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| **Edexcel Biology (1BI0) from 2016 Topic B4** |
| **Topic**  | **Student Checklist** | **R** | **A** | **G** |
| **Topic 4 – Natural selection and genetic modification** | Describe the differences in severity of a genetic mutation on the phenotype  |   |   |   |
| Bio ONLY: Describe the work of Darwin and Wallace in the development of the theory of evolution by natural selection and explain the impact of these ideas on modern biology  |   |   |   |
| Explain Darwin’s theory of evolution by natural selection  |   |   |   |
| Explain how the emergence of resistant organisms supports Darwin’s theory of evolution including antibiotic resistance in bacteria  |   |   |   |
| Describe the evidence for human evolution, based on fossils, including: Ardi, Lucy and Leakey’s discovery of fossils  |   |   |   |
| Describe the evidence for human evolution based on stone tools, including: a) the development of stone tools over time b) how these can be dated from their environment  |   |   |   |
| Bio ONLY: Describe how the anatomy of the pentadactyl limb provides scientists with evidence for evolution  |   |   |   |
| Describe how genetic analysis has led to the suggestion of the three domains rather than the five kingdoms classification method  |   |   |   |
| Explain selective breeding and its impact on food plants and domesticated animals  |   |   |   |
| Bio ONLY: Describe the process of tissue culture and its advantages in medical research and plant breeding programmes  |   |   |   |
| Describe genetic engineering as a process which involves modifying the genome of an organism to introduce desirable characteristics |   |   |   |
| **HT ONLY: Describe the main stages of genetic engineering including the use of: restriction enzymes, ligase, sticky ends and vectors**  |   |   |   |
| Bio ONLY: Explain the advantages and disadvantages of genetic engineering to produce GM organisms including the modification of crop plants |   |   |   |
| Bio ONLY: Explain the advantages and disadvantages of agricultural solutions to the demands of a growing human population, including use of fertilisers and biological control |   |   |   |

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| **Edexcel Biology (1BI0) from 2016 Topic B5** |
| **Topic**  | **Student Checklist** | **R** | **A** | **G** |
| **Topic 5 – Health, disease and the development of medicines** | Evaluate the benefits and risks of genetic engineering and selective breeding in modern agriculture and medicine, including practical and ethical implications |   |   |   |
| Describe health as defined by the World Health Organization (WHO)  |   |   |   |
| Describe the difference between communicable and non-communicable diseases  |   |   |   |
| Explain why the presence of one disease can lead to a higher susceptibility to other diseases |   |   |   |
| Describe a pathogen as a disease-causing organism, including viruses, bacteria, fungi and protists |   |   |   |
| Describe some common infections, including: cholera, tuberculosis, Chalara ash dieback, malaria, HIV, stomach ulcers, Ebola and state the pathogen type and details of the symptoms |   |   |   |
| Explain how pathogens are spread and how this spread can be reduced or prevented, including: cholera, tuberculosis, Chalara ash dieback, malaria, HIV, stomach ulcers, Ebola |   |   |   |
| Bio ONLY: Describe the lifecycle of a virus, including lysogenic and lytic pathways  |   |   |   |
| Explain how sexually transmitted infections (STIs) are spread and how this spread can be reduced or prevented, including: Chlamydia and HIV  |   |   |   |
| Bio ONLY: Describe how some plants defend themselves against attack from pests and pathogens by physical barriers |   |   |   |
| Bio ONLY: Describe how plants defend themselves against attack from pests and pathogens by producing chemicals and how some can be used to treat humans |   |   |   |
| **Bio & HT ONLY: Describe different ways plant diseases can be detected and identified** |   |   |   |
| Describe how the physical barriers and chemical defences of the human body provide protection from pathogens |   |   |   |
| Explain the role of the specific immune system of the human body in defence against disease, including ideas on antigens and lymphocytes |   |   |   |
| Explain the body’s response to immunisation using an inactive form of a pathogen  |   |   |   |
| Bio ONLY: Discuss the advantages and disadvantages of immunisation, including the concept of herd immunity  |   |   |   |
| Explain why antibiotics can only be used to treat bacterial infections  |   |   |   |
| Bio ONLY: Explain the aseptic techniques used in culturing microorganisms in the laboratory |   |   |   |
| *Bio ONLY: Core Practical: Investigate the effects of antiseptics, antibiotics or plant extracts on microbial cultures*  |   |   |   |
| Bio ONLY: Calculate cross-sectional areas of bacterial cultures and clear agar jelly using πr2  |   |   |   |
| Describe that the process of developing new medicines, including antibiotics, has many stages, including discovery, development, preclinical and clinical testing |   |   |   |
| **Bio & HT ONLY: Describe the production of monoclonal antibodies** |   |   |   |
| **Bio & HT ONLY: Explain the use of monoclonal antibodies** |   |   |   |
| Describe that many non-communicable human diseases are caused by the interaction of a number of factors |   |   |   |
| Explain the effect of lifestyle factors on non-communicable diseases at local, national and global levels including BMI, alcohol and smoking |   |   |   |
| Evaluate some different treatments for cardiovascular disease, including: life-long medication, surgical procedures and lifestyle changes |   |   |   |

