Personalised Learning Checklists Edexcel Single: Physics Paper 2

Edexcel Physics (1PI0) from 2016 Topics P1,8&9				
TOPIC	**Student Checklist**	**R**	**A**	**G**
Topic 1 – Key concepts	Recall and use the SI unit for physical quantities, as listed in the specification			
	Recall and use multiples and sub-multiples of units, including giga (G), mega (M), kilo (k), centi (c), milli (m), micro (μ) and nano (n)			
	Be able to convert between different units, including hours to seconds			
	Use significant figures and standard form where appropriate			
Topic 8 – Energy – forces doing work	Describe the changes involved in the way energy is stored when systems change			
	Draw and interpret diagrams to represent energy transfers			
	Explain that where there are energy transfers in a closed system there is no net change to the total energy in that system			
	Identify the different ways that the energy of a system can be changed through work done by forces, in electrical equipment and in heating			
	Describe how to measure the work done by a force and recall that energy transferred (joule, J) is equal to work done (joule, J)			
	Recall and use the equation: $E = F \times d$			
	Describe and calculate the changes in energy involved when a system is changed by work done by forces			
	Recall and use the equation to calculate the change in gravitational PE when an object is raised above the ground: $\Delta GPE = m \times g \times \Delta h$			
	Recall and use the equation to calculate the amounts of energy associated with a moving object: $KE = \frac{1}{2} \times m \times v^2$			
	Explain, using examples, how in all system changes energy is dissipated so that it is stored in less useful ways			
	Explain that mechanical processes become wasteful when they cause a rise in temperature so dissipating energy in heating the surroundings			
	Define power as the rate at which energy is transferred and use examples to explain this definition			
	Recall and use the equation: $P = E/t$			
	Recall what one Watt is equal to			
	Recall and use the efficiency equation			
Topic 9 – Forces and their effects	Describe, with examples, how objects can interact with and without contact			
	Explain the difference between vector and scalar quantities using examples			
	HT ONLY: Use vector diagrams to illustrate resolution of forces, a net force, and equilibrium situations			
	HT ONLY: Draw and use free body force diagrams			
	HT ONLY: Explain examples of the forces acting on an isolated solid object or a system where several forces lead to a resultant force			
	Phy ONLY: Describe situations where forces can cause rotation			
	Phy ONLY: Recall and use the equation: moment of a force = force × distance normal to the direction of the force			
	Phy ONLY: Recall and use the principle of moments in situations where rotational forces are in equilibrium			
	Phy ONLY: Explain how levers and gears transmit the rotational effects of forces			
	Explain ways of reducing unwanted energy transfer through lubrication			

Edexcel Physics (1PI0) from 2016 Topics P10 a/b & 11				
TOPIC	**Student Checklist**	**R**	**A**	**G**
Topic 10a – Electricity and circuits- part a	Describe the structure of the atom, limited to the position, mass and charge of protons, neutrons and electrons			
	Draw and use electric circuit diagrams			
	Describe the differences between series and parallel circuits			
	Recall how to measure potential difference using a voltmeter in series and parallel circuits			
	Define potential difference end describe what a volt is			
	Recall and use the equation: $E = Q \times V$			
	Recall how to measure current using an ammeter in series and parallel circuits			
	Explain what electrical current is			
	Recall and use the equation: $Q = I \times t$			
	Describe that when a closed circuit includes a source of potential difference there will be a current in the circuit			
	Recall that current is conserved at a junction in a circuit			
	Describe how to use a variable resistor in a circuit			
	Recall and use the equation: $V = I \times R$			
	Explain why, if two resistors are in series, the net resistance is increased, whereas with two in parallel the net resistance is decreased			
	Calculate the currents, potential differences and resistances in series circuits			
	Explain the design and construction of series circuits for testing and measuring			
	Core Practical: Construct electrical circuits to: investigate the relationship between, V, I and R for a resistor and a filament lamp			
Topic 10b – Electricity and circuits- part b	Explain how I varies with V for the following devices and how this relates to R for filament lamps, diodes and fixed resistors			
	Describe how the resistance of a light-dependent resistor(LDR) varies with light intensity			
	Describe how the resistance of a thermistor varies with change of temperature (neg temp thermistors only)			
	Explain how the design and use of circuits can be used to explore the variation of resistance in: filament lamps, diodes, thermistors & LDRs			
	Recall that, when there is an electric current in a resistor, there is an energy transfer which heats the resistor			
	Explain how electrical energy is dissipated when an electrical current does work against electrical resistance			
	Explain the energy transfer when electrical energy is dissipated when an electrical current does work against electrical resistance			
	Explain ways of reducing unwanted energy transfer through low resistance wires			
	Describe the advantages and disadvantages of the heating effect of an electric current			
	Use the equation: $E = I \times V \times t$			
	Describe power as the energy transferred per second and recall that it is measured in watt			
	Recall and use the equation: $P = E/t$			
	Explain how the power transfer in any circuit device is related to the potential difference across it and the current in it			
	Recall and use the equations: $P = I \times V$ and $P = I^2 \times R$			
	Describe how, in different domestic devices, energy is transferred from batteries and a.c. mains motors and heating devices			
	Explain the difference between direct and alternating voltage			
	Describe what direct current (d.c.) is and recall the objects that supply it			
	Describe what alternating current (a.c.) is and recall the frequency and voltage in the UK			
	Explain the difference in function between the live and the neutral mains input wires			
	Explain the function of an earth wire and of fuses or circuit breakers in ensuring safety			
	Explain why switches and fuses should be connected in the live wire of a domestic circuit			
	Recall the potential differences between the live, neutral and earth mains wires			
	Explain the dangers of providing any connection between the live wire and earth			
	Describe, with examples, the relationship between the power ratings for domestic electrical appliances and the changes in energy when used			

