Science department - Year 11 scheme of work

National curriculum: https://www.gov.uk/government/publications/national-curriculum-in-england-science-programmes-of-study Combined Science Syllabus https://qualifications.pearson.com/content/dam/pdf/GCSE/Science/2016/Specification/GCSE_CombinedScience_Spec.pdf				
Term	Title	Unit content	Key vocabulary	Resource links:
Autumn one				
Week 1	**Biology** Microscopes and Cells	**Key knowledge taught:** 1.1 Explain the structures of plant cells, animal cells and bacteria 1.2 Describe how specialised cells (sperm cell, egg cell and ciliated epithelial cells) are adapted to their function 1.3 Explain how changes in microscope technology have enabled us to see cell structures and organelles with more clarity and detail than in the past **Practical ideas:** **1.6 Core Practical**: Investigate biological specimens using microscopes, including magnification calculations and labeled scientific drawings from observation	nucleus, cell membrane, mitochondria, ribosomes, vacuole, chloroplasts, flagella, haploid nucleus, cytoplasm	
Week2	**Biology** Genetics and Natural Selection	**Key knowledge taught:** 3.3 Explain the role of meiotic cell division 3.4 Recap the structure of DNA 3.5 Describe the genome as the entire DNA of an organism and a gene as a section of a DNA molecule that codes for a specific protein 3.16 Calculate outcomes from monohybrid crosses and pedigree analysis for dominant and recessive traits 3.19 Know that most phenotypic features are the result of multiple genes 3.21 Discuss the outcomes of the Human Genome Project and its application within medicine **Practical ideas:** 3.6 Explain how DNA can be extracted from fruit Modelling DNA	daughter cell, gametes, DNA, gene, protein, genome, phenotypic, extract	

Week 3	**Biology** Diseases (a lot of content but all recap - covered in ELC and FLC with extension tasks)	5.1 Describe health as defined by the World Health Organization (WHO) 5.2 Describe the difference between communicable and non-communicable diseases 5.3 Explain why the presence of one disease can lead to a higher susceptibility to other diseases 5.4 Describe a pathogen as a disease-causing organism 5.5-5.7 Describe the following infections, how they're spread and how to stop the spread: cholera, tuberculosis, chalara, malaria and HIV 5.8 Explain how sexually transmitted infections (STIs) are spread and how this spread can be reduced or prevented, including chlamydia and HIV 5.12 How physical barriers & chemical defenses of the human body protect from pathogens 5.13/5.14 Explain the role of the specific immune system of the human body in defense against disease and how the body responds to immunisation 5.16 Explain that antibiotics can only be used to treat bacterial infections 5.20 Describe that developing new medicines, including antibiotics, has many stages 5.23/5.24 Describe that many non-communicable human diseases are caused by a number of factors, explain the effect of lifestyle on these diseases 5.25 Evaluate some different treatments for cardiovascular disease **Practical ideas:** Research lesson on diseases and prevention	WHO, communicablenon-communicable, disease, pathogen, virus, bacteria, fungi, protists, STI, mucus, skin, lysozymes, antigen, immune system, antibodies, BMI, cardiovascularobesity, malnutrition	
Week 4 & 5	**Chemistry** Atoms and Bonding	**Key knowledge taught:** **Atomic structure** 1.10 Calculate the numbers of protons, neutrons and electrons in atom 1.11/1.12 Explain how the existence of isotopes results in relative atomic masses of some elements not being whole numbers. Calculate the relative atomic mass of an element from the relative masses and abundances of its isotopes **Ionic Bonding** 1.22/1.23 define an ion, calculate the numbers of protons, neutrons and electrons in simple ions 1.24 Explain the formation of ions in ionic compounds from their atoms (groups 1, 2, 6 and 7) 1.25 Explain the use of the endings –ide and –ate in the names of compounds 1.27 Explain the structure of an ionic compound as a lattice structure **Covalent Bonding**	proton, neutron, electron, ion, isotope, covalent bond, ionic bond, atomic mass, fullerene, dot and cross	