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| **Edexcel Single Biology (1BI0) from 2016 Topic B6** |
| **Topic**  | **Student Checklist** | **R** | **A** | **G** |
| **Topic 6 – Plant structures and their functions** | Describe photosynthetic organisms as the main producers of food and therefore biomass |   |   |   |
| Describe photosynthesis in plants and algae as an endothermic reaction and recall the reactants and products |   |   |   |
| Explain the effect of temperature, light intensity and carbon dioxide concentration as limiting factors on the rate of photosynthesis  |   |   |   |
| **HT ONLY: Explain the interactions of temperature, light intensity and carbon dioxide concentration in limiting the rate of photosynthesis** |   |   |   |
| *Core Practical: Investigate the effect of light intensity on the rate of photosynthesis*  |   |   |   |
| **HT ONLY: Explain how the rate of photosynthesis, including the use of the inverse square law calculation**  |   |   |   |
| Explain how the structure of the root hair cells is adapted to absorb water and mineral ions  |   |   |   |
| Explain how the structures of the xylem and phloem are adapted to their function in the plant |   |   |   |
| Describe how water and mineral ions are transported through the plant by transpiration, including the structure and function of the stomata |   |   |   |
| Describe how sucrose is transported around the plant by translocation |   |   |   |
| Bio ONLY: Explain how the structure of a leaf is adapted for photosynthesis and gas exchange |   |   |   |
| Explain the effect of environmental factors on the rate of water uptake by a plant |   |   |   |
| Demonstrate an understanding of rate calculations for transpiration |   |   |   |
| Bio ONLY: Explain how plants are adapted to survive in extreme environments  |   |   |   |
| Bio ONLY: Explain how plant hormones control and coordinate plant growth and development, including the role of auxins |   |   |   |
| **HT & Bio ONLY: Describe the commercial uses of auxins, gibberellins and ethene in plants** |   |   |   |

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| **Edexcel Single Chemistry (1CI0) from 2016 Topic C1b** |
| **Topic** | **Student Checklist** | **R** | **A** | **G** |
| **Topic 1b – Key concepts in chemistry** | Calculate relative formula mass given relative atomic masses |   |   |   |
| Calculate the formulae of simple compounds from reacting masses and understand that these are empirical formulae |   |   |   |
| Deduce: empirical formula of a compound from the formula of its molecule |   |   |   |
| Deduce: molecular formula of a compound from its empirical formula and its relative molecular mass |   |   |   |
| Describe an experiment to determine the empirical formula of a simple compound such as magnesium oxide |   |   |   |
| Explain the law of conservation of mass applied to: a closed system and a non-enclosed system  |   |   |   |
| Calculate masses of reactants and products from balanced equations, given the mass of one substance |   |   |   |
| Calculate the concentration of solutions in g dm–3 |   |   |   |
| **HT ONLY: Recall what one mole of particles of a substance is defined as** |   |   |   |
| **HT ONLY: Calculate the number of: moles of particles of a substance in a given mass of that substance and vice versa** |   |   |   |
| **HT ONLY: Calculate the number of: particles of a substance in a given number of moles of that substance and vice versa** |   |   |   |
| **HT ONLY: Calculate the number of: particles of a substance in a given mass of that substance and vice versa** |   |   |   |
| **HT ONLY: Explain why, in a reaction, the mass of product formed is controlled by the mass of the reactant which is not in excess** |   |   |   |
| **HT ONLY: Deduce the stoichiometry of a reaction from the masses of the reactants and products** |   |   |   |