Topic 11 – Static electricity	Phy ONLY: Explain how an insulator can be charged by friction, through the transfer of electrons			
	Phy ONLY: Explain how insulating materials become charged due to the loss or gain of electrons			
	Phy ONLY: Describe the interactions between like charges and unlike charges			
	Phy ONLY: Explain common electrostatic phenomena for movement of electrons, inc: shocks from objects, lightning & attraction by induction			
	Phy ONLY: Explain how earthing removes excess charge			
	Phy ONLY: Explain some of the uses of electrostatic charges in everyday situations			
	Phy ONLY: Describe some of the dangers of sparking in everyday situations			
	Phy ONLY: Define what an electric field is			
	Phy ONLY: Describe the shape and direction of the electric field around a point charge and between parallel plates			
	Phy ONLY: Relate the electrical strength of the field to the concentration of lines			
	Phy ONLY: Explain how the concept of an electric field helps to explain the phenomena of static electricity			

Edexcel Physics (1PI0) from 2016 Topics P12&13				
TOPIC	**Student Checklist**	**R**	**A**	**G**
Topic 12 – Magnetism and the motor effect	Describe the interactions between like and unlike magnetic poles			
	Describe the uses of permanent and temporary magnetic materials including cobalt, steel, iron and nickel			
	Explain the difference between permanent and induced magnets			
	Describe the shape and direction of the magnetic field around bar magnets and for a uniform field			
	Relate the strength of the magnetic field to the concentration of lines			
	Describe the use of plotting compasses to show the shape and direction of the field of a magnet and the Earth's magnetic field			
	Explain how the behaviour of a magnetic compass is related to evidence that the core of the Earth must be magnetic			
	Describe how to show that a current can create a magnetic effect around a long straight conductor			
	Describe the shape of the magnetic field produced and relating the direction of the magnetic field to the direction of the current			
	Recall that the strength of the field depends on the size of the current and the distance from the long straight conductor			
	Explain how inside a solenoid the fields from individual coils can add together or cancel			
	HT ONLY: Recall what happens when a current carrying conductor is placed near a magnet experiences in terms of force			
	HT ONLY: Explain how magnetic forces are due to interactions between magnetic fields			
	HT ONLY: Recall and use Fleming's left-hand rule to represent the relative directions of the force			
	HT ONLY: Use the equation: $F = B \times I \times l$			
	HT ONLY: Explain how the force on a conductor in a magnetic field is used to cause rotation in electric motors			
Topic 13 – Electromagnetic induction	**HT & Phy ONLY: Explain how to produce an electric current by the relative movement of a magnet and a conductor in the lab & on a large-scale**			
	HT & Phy ONLY: Recall the factors that affect the size and direction of an induced potential difference			
	HT & Phy ONLY: Describe how the magnetic field produced opposes the original change			
	HT & Phy ONLY: Explain how electromagnetic induction is used in alternators to generate alternating current (a.c)			
	HT & Phy ONLY: Explain how electromagnetic induction is used in dynamos to generate direct current (d.c.)			
	HT & Phy ONLY: Explain the action of the microphone in converting sound waves into variations in current			
	HT & Phy ONLY: Explain the action of loudspeakers and headphones in converting current into sound waves			
	HT & Phy ONLY: Explain how an alternating current in one circuit can induce a current in another circuit in a transformer			
	HT & Phy ONLY: Recall that a transformer can change the size of an alternating voltage			
	HT & Phy ONLY: Use the turns ratio equation for transformers to calculate either voltage or number of turns: $V_p/V_s = N_p/N_s$			
	Explain why, in the national grid, electrical energy is transferred at different voltages			
	Explain where and why step-up and step-down transformers are used in the transmission of electricity in the national grid			
	Use the power equation (for transformers with100% efficiency): $V_p \times I_p = V_s \times I_s$			
	HT & Phy ONLY: Explain the advantages of power transmission in high voltage cables, using the equations from the spec			

