dam/pdf/GCSE/Science/2011/Specification%20and%20sample%20assessments/UG029980_GCSE_Physics_Spec_2012.pdf
To download physics past papers:
http://qualifications.pearson.com/en/support/support-topics/exams/past-papers.html?Qualification-Family=GCSE&Qualification-Subject=Science%20-%20Mixed%20science%20route%20(2011)%20&Status=Pearson-UK:Status%2FLive&Specification-Code=Pearson-UK:Specification-Code%2Fgcse11-science

YEAR 10	Theme Title	Key Areas of Knowledge Acquisition	Key Skills and Processes Learned
Term 1 (September – October)	Energy and the future	• To explore energy transfers in common situations and appliances and investigate the absorption and radiation of energy from surfaces. This will lead to the idea of energy conservation and the efficiency of energy transfer devices.	• Demonstrate an understanding that energy is conserved • Describe energy transfer chains involving the following forms of energy • Apply the idea that efficiency is the proportion of energy transferred to useful forms to everyday situations
	Motions and Forces	• Develop an understanding of the motion of objects and Newton's second law of motion.	• Interpret distance/time graphs including determination of speed from the gradient

			• Recall that velocity is speed in a stated direction • Interpret velocity/time graphs to compare acceleration from gradients qualitatively, to calculate the acceleration from the gradient, determine the distance travelled using the area between the graph line and the time axis • Calculate a resultant force using a range of forces • Use the equation: $F = m \times a$ $W = m \times g$ • Recall that in a vacuum all falling bodies accelerate at the same rate
Term 2 (November – December)	Momentum, energy, work and power	• To develop understanding about conservation of momentum by investigating collisions between bodies. This will enable students to apply ideas about rate of change of momentum to crumple zones, seat belts and air bags. Students will then develop an understanding of the relationship between work done, energy transferred and power.	• Demonstrate an understanding of the factors affecting the stopping distance of a vehicle • Demonstrate an understanding of the idea of rate of change of momentum to explain protective features including bubble wraps, seat belts, crumple zones and air bags • Use the following equation: $p = m \times v$ $F = (mv - mu)/t$ $E = F \times d$ $P = E/t$ $GPE = m \times g \times h$ $KE = \frac{1}{2} \times m \times v^2$

Term 3 (January – February)	Electromagnetic spectrum	• To understand the electromagnetic spectrum, including properties, effects, dangers and uses.	• Demonstrate an understanding that the electromagnetic spectrum is continuous from radio waves to gamma rays, but the radiations within it can be grouped in order of decreasing wavelength and increasing frequency • Demonstrate an understanding that the potential danger associated with an electromagnetic wave increases with increasing frequency • Describe some uses of electromagnetic radiation • Describe that ionising radiation includes alpha and beta particles and gamma rays and that they transfer energy
	Visible light and the solar system	• To explore ideas about the Solar System and how visible light and lenses have been used in discovery.	• Describe how ideas about the structure of the Solar System have changed over time • Compare methods of observing the Universe using visible light, including the naked eye, photography and telescopes • Explain how to measure the focal length of a converging lens using a distant object • Describe how a reflecting telescope works • Recall that waves are reflected and refracted at boundaries between

			different materials • Explain how waves will be refracted at a boundary in terms of the change of speed and direction • Describe that waves transfer energy and information without transferring matter • Use the terms of frequency, wavelength, amplitude and speed to describe waves • Differentiate between longitudinal and transverse waves by referring to sound, electromagnetic and seismic waves
Term 4 (March – April)	Waves and Universe Waves and Earth	• To explore how observations using different types of telescope led to the development of our knowledge and understanding of the Universe. • To explore the uses of infrasound and	• Recall that the Solar System is part of the Milky Way galaxy • Describe a galaxy as a collection of stars • Recall that the Universe includes all of the galaxies • Compare the relative sizes of and the distances between the Earth, the Moon, the planets, the Sun, galaxies and the Universe • Describe the use of other regions of the electromagnetic spectrum by some modern telescopes • Describe uses of ultrasound • Calculate depth or distance from time and

