Term / Week	Syllabus Topic	Learning Outcomes (IP)	Remarks
T1W1 - T1W4	11. Light	11(a) recall and use the terms for reflection, including normal, angle of incidence and angle of	
		11(b) state that, for reflection, the angle of incidence is equal to the angle of reflection and use this principle in constructions, measurements and calculations	
		11(c) recall and use the terms for refraction, including normal, angle of incidence and angle of	Investigation (**T1, W3**): Is the image the same size as the object? Is it equidistant from the mirror as the
		11(d) recall and apply snell's law to new situations or to solve related problems	
		11(e) define refractive index of a medium in terms of the ratio of speed of light in vacuum and in	
		11(f) explain the terms critical angle and total internal reflection	investigation - raybox
		11(g) identify the main ideas in total internal reflection and apply them to the use of optical fibres in telecommunication.	
		11(h) describe the action of a thin lens (both converging and diverging) on a beam of light	Practical 4-01 (**T1, W5**): Relation between i, r and n using ray box. Exploring total internal reflection
T1W5-W6	12. General Wave Properties	12(a) describe what is meant by wave motion as illustrated by vibrations in ropes and springs and bywaves in a ripple tank	
		12(b) show understanding that waves transfer energy without transferring matter	
		12(c) define speed, frequency, wavelength, period and amplitude	
		12(d) state what is meant by the term wavefront	
		12(e) recall and apply the relationship velocity = frequency × wavelength to new situations or to solve related problems	
		12(f) compare transverse and longitudinal waves and give suitable examples of each	
		12(g) sketch and interpret displacement-time and displacement-distance for transverse and	
	13. Electromagnetic Spectrum	13(a) state that all electromagnetic waves are transverse waves that travel with the same speed in vacuum and state the magnitude of this speed	
		13(b) describe the main components of the electromagnetic spectrum	
		13(c) state examples of the use of the following components:	
		13(d) describe the effects of absorbing electromagnetic waves, e.g. heating, ionisation and damage toliving cells and tissue	
T1W7-W9	14. Sound	14(a) describe the production of sound by vibrating sources	
		14(b) describe the longitudinal nature of sound waves in terms of the processes of compression	
		14(c) explain that a medium is required in order to transmit sound waves and the speed of sound	
		14(d) describe a direct method for the determination of the speed of sound in air and make the	design lab - determining the speed of
		14(e) relate loudness of a sound wave to its amplitude and pitch to its frequency	
		14(f) describe how the reflection of sound may produce an echo, and how this may be used for	
		14(g) define ultrasound and describe one use of ultrasound, e.g. quality control and pre-natal	
T1W10 - T2W1	15. Static Electricity	15(a) state that there are positive and negative charges and that charge is measured in	
		15(b) state that unlike charges attract and like charges repel	investigative - conductors and non-
		15(c) describe an electric field as a region in which an electric charge experiences a force	
		15(d) draw the electric field of an isolated point charge and recall that the direction of the field	
		15(e) draw the electric field pattern between two isolated point charges	
		15(f) show understanding that electrostatic charging by rubbing involves a transfer of electrons	
		15(g) describe experiments to show electrostatic charging by induction	

		15(h) describe examples where electrostatic charging may be *a potential hazard or a useful*	
T2W2 - T2W4	16. Current of Electricity	16(a) state that current is a rate of flow of charge and that it is measured in amperes	
		16(b) distinguish between conventional current and electron flow	
		16(c) recall and apply the relationship charge = current × time to new situations or to solve	
		16(d) define electromotive force (e.m.f.) as the work done by a source in driving unit charge	
		16(e) calculate the total e.m.f. where several sources are arranged in series	
		16(f) state that the e.m.f. of a source and the potential difference (p.d.) across a circuit	
		16(g) define the p.d. across a component in a circuit as the work done to drive unit charge	
		16(h) state the definition that resistance = p.d. / current	
		16(i) apply the relationship R = V/I to new situations or to solve related problems	