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| **Edexcel Chemistry (1CI0) from 2016 Topic C3** |
| **Topic** | **Student Checklist** | **R** | **A** | **G** |
| **Topic 3 – Chemical changes** | Recall that electrolytes are ionic compounds in the molten state or dissolved in water |   |   |   |
| Describe electrolysis as a process in which electrical energy, from a direct current supply, decomposes electrolytes |   |   |   |
| Explain the movement of ions during electrolysis |   |   |   |
| Explain the formation of the products in the electrolysis, using inert electrodes, for copper & sodium chloride solution, sodium sulfate, acidified water & molten lead bromide  |   |   |   |
| Predict the products of electrolysis of other binary, ionic compounds in the molten state |   |   |   |
| **HT ONLY: Write half equations for reactions occurring at the anode and cathode in electrolysis** |   |   |   |
| **HT ONLY: Explain oxidation and reduction in terms of loss or gain of electrons** |   |   |   |
| **HT ONLY: Recall that reduction occurs at the cathode and that oxidation occurs at the anode in electrolysis reactions** |   |   |   |
| Explain the formation of the products in the electrolysis of copper sulfate solution, using copper electrodes, and how this can be used to purify copper |   |   |   |
| *Core Practical: Investigate the electrolysis of copper sulfate solution with inert electrodes and copper electrodes* |   |   |   |

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| **Edexcel Chemistry (1CI0) from 2016 Topic C4** |
| **Topic** | **Student Checklist** | **R** | **A** | **G** |
| **Topic 4 – Extracting metals and equilibria** | Deduce the relative reactivity of some metals, by their reactions with water, acids and salt solutions |   |   |   |
| **HT ONLY: Explain displacement reactions as redox reactions, in terms of gain or loss of electrons** |   |   |   |
| Explain the reactivity series of metals in terms of the reactivity of the metals with water and dilute acids (relative to carbon) |   |   |   |
| Recall what ores and native metals are |   |   |   |
| Describe what oxidation and reduction are |   |   |   |
| Explain why the method used to extract a metal from its ore is related to its position in the reactivity series and the cost of the extraction process (electrolysis and smelting) |   |   |   |
| **HT ONLY: Evaluate alternative biological methods of metal extraction (bacterial and phytoextraction)** |   |   |   |
| Explain how a metal’s relative resistance to oxidation is related to its position in the reactivity series |   |   |   |
| Evaluate the advantages of recycling metals |   |   |   |
| Describe what a life time assessment for a product involves and what it needs to consider |   |   |   |
| Evaluate data from a life cycle assessment of a product |   |   |   |
| Recall that chemical reactions are reversible, the use of the symbol ⇌ in equations and how the direction of some reversible reactions can be altered |   |   |   |
| Explain what is meant by dynamic equilibrium |   |   |   |
| Describe the formation of ammonia as a reversible reaction in the Haber process |   |   |   |
| Recall the conditions for the Haber process |   |   |   |
| **HT ONLY: Predict how the position of a dynamic equilibrium is affected by changes in temperature, pressure and concentration** |   |   |   |

