**Year 11 Topic List – Topics covered during Term 1**

**Unit 6 – Energy**

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| **Subtopic** | **Self** | **Objective** | **Self** | **Peer** |
| Types of energy |  | **Recall that** energy can be categorised as: thermal, sound, kinetic, chemical, electrical, nuclear, light |  |  |
|  |  | **Recall** that the joule is the standard unit for energy (but not the SI unit) |  |  |
|  |  | **Explain** how energy can be transformed between *potential* and *kinetic.* |  |  |
| Work done |  | **Explain** that energy is the ability to cause change, and that change is measured as work in various situations |  |  |
|  |  | **Solve** problems involving work done by machines that transform energy |  |  |
| Heat energy |  | **Explain** that in each transformation of energy some energy is wasted (usually as heat) |  |  |
|  |  | **Outline** the principle heat transfer processes: conduction, convection, radiation |  |  |
|  |  | **Describe** the states of matter in terms of particle motion |  |  |
| Efficiency |  | **State** the definition of efficiency |  |  |
|  |  | **Solve** problems involving the efficiency of machines and energy transformation processes |  |  |
|  |  | **Suggest** some different ways of minimizing energy loss |  |  |
| Power |  | **Explain** the concept of power as energy transformed per unit time |  |  |
|  |  | **Outline** the use of power and compare machines in terms of their power |  |  |
|  |  | **Solve** problems involving power |  |  |

**Unit 7 – Waves**

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| **Subtopic** | **Self** | **Objectives** | **Self** | **Peer** |
| Wave basics |  | **Summarize** the properties of a wave (and other oscillators) |  |  |
|  |  | **Describe** longitudinal and transverse wave motion |  |  |
|  |  | **Describe** a wave in terms of the key features of wavelength, frequency and amplitude |  |  |
|  |  | **Explain** the speed of waves through different media |  |  |
| Sound |  | **Explain** loudness and of pitch in terms of the features of a sound wave |  |  |
|  |  | **Outline** the phenomena of active noise cancelling and resonance in terms of wave interference |  |  |
| Electromagnetic spectrum |  | **Outline** the principal regions of the electromagnetic spectrum and describe their features (with uses) |  |  |
| Communication |  | **Describe** the communication of information through modulation of wave amplitude and frequency |  |  |
| Light |  | **Describe** the phenomenon of reflection in terms of wave fronts and a ray model |  |  |
|  |  | **Describe** the phenomenon of refraction in terms of wave fronts and a ray model |  |  |
|  |  | **Describe** the phenomenon of simple diffraction in terms of wave fronts and a ray model |  |  |
|  |  | **Explain** the perception of brightness and of colour in terms of the features of a visible light wave |  |  |

**Unit 11 – Radioactivity**

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| **Topic** | **Self** | **Objectives** | **Self** | **Peer** |
| **Atom** |  | **Recall the structure of the atom** |  |  |
|  |  | **Describe the basic properties of protons, electrons and neutrons** |  |  |
|  |  | **Model the relative size of the atom** |  |  |
|  |  | **Describe what is meant by an isotope** |  |  |
|  |  | **Discuss the importance of Rutherford and Thompson in developing an understanding of the atom** |  |  |
| **Interactions in the atom** |  | **Draw the basic structure of the atom** |  |  |
|  |  | **Outline the principle of electrons moving between shells** |  |  |
|  |  | **Explain the relationship between neutrons and protons in the nucleus** |  |  |
| **Ionizing radiation** |  | Describe what is meant by ionizing radiation |  |  |
|  |  | Outline the phenomena of ionization |  |  |
|  |  | Summaries the properties of alpha, beta and gamma |  |  |
|  |  | Outline sources of background radiation |  |  |
|  |  | Evaluate which form of radiation is the most harmful to humans |  |  |
|  |  | Calculate half-life of a decay source |  |  |
| **Use of radioactivity** |  |  |  |  |
|  |  | Explain how we use carbon dating to find out the age of objects |  |  |

**Unit 12 – Astrophysics (Topics Covered up to end of Term 1 – not full list for this unit)**

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| **Topic** | **Self** | **Objectives** | **Self** | **Peer** |
| Solar system |  | **Compare**in terms of relative factors of scale: size of Solar System, size of galaxy, size of known Universe |  |  |
|  |  | **Outline**the principal constituents of our Solar System: Sun, rocky planets, gas planets, satellites, asteroids, comets |  |  |
|  |  | **Calculate** the orbital speed of celestial bodies at different distances from the sun. |  |  |
| Planetary motion |  | **Summarize**the astronomical bases for the calendar: the day, the month, the year |  |  |
|  |  | **Describe** planetary orbits in terms of centripetal force and gravitational attraction |  |  |
|  |  | **Describe** Kepler’s laws for planetary motion |  |  |
|  |  | **Outline** Newton’s law of universal gravitation |  |  |
|  |  | **Calculate** gravitational forces and gravitational field strengths at different positions in space. |  |  |
|  |  | **Draw** diagrams to represent the magnitude and direction of gravitational forces and gravitational field strength vectors. |  |  |