		16(j) describe an experiment to determine the resistance of a metallic conductor using a	Lab Investigation
		16(k) recall and apply the formulae for the effective resistance of a number of resistors in series	investigation - parallel and series
		16(l) recall and apply the relationship of the proportionality between resistance and the length	
		16(m) state Ohm's Law	
		16(n) describe the effect of temperature increase on the resistance of a metallic conductor	
		16(o) sketch and interpret the I/V characteristic graphs for a metallic conductor at constant	
T2W4 - T2W6	17. D.C. Circuits	17(a) draw circuit diagrams with power sources (cell, battery, d.c. supply or a.c. supply),	
		17(b) state that the current at every point in a series circuit is the same and apply the principle to	
		17(c) state that the sum of the potential differences in a series circuit is equal to the potential	
		17(d) state that the current from the source is the sum of the currents in the separate branches of	
		17(e) state that the potential difference across the separate branches of a parallel circuit is the	
		18(f) recall and apply the relevant relationships, including R = V/I and those for current, potential	
		18(g) describe the action of a variable potential divider (potentiometer)	practical
		18(h) describe the action of thermistors and light-dependent resistors and explain their use as	
		18(i) recall and apply the relationships P = V I and E = V I t to new situations or to solve related	
T2W7-8	18. Practical Electricity	19(a) describe the use of the heating effect of electricity in appliances such as electric kettles,	*Enrichment*
		19(c) calculate the cost of using electrical appliances where the energy unit is the kW h	
		19(e) state the hazards of using electricity in the following situations:	
		19(f) explain the use of fuses and circuit breakers in electrical circuits and of fuse ratings	
		19(g) explain the need for earthing metal cases and for double insulation	
		19(h) state the meaning of the terms live, neutral and earth	
		19(i) describe the wiring in a mains plug	
		19(j) explain why switches, fuses, and circuit breakers are wired into the live conductor	
		21(b) describe the application of the magnetic effect of a current in a circuit breaker	*moved here practical electricity*
T2W9	19. Magnetism	20(a) state the properties of magnets - North pole always point to the earth's North Pole	- Lab Investigation
		20(d) draw the magnetic field pattern around a bar magnet and between the poles of two bar	
		20(e) describe the plotting of magnetic field lines with a compass	
T2W10-T3W2	20. Electromagnetism	21(a) draw the pattern of the magnetic field due to currents in straight wires and in solenoids and	demo - deflection of plotting compass
		21(c) describe experiments to show the force on a current-carrying conductor, and on a beam of	investigate - kicking wire experiment
		21(d) deduce the relative directions of force, field and current when any two of these quantities	
		21(e) describe the field patterns between currents in parallel conductors and relate these to the	

		21(f) explain how a current-carrying coil in a magnetic field experiences a turning effect and that	investigative - building a motor
T3W3 - T3W5	21. Electromagnetic Induction	22(a) deduce from Faraday's experiments on electromagnetic induction or other appropriate experiments: (i) that a changing magnetic field can induce an e.m.f. in a circuit (ii) that the direction of the induced e.m.f. opposes the change producing it (iii) the factors affecting the magnitude of the induced e.m.f.	
		22(b) describe a simple form of a.c. generator (rotating coil or rotating magnet) and the use of	investigative - ac generator demo
		22(c) sketch a graph of voltage output against time for a simple a.c. generator	
		19(d) compare the use of non-renewable and renewable energy sources such as fossil fuels,	
		22(d) describe the use of a cathode-ray oscilloscope (c.r.o.) to display waveforms and to	*Lab Investigation*
		22(e) interpret c.r.o. displays of waveforms, potential differences and time intervals to solve	
		22(f) describe the structure and principle of operation of a simple iron-cored transformer as used	
		22(g) recall and apply the equations VP / VS = NP / NS and VPIP = VSIS to new situations or to	
		22(h) describe the energy loss in cables and deduce the advantages of high voltage transmission	
T3W6-T3W10	Revision and preparation for EOY exam		