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| **Edexcel Chemistry (1CI0) from 2016 Topic C5** |
| **Topic** | **Student Checklist** | **R** | **A** | **G** |
| **Topic 5 – Separate chemistry 1** | Chem ONLY: Recall that most metals are transition metals and describe their typical properties |   |   |   |
| Chem ONLY: Recall that the oxidation of metals results in corrosion |   |   |   |
| Chem ONLY: Explain how rusting of iron can be prevented |   |   |   |
| Chem ONLY: Explain how electroplating can be used to improve the appearance and/or the resistance to corrosion of metal objects |   |   |   |
| Chem ONLY: Explain, using models, why converting pure metals into alloys often increases the strength of the product |   |   |   |
| Chem ONLY: Explain why iron is alloyed with other metals to produce alloy steels |   |   |   |
| Chem ONLY: Explain how the uses of metals are related to their properties (and vice versa) for AL, CU, Ag and alloys inc: magnalium and brass |   |   |   |
| **HT & Chem ONLY: Calculate the concentration of solutions in mol dm–3 and convert concentration in g dm–3 into mol dm–3 and vice versa** |   |   |   |
| *Chem ONLY: Core Practical: Carry out an accurate acid-alkali titration, using burette, pipette and a suitable indicator* |   |   |   |
| **HT & Chem ONLY: Carry out simple calculations using the results of titrations to calculate an unknown concentration/volume of a solution**  |   |   |   |
| Chem ONLY: Calculate the percentage yield of a reaction from the actual yield and the theoretical yield |   |   |   |
| Chem ONLY: Describe that the actual yield of a reaction is usually less than the theoretical yield and that the causes of this |   |   |   |
| Chem ONLY: Recall the atom economy of a reaction forming a desired product |   |   |   |
| Chem ONLY: Calculate the atom economy of a reaction forming a desired product |   |   |   |
| **HT & Chem ONLY: Explain why a particular reaction pathway is chosen to produce a specified product** |   |   |   |
| **HT & Chem ONLY: Describe what the molar volume, of any gas at room temperature and pressure is** |   |   |   |
| **HT & Chem ONLY: Use the molar volume and balanced equations in calculations involving the masses of solids and volumes of gases** |   |   |   |
| **HT & Chem ONLY: Use Avogadro’s law to calculate volumes of gases involved in a gaseous reaction, given the relevant equation** |   |   |   |
| Chem ONLY: Describe what the Haber process is |   |   |   |
| **HT & Chem ONLY: Predict how the rate of attainment of equilibrium is affected by: changes in temperature, pressure, concentration and use of a catalyst** |   |   |   |
| **HT & Chem ONLY: Explain how, in industrial reactions, including the Haber process, conditions used are related to cost, energy and acceptable yield** |   |   |   |
| Chem ONLY: Name the elements (in compound form) fertilisers may contain to promote plant growth |   |   |   |
| Chem ONLY: Describe how ammonia reacts with nitric acid to produce a salt that is used as a fertiliser |   |   |   |
| Chem ONLY: Describe and compare the laboratory and industrial production of ammonium sulfate |   |   |   |
| Chem ONLY: Recall that a chemical cell produces a voltage until what happens |   |   |   |
| Chem ONLY: Recall that in a hydrogen–oxygen fuel cell hydrogen and oxygen are used to produce a voltage and name the only product |   |   |   |
| Chem ONLY: Evaluate the strengths and weaknesses of fuel cells for given uses |   |   |   |