		1.30 Recall the typical size (order of magnitude) of atoms and small molecules 1.31 Explain the formation of simple molecular, covalent substances using dot and cross diagrams, including hydrogen, hydrogen chloride, water, methane, oxygen, carbon dioxide **Types of Substance** 1.32 Explain why elements and compounds can be classified as: **a** ionic **b** simple molecular (covalent) **c** giant covalent **d** metallic and how the structure and bonding of these types of substances results in different physical properties 1.38 Explain the properties of fullerenes including C60 and graphene 1.41 Describe the limitations of particular representations and models e.g. dot and cross, ball and stick models and two- and three-dimensional representations **Practical ideas:** 3D modeling bonding of bonding types		
Week 6	**Chemistry** Periodic Table	**Key knowledge taught:** 1.13/1.14 Describe Mendeleev's periodic table and how he used it to predict the existence of undiscovered elements. 1.15 Explain that Mendeleev thought he had arranged elements in order of increasing relative atomic mass but this was not always true because of the relative abundance of isotopes 1.16 Explain the meaning of atomic number of an element 1.17/1.18 explain groups and periods and identify metals and non-metals 1.19 Predict the electronic configurations of the first 20 elements in the periodic table as diagrams and in the form, for example 2.8.1 1.20 Explain how the electronic configuration of an element is related to its position **Practical ideas:** Model atomic structure and electronic configuration	Mendeleev, periodic table, group, period, isotope, metal, non-metal, electronic configuration	
Week 7	**Physics** Forces Recap	**Key knowledge taught:** 2.1-2.3 Describe and explain the difference between scalar and vector quantities 2.4/2.5 Recall vector and scalar quantities, including: **a** displacement/ distance **b** velocity/speed **c** acceleration **d** force **e** weight/mass **f** momentum **g** energy 9.1 Describe, with examples, how objects can interact **a** at a distance without contact due to gravitational, electrostatic and magnetic fields involved **b** by contact due to normal contact force and friction **c** producing pairs of forces which can be represented as vectors 9.3 Use scale vector diagrams to show resolution of forces, a net force, and equilibrium situations 9.4 Draw and use free body force diagrams	scalar, vector, quantity, gravitational, electrostatic, magnetic, normal contact, friction, balanced,	

		9.5 Explain examples of multiple forces acting on an object that either lead to an overall resultant force or a result force of zero (if the forces are balanced) **Practical ideas:** Measuring forces (Newton metres) Forces investigation on friction	resultant force	
Autumn two				
Week 1 Week 2	**Physics** Newtons Laws	**Key knowledge taught:** 2.13 Recall that the acceleration (g) is 10 m/s2, estimate the magnitudes of everyday accelerations 2.14 Recall Newton's first law and apply it in simple situations (both with/without a net resultant force) 2.15 Recall and use Newton's second law as: F = m x a *force (newton, N) = mass (kilogram, kg) × acceleration (metre per second squared, m/s2)* 2.20 Explain that an object moving in a circular orbit at constant speed has a changing velocity 2.21 Explain that for motion in a circle there must be a resultant force known as a centripetal force that acts towards the centre of the circle 2.22 Explain that inertial mass is a measure of how difficult it is to change the velocity of an object (including from rest) and know that it is defined as the ratio of force over acceleration 2.23 Recall and apply Newton's third law both to equilibrium situations and to collision interactions and relate it to the conservation of momentum in collisions 2.24 Define momentum, recall and use the equation: p = m x v *momentum (kilogram metre per second, kg m/s) = mass (kg) × velocity (m/s)* 2.25 Describe examples of momentum in collisions 2.26 Use Newton's second law as: *force (newton, N) = change in momentum (kilogram metre per second, kg m/s) ÷ time (second, s)* 2.27 Explain methods of measuring human reaction times and recall typical results **Practical ideas:** **2.19 Core Practical:** Investigate the relationship between force, mass and acceleration by varying the masses added to trolleys Measuring reaction times – ruler drop measurements	Newtons laws, acceleration, mass, inertial mass, speed, velocity, momentum, reaction time	
Week 3	**Physics**	**Key knowledge taught:** 4.5 Describe the difference between longitudinal & transverse waves using examples of sound, electromagnetic, seismic and water waves	longitudinal, transverse, light, sound,	