Edexcel Physics (1PI0) from 2016 Topics P12&13				
TOPIC	**Student Checklist**	**R**	**A**	**G**
Topic 14 – Particle model	Use a simple kinetic theory model to explain the different states of matter			
	Recall and use the equation: $\rho = m/V$			
	Core Practical: Investigate the densities of solid and liquids			
	Explain the differences in density between the different states of matter in terms of the arrangements of the particles			
	Name and describe the physical changes of state			
	Describe the differences between chemical and physical changes			
	Explain how heating a system will change the energy stored within the system and affect temperature at the state of the material			
	Define the terms specific heat capacity and specific latent heat and explain the differences between them			
	Use the equation: $\Delta Q = m \times c \times \Delta\theta$			
	Use the equation: $Q = m \times L$			
	Explain ways of reducing unwanted energy transfers through thermal insulation			
	Core Practical: Investigate the properties of water by determining the specific heat capacity of water for melting ice			
	Explain the pressure of a gas in terms of the motion of its particles			
	Explain the effect of changing the temperature of a gas on the velocity of its particles and hence on the pressure			
	Describe the term absolute zero, −273 °C, in terms of movement of particles			
	Convert between the kelvin and Celsius scales			
	Phy ONLY: Explain that gases can be compressed or expanded by pressure changes			
	Phy ONLY: Explain that the pressure of a gas produces a net force at right angles to any surface			
	Phy ONLY: Explain the effect of changing the volume of a gas on the rate at which its particles collide with the walls of its container and therefore pressure			
	Phy ONLY: Use the equation: $P_1 \times V_1 = P_2 \times V_2$			
	HT ONLY: Explain why doing work on a gas can increase its temperature, including a bicycle pump			
Topic 15 – Forces and matter	Explain, using springs and other elastic objects, that stretching, bending or compressing an object requires more than one force			
	Describe the difference between elastic and inelastic distortion			
	Recall and use the equation for linear elastic distortion including calculating the spring constant: $F = k \times x$			
	Use the equation to calculate the work done in stretching a spring: $E = \frac{1}{2} k \times x^2$			
	Describe the difference between linear and non-linear relationships between force and extension			
	Core Practical: Investigate the extension and work done when applying forces to a spring			
	Phy ONLY: Explain why atmospheric pressure varies with height above the Earth's surface with refer to Earth's atmosphere			
	Phy ONLY: Describe the pressure in a fluid as being due to the fluid and atmospheric pressure			
	Phy ONLY: Recall that the pressure in fluids causes a force normal to any surface			
	Phy ONLY: Explain how pressure is related to force and area, using appropriate examples			
	Phy ONLY: Recall and use the equation: $P = F/A$			
	Phy ONLY: Describe how pressure in fluids increases with depth and density			
	HT & Phy ONLY: Explain why the pressure in liquids varies with density and depth			
	HT & Phy ONLY: Use the equation to calculate the magnitude of pressure in liquids & differences at different depths: $P = h \times \rho \times g$			
	HT & Phy ONLY: Explain why an object in a fluid is subject to an upwards force (upthrust)			
	HT & Phy ONLY: Relate upthrust to examples including objects that are fully immersed in a fluid (liquid or gas)			
	HT & Phy ONLY: Relate upthrust to examples including objects that are partially immersed in a liquid			
	HT & Phy ONLY: Recall that the upthrust is equal to the weight of fluid displaced			
	HT & Phy ONLY: Explain the factors influence whether an object will float or sink			