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| **Edexcel Chemistry (1CI0) from 2016 Topic C6** |
| **Topic** | **Student Checklist** | **R** | **A** | **G** |
| **Topic 6 – Groups in the periodic table** | Explain why some elements can be classified as alkali metals, halogens or noble gases, based on their position in the periodic table |   |   |   |
| Recall the physical properties of alkali metals |   |   |   |
| Describe the reactions of lithium, sodium and potassium with water |   |   |   |
| Describe the pattern in reactivity of the alkali metals, lithium, sodium and potassium, with water; and use this pattern to predict the reactivity of other alkali metals |   |   |   |
| Explain this pattern in reactivity in terms of electronic configurations |   |   |   |
| Recall the colours and physical states of chlorine, bromine and iodine at room temperature |   |   |   |
| Describe the pattern in the physical properties of the halogens, chlorine, bromine and iodine, and use this pattern to predict the physical properties of other halogens |   |   |   |
| Describe the chemical test for chlorine |   |   |   |
| Describe the reactions of the halogens, chlorine, bromine and iodine, with metals to form metal halides, and use this pattern to predict the reactions of other halogens |   |   |   |
| Recall that the halogens, chlorine, bromine and iodine, form hydrogen halides which dissolve in water to form acidic solutions, and use this pattern to predict the reactions of other halogens |   |   |   |
| Describe the relative reactivity of the halogens chlorine, bromine and iodine, as shown by their displacement reactions with halide ions and use this to predict the reactions of astatine |   |   |   |
| **HT ONLY: Explain why these displacement reactions are redox reactions in terms of gain and loss of electrons, identifying which of these are oxidised and which are reduced** |   |   |   |
| Explain the relative reactivity of the halogens in terms of electronic configurations |   |   |   |
| Explain why the noble gases are chemically inert, compared with the other elements, in terms of their electronic configurations |   |   |   |
| Explain how the uses of noble gases depend on their inertness, low density and/or non-flammability |   |   |   |
| Describe the pattern in the physical properties of some noble gases and use this pattern to predict the physical properties of other noble gases |   |   |   |

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| **Edexcel Physics (1PI0) from 2016 Topics P5** |
| **Topic** | **Student Checklist** | **R** | **A** | **G** |
| **Topic 5 – Light and the electromagnetic spectrum** | Explain, with the aid of ray diagrams, reflection, refraction and total internal reflection (TIR), including the law of reflection and critical angle |   |   |   |
| Explain the difference between specular and diffuse reflection |   |   |   |
| Explain how colour of light is related to differential absorption at surfaces and transmission of light through filters |   |   |   |
| Relate the power of a lens to its focal length and shape |   |   |   |
| Use ray diagrams to show the similarities and differences in the refraction of light by converging and diverging lenses |   |   |   |
| Explain the effects of different types of lens in producing real and virtual images |   |   |   |
| Recall that all electromagnetic waves are transverse, that they travel at the same speed in a vacuum |   |   |   |
| Explain, with examples, that all electromagnetic waves transfer energy from source to observer |   |   |   |
| *Investigate refraction in rectangular glass blocks in terms of the interaction of electromagnetic waves with matter* |   |   |   |
| Recall the main groupings of the continuous electromagnetic spectrum |   |   |   |
| Describe the electromagnetic spectrum |   |   |   |
| Recall that our eyes can only detect a limited range of frequencies of electromagnetic radiation |   |   |   |
| **HT ONLY: Recall that different substances may absorb, transmit, refract or reflect electromagnetic waves in ways that vary with wavelength** |   |   |   |
| Explain the effects of differences in the velocities of electromagnetic waves in different substances |   |   |   |
| Explain that all bodies emit radiation, that the intensity and wavelength distribution of any emission depends on their temperature |   |   |   |
| **HT ONLY: Explain that for a body to be at a constant temperature it needs to radiate the same average power that it absorbs** |   |   |   |
| **HT ONLY: Explain what happens to a body if the average power it radiates is less or more than the average power that it absorbs** |   |   |   |
| **HT ONLY: Explain how the temperature of the Earth is affected by factors controlling the balance between incoming radiation and radiation emitted** |   |   |   |
| *Core Practical: Investigate how the nature of a surface affects the amount of thermal energy radiated or absorbed* |   |   |   |
| Recall that the potential danger associated with an electromagnetic wave increases with increasing frequency |   |   |   |
| Describe the harmful effects on people of excessive exposure to electromagnetic radiation |   |   |   |
| Describe some uses of electromagnetic radiation |   |   |   |
| **HT ONLY: Recall that radio waves can be produced by, or can themselves induce, oscillations in electrical circuits** |   |   |   |
| Recall that changes in atoms and nuclei can generate radiations over a wide frequency range and be caused by absorption of a range of radiations |   |   |   |