	Waves, Light and the Electromagnetic Spectrum	4.7 Describe how to measure the velocity of sound in air and ripples on water surfaces 4.11/5.13 Recall that different substances may absorb, transmit, refract or reflect waves in ways that vary with wavelength 5.8 Explain that all electromagnetic waves transfer energy from source to observer 5.20 Recap: the order, uses and dangers of electromagnetic waves, recall that potential danger increases with increasing frequency 5.14 Explain the effects of differences in the velocities of electromagnetic waves different substances 5.23 Recall that radio waves can be produced by electrical circuits 5.24 Recall that changes in atoms and nuclei can: **a** generate radiations over a wide frequency range **b** be caused by absorption of a range of radiations **Practical ideas:** **5.9 Core Practical**: Investigate refraction in rectangular glass blocks in terms of the interaction of electromagnetic waves with matter **4.17 Core Practical**: Investigate the suitability of equipment to measure the speed, frequency and wavelength of a wave in a solid and a fluid	electromagnetic, radio wave, microwave, infra-red, visible, ultraviolet, x-ray, gamma, frequency	
Week 4		**Consolidation, revision and assessment** GCSE style exam questions taken from the topics covered 45-minute paper covering: *Biology: microscopes and cells, genetics and diseases. [15 marks]* *Chemistry: atoms and bonding, periodic table [15 marks]* *Physics: forces and Newtons Laws [15 marks]*		
Week 5	**Physics** Radioactivity	**Key knowledge taught:** 6.2 Recall the typical size of atoms and small molecules 6.3 Describe the structure of nuclei of isotopes 6.6 Recall that an atom is neutral as the number of protons equals the number of electrons 6.7 Recall that in each atom its electrons orbit the nucleus at different set distances 6.8 Explain that electrons change orbit when there is absorption/ emission of electromagnetic radiation 6.11 Recall that alpha, β– (beta minus), β+ (positron) and gamma rays are ionising radiations 6.12/6.13 Explain what is meant by background radiation and where it comes from 6.14 Describe methods for measuring and detecting radioactivity 6.15 Recall: alpha particle is equivalent to a helium nucleus, a beta particle is an electron emitted from the nucleus and a gamma ray is electromagnetic radiation. Compare their penetration and ionisation	atom, molecule, isotope, proton, nucleus, ionising radiation, alpha, beta, gamma	

		6.17 Describe how and why the atomic model has changed over time including the plum pudding model and Rutherford alpha particle scattering leading to the Bohr model 6.18 Describe the process of β– decay (a neutron becomes a proton plus an electron) Describe the process of β+ decay (a proton becomes a neutron plus a positron) 6.20 Explain the effects on the atomic (proton) number and mass (nucleon) number of radioactive decays (α, β, γ and neutron emission) 6.21 Recall that nuclei that have undergone radioactive decay often undergo nuclear rearrangement with a loss of energy as gamma radiation 6.22 Use given data to balance nuclear equations in terms of mass and charge **Practical ideas** Video showing penetrating power of radiation and alpha particle scattering experiment		
Week 6	**Biology** Plants and Animals	**Key knowledge taught:** <u>Plants</u> 6.4/6.6 Explain the interactions of temperature, light intensity and carbon dioxide concentration in limiting the rate of photosynthesis. Rate is directly proportional to light intensity, inversely proportional to distance from light source 6.8 Explain how the structures of the xylem and phloem are adapted to their function in the plant, including: **a** lignified dead cell in xylem transporting water and minerals through the plant **b** living cells in phloem using energy to transport sucrose around the plant 6.9 Explain how water and mineral ions are transported through the plant by transpiration, including the structure and function of the stomata 6.10 Describe how sucrose is transported around the plant by translocation 6.12 Explain the effect of environmental factors (light, air movement, temperature) on the rate of water uptake by a plant 6.13 Demonstrate an understanding of rate calculations for transpiration <u>Animals</u> 7.1 Describe where hormones are produced and how they are transported from endocrine glands to their target organs, including the **pituitary gland, thyroid gland,** pancreas, **adrenal glands,** ovaries and testes 7.2 Explain that adrenalin is produced by the adrenal glands to prepare the body for fight or flight, including: **a** increased heart rate **b** increased blood pressure **c** increased blood flow to the muscles **d** raised blood sugar levels by stimulating the liver to change glycogen into glucose	temperature, light intensity, carbon dioxide, photosynthesis, xylem, phloem, mineral, sucrose, transpiration	