		ultrasound, and then moves to a study of seismic waves, touching on plate tectonics, including a practical activity to demonstrate the unpredictable nature of earthquakes	velocity of ultrasound • Recall that seismic waves are generated by earthquakes or explosions • Explain why scientists find it difficult to predict earthquakes and tsunami waves even with available data • Demonstrate an understanding of how P and S waves travel inside the Earth including reflection and refraction • Explain how the Earth's outermost layer is composed of (tectonic) plates and is in relative motion due to convection currents in the mantle • Demonstrate an understanding of how, at plate boundaries, plates may slide past each other, sometimes causing earthquakes
Term 5 (April – May)	Static and Current Electricity Controlling and Using electric current	• To develop understanding about static electricity before discussing some uses and dangers of electrical charges. • To understand the relationship between current, voltage and resistance. Equations for	• Describe the structure of the atom, limited to the position, mass and charge of protons, neutrons and electrons • Explain how an insulator can be charged by friction, through the transfer of electrons • Recall that like charges repel and unlike charges attract • Explain some of the uses of electrostatic charges in everyday situations • Recall that an electric current is the rate of flow

		electrical power and energy transferred are also used. Further investigations lead to an understanding of how current varies with voltage in some common components.	of charge • Use the equation: Q= I X t • Describe how an ammeter and voltmeter is placed in circuit. • Explain how current is conserved at a junction • Explain how the current in a circuit depends on the potential difference of the source • Explain how changing the resistance in a circuit changes the current and how this can be achieved using a variable resistor • Demonstrate an understanding of how the resistance of a light dependent resistor (LDR) changes with light intensity
	Generation and transmission of electricity	• To explore how to generate an electric current and from this students will develop an understanding of factors affecting the size of	• Explain how to produce an electric current by the relative movement of a magnet and a coil of wire • Recall that generators supply current which alternates in direction

		induced current in a generator. Students will learn how transformers can be used to transmit electrical energy over large distances, as well as the hazards of electricity and cost-efficiency.	• Use the turns ratio equation for transformers to predict either the missing voltage or the missing number of turns • Explain why electrical energy is transmitted at high voltages, as it improves the efficiency by reducing heat loss in transmission lines • Explain where and why step-up and step-down transformers are used in the transmission of electricity in the National Grid • Describe the hazards associated with electricity transmission • Use data to compare and contrast the advantages and disadvantages of energy-saving devices • Use data to consider cost-efficiency by calculating payback times
Term 6 (June – July)	Nuclear Fission and Nuclear Fusion	• To develop an understanding of radioactive decay, including chain reactions, and difference between fission and fusion.	• Describe the structure of nuclei of isotopes • Recall that alpha and beta particles and gamma rays are ionising radiations emitted from unstable nuclei in a random process • Explain how the fission of U-235 produces two daughter nuclei and two or more neutrons, accompanied by a release of energy • Describe nuclear fusion as the creation of larger nuclei from smaller

			nuclei, accompanied by a release of energy and recognise fusion as the energy source for stars • Explain the difference between nuclear fusion and nuclear fission • Explain why nuclear fusion does not happen at low temperatures and pressures, due to electrostatic repulsion of protons • Relate the conditions for fusion to the difficulty of making a practical and economic form of power station.
	Benefits and drawbacks of using radioactive materials	• To develop an understanding of the uses of different ionising radiations. They will compare and contrast the advantages and risks involved and use models to investigate radioactive decay.	• Describe uses of radioactivity • Describe how the activity of a radioactive source decreases over a period of time • Use the concept of half-life to carry out simple calculations on the decay of a radioactive isotope, including graphical representations • Describe how scientists have changed their ideas of radioactivity over time • Discuss the long-term possibilities for storage and disposal of nuclear waste • Evaluate the advantages and disadvantages of nuclear power for generating electricity, including the lack of

			carbon dioxide emissions, risks, public perception, waste disposal and safety issues