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| **Edexcel Physics (1PI0) from 2016 Topic P6a** |
| **Topic** | **Student Checklist** | **R** | **A** | **G** |
| **Topic 6a– Radioactivity - part a** | Describe the structure of the atom |   |   |   |
| Recall the typical size (order of magnitude) of atoms and small molecules |   |   |   |
| Describe the structure of nuclei of isotopes |   |   |   |
| Define the term isotope |   |   |   |
| Recall the relative masses and relative electric charges of protons, neutrons, electrons and positrons |   |   |   |
| Recall that in an atom the number of protons equals the number of electrons and is therefore neutral |   |   |   |
| Recall that in each atom its electrons orbit the nucleus at different set distances from the nucleus |   |   |   |
| Explain that electrons change orbit when there is absorption or emission of electromagnetic radiation |   |   |   |
| Explain how atoms may form positive ions |   |   |   |
| Recall that alpha, β–, β+, gamma rays and neutron radiation are emitted from unstable nuclei in a random process |   |   |   |
| Recall that alpha, β–, β+ and gamma rays are ionising radiation |   |   |   |
| Explain what is meant by background radiation |   |   |   |
| Describe the origins of background radiation from Earth and space |   |   |   |
| Describe methods for measuring and detecting radioactivity limited to photographic film and a Geiger–Müller tube |   |   |   |
| Recall what alpha, beta and gamma radiation are made up of |   |   |   |
| Compare alpha, beta and gamma radiations in terms of their abilities to penetrate and ionise |   |   |   |
| Describe how and why the atomic model has changed over time including reference to the different models and scattering experiments |   |   |   |
| Describe the process of β– and β+ decay |   |   |   |
| Explain the effects on the atomic (proton) number and mass (nucleon) number of radioactive decays (α, β, γ and neutron emission) |   |   |   |
| Recall that nuclei that have undergone radioactive decay often undergo nuclear rearrangement with a loss of energy as gamma radiation |   |   |   |

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| **Edexcel Physics (1PI0) from 2016 Topic P6b** |
| **Topic** | **Student Checklist** | **R** | **A** | **G** |
| **Topic 6b– Radioactivity - part b** | Use given data to balance nuclear equations in terms of mass and charge |   |   |   |
| Describe how the activity of a radioactive source decreases over a period of time |   |   |   |
| Recall that the unit of activity of a radioactive isotope is the Becquerel, Bq |   |   |   |
| Explain what half life of a radioactive isotope is |   |   |   |
| Explain that it cannot be predicted when a particular nucleus will decay but half-life enables the activity of a very large number of nuclei to be predicted |   |   |   |
| Use the concept of half-life to carry out simple calculations on the decay of a radioactive isotope, including graphical representations |   |   |   |
| Describe uses of radioactivity in: the home, industry and medicine |   |   |   |
| Describe the dangers of ionising radiation in terms of tissue damage and possible mutations and relate this to the precautions needed |   |   |   |
| Explain how the dangers of ionising radiation depend on half-life and relate this to the precautions needed |   |   |   |
| Explain the precautions taken to ensure the safety of people exposed to radiation, including limiting the dose |   |   |   |
| Describe the differences between contamination and irradiation effects and compare the hazards associated with these two |   |   |   |
| Phy ONLY: Compare and contrast the treatment of tumours using radiation applied internally or externally |   |   |   |
| Phy ONLY: Explain some of the uses of radioactive substances in diagnosis of medical conditions, including PET scanners and tracers |   |   |   |
| Phy ONLY: Explain why isotopes used in PET scanners have to be produced nearby |   |   |   |
| Phy ONLY: Evaluate the advantages and disadvantages of nuclear power for generating electricity |   |   |   |
| Phy ONLY: Recall that nuclear reactions, including fission, fusion and radioactive decay, can be a source of energy |   |   |   |
| Phy ONLY: Explain the fission of U-235 |   |   |   |
| Phy ONLY: Explain the principle of a controlled nuclear chain reaction |   |   |   |
| Phy ONLY: Explain how the chain reaction is controlled in a nuclear reactor, including the action of moderators and control rods |   |   |   |
| Phy ONLY: Describe how thermal (heat) energy from the chain reaction is used in the generation of electricity in a nuclear power station |   |   |   |
| Phy ONLY: Recall that the products of nuclear fission are radioactive |   |   |   |
| Phy ONLY: Describe nuclear fusion |   |   |   |
| Phy ONLY: Explain the difference between nuclear fusion and nuclear fission |   |   |   |
| Phy ONLY: Explain why nuclear fusion does not happen at low temperatures and pressures |   |   |   |
| Phy ONLY: Relate the conditions for fusion to the difficulty of making a practical and economic form of power station |   |   |   |

