P8 Module Outline

- Recall typical speeds encountered in everyday experience for wind and sound, and for walking, running, cycling and other transportation systems
- Estimate the accelerations of everyday accelerations
- Make calculations using ratios and proportional reasoning to covert units and to compute rates
- Explain methods of measuring human reaction times and recall typical results
- Explain the factors which affect the distance required for road transport vehicles to come to rest in emergencies and the implications for safety
- Estimate how the distances required for road vehicles to stop in an emergency varies over a range of typical speeds
- Explain the dangers caused by large decelerations
- ***Estimate the forces involved in typical situations on a public road (Higher only) (Separate Sciences only)***
- *Estimate for every day road transport the speed, accelerations and forces involved in large accelerations (Separate Sciences only)*
- Describe the main energy sources available for use on Earth, compare the ways in which they are used and distinguish between renewable and non-renewable resources
- Explain patterns and trends in the use of energy resources
- Recall that in the national grid, electrical power is transferred at high voltages from power stations and then transferred at lower voltages in each locality for domestic use
- Recall that step up and step down transformers are used to change the potential difference as power is transferred from power stations
- Explain how the national grid is an efficient way to transfer energy
- ***Link the potential differences and numbers of turns of a transformer to the power transfer involved; relate this to the advantages of power transmission at high voltages (Higher only) (Separate Science Only)***
- Recall that the domestic supply in the UK is ac at 50Hz and about 230 volts.
- Explain the difference between direct and alternating voltage
- Recall the differences in function between the live, neutral and earth mains wires, and the potential differences between these wires
- Explain that a live wire may be dangerous even when a switch in a mains circuit is open and explain the dangers of providing any connection between the live wire and earth.
- *Explain the red-shift of light as seen from galaxies which are receding (qualitative only). The change with distance of each galaxy's speed is evidence of an expanding universe. (Separate Sciences only)*
- *Explain how the red-shift and other evidence can be linked to the Big-Bang model (separate Sciences only)*
- *Recall that our Sun was formed from dust and gas drawn together by gravity and explain how this caused fusion reactions leading to equilibrium between gravitational collapse and expansion due to the energy released during fusion (separate Sciences only)*
- *Explain that all bodies emit radiation and that the intensity and wavelength distribution of any emission depends on their temperatures (separate Sciences only)*
- *Recall the main features of our solar system including the similarities and distinctions between the planets, their moons and artificial satellites (separate Sciences only)*
- ***Explain for circular orbits how the force of gravity can lead to changing velocity of a planet but unchanged speed (qualitative only) (Higher only) (separate Sciences only)***
- ***Explain how for a stable orbit the radius must change if this speed changes (qualitative only) (Higher only) (separate Sciences only)***
- ***Explain how the temperature of a body is related to the balance between incoming radiation absorbed and radiation emitted; illustrate this balance using everyday examples and the example of the factors which determine the temperature of the earth. (Higher only) (separate Sciences only)***

- *Explain in qualitative terms how the differences in velocity, absorption and reflection between different types of waves in solids and liquids can be used both for detection and for exploration of structures which are hidden from direct observation notable in the Earth's core and in deep water. (Higher only) (separate Sciences only)*

P8 Formulae to Learn

Distance travelled (m) = speed (m/s) x time (s) (Also in P2)

Acceleration (m/s^2) = change in velocity (m/s) / time (s) (Also in P2)

Force (N) = mass (kg) x acceleration (m/s^2) (Also in P2)

Stopping distance (m) = thinking distance (m) + braking distance (m)

P8 Formulae to Use (provided in the exam)

Potential difference across primary coil (V) / potential difference across secondary coil (V) = Number of turns in primary coil / number of turns in secondary coil (Also in P4), (Higher only), (Separate Sciences Only)

$$\frac{V_p}{V_s} = \frac{N_p}{N_s}$$