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| **Edexcel Physics (1PI0) from 2016 Topic P7** |
| **Topic** | **Student Checklist** | **R** | **A** | **G** |
| **Topic 7 – Astronomy** | Phy ONLY: Explain how and why both the weight of any body and the value of g differ between the surface of the Earth and the surface of other bodies in space |   |   |   |
| Phy ONLY: Recall what our solar system consists of |   |   |   |
| Phy ONLY: Recall the names and order, in terms of distance from the Sun, of the eight planets  |   |   |   |
| Phy ONLY: Describe how ideas about the structure of the Solar System have changed over time |   |   |   |
| Phy ONLY: Describe the orbits of moons, planets, comets and artificial satellites |   |   |   |
| Phy ONLY: Explain for circular orbits how the force of gravity can lead to changing velocity of a planet but unchanged speed |   |   |   |
| Phy ONLY: Explain how, for a stable orbit, the radius must change if orbital speed changes (qualitative only) |   |   |   |
| Phy ONLY: Compare the Steady State and Big Bang theories |   |   |   |
| Phy ONLY: Describe evidence supporting the Big Bang theory, limited to red-shift and the cosmic microwave background (CMB) radiation |   |   |   |
| Phy ONLY: Recall that as there is more evidence supporting the Big Bang theory than the Steady State theory |   |   |   |
| Phy ONLY: Describe that if a wave source is moving relative to an observer there will be a change in the observed frequency and wavelength |   |   |   |
| Phy ONLY: Describe the red-shift in light received from galaxies at different distances away from the Earth |   |   |   |
| Phy ONLY: Explain why the red-shift of galaxies provides evidence for the Universe expanding |   |   |   |
| Phy ONLY: Explain how both the Big Bang and Steady State theories of the origin of the Universe both account for red-shift of galaxies |   |   |   |
| Phy ONLY: Explain how the discovery of the CMB radiation led to the Big Bang theory becoming the currently accepted model |   |   |   |
| Phy ONLY: Describe the evolution of stars of similar mass to the Sun |   |   |   |
| Phy ONLY: Explain how the balance between thermal expansion and gravity affects the life cycle of stars |   |   |   |
| Phy ONLY: Describe the evolution of stars with a mass larger than the Sun |   |   |   |
| Phy ONLY: Describe how methods of observing the Universe have changed over time including why some telescopes are located outside the Earth’s atmosphere |   |   |   |

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| **Edexcel Physics (1PI0) from 2016 Topics P8&9** |
| **Topic** | **Student Checklist** | **R** | **A** | **G** |
| **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 × 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: ***ΔGPE = m× g ×Δh*** |   |   |   |
| Recall and use the equation to calculate the amounts of energy associated with a moving object: ***KE = ½ × m × v2*** |   |   |   |
| 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 |   |   |   |

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| **Edexcel Physics (1PI0) from 2016 Topic P10 a/b**  |
| **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 × 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 × 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 × 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 × V × 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 × V*** and P ***= I 2 × 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 |   |   |   |

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| **Edexcel Physics (1PI0) from 2016 Topic 11** |
| **Topic** | **Student Checklist** | **R** | **A** | **G** |
| **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 |   |   |   |