		7.3 Explain how thyroxine controls metabolic rate as an example of negative feedback, including: **a** low levels of thyroxine stimulates production of TRH in hypothalamus **b** this causes release of TSH from the pituitary gland **c** TSH acts on the thyroid to produce thyroxine d when thyroxine levels are normal thyroxine inhibits the release of TRH and the production of TSH **Practical ideas:** **6.5 Core Practical**: Investigate the effect of light intensity on the rate of photosynthesis		
Week 7	**Biology** Ecosystems and Material Sciences	**Key knowledge taught:** 9.6 Determine the number of organisms in a given area from field-work (quadrats and belt transects) 9.9 Explain the positive and negative human interactions within ecosystems and their impacts on biodiversity, including: **a** fish farming **b** introduction of non-indigenous species **c** eutrophication 9.10 Explain the benefits of maintaining local and global biodiversity, including the conservation of animal species and the impact of reforestation 9.12 Describe how different materials cycle through the abiotic and biotic components of an ecosystem 9.13 Explain the importance of the carbon cycle 9.14 Explain the importance of the water cycle 9.15 Explain how nitrates are made available for plant uptake **Practical ideas:** **9.5 Core Practical**: Investigate the relationship between organisms and their environment using field-work techniques, including quadrats and belt transects	quadrat, belt transect, ecosystem, fish farming, animal conservation, reforestation, water cycle, carbon cycle	
Spring one				
Week 1	**Chemistry** Acids	**Key knowledge taught:** **Acid** 3.1 Recall that in solution) acids are sources of hydrogen ions and alkalis are sources of hydroxide ions 3.4 Recall that the higher the concentration of hydrogen ions in an acidic solution, the lower the pH; and the higher the concentration of hydroxide ions in an alkaline solution, the higher the pH 3.5 Recall that as hydrogen ion concentration in a solution increases by a factor of 10, the pH of the solution decreases by 1 3.7/3.8/3.9/3.10 Explain the terms dilute, concentrated, weak acid, strong acid, alkali and base	acid, alkali, base, concentrated, dilute, hydroxide ion, hydrogen ion, reactant, concentratio	

		3.8 Explain the terms weak and strong acids, with respect to the degree of dissociation into ions 3.13/3.14 Describe a neutralisation reaction as a reaction between an acid and a base in which hydrogen ions (H+) from the acid react with hydroxide ions (OH–) from the alkali to form water 3.16 Explain why, if soluble salts are prepared from an acid and a soluble reactant: **a** titration is used **b** the acid and the soluble reactant are then mixed in the correct proportions **c** the solution is only salt and water 3.19 Recall the general rules which describe the solubility of common types of substances in water, use them to predict if precipitates are formed, naming any that are 3.21 Describe the method used to prepare a pure, dry sample of an insoluble salt **Practical ideas:** **3.6 Core Practical**: Investigate the change in pH on adding powdered calcium hydroxide or calcium oxide to a fixed volume of dilute hydrochloric acid **3.17 Core Practical**: Investigate the preparation of pure, dry hydrated copper sulfate crystals starting from copper oxide including the use of a water bath 3.18 Describe how to carry out an acid-alkali titration, using burette, pipette and a suitable indicator, to prepare a pure, dry salt	n, neutralisation, titration	
Week 2	**Chemistry** Electrolysis	**Electrolytic process** 3.23 Describe electrolysis as a process in which electrical energy (DC) decomposes electrolytes 3.24 Explain the movement of ions during electrolysis (positive charged cations move to cathode (-), negatively charged anions move to anode (+)) 3.27 Write half equations for reactions occurring at the anode and cathode in electrolysis 3.28/3.29 Explain oxidation and reduction in terms of loss or gain of electrons, reduction occurs at cathode and oxidation occurs at the anode. 3.30 Explain the formation of the products in the electrolysis of copper sulfate solution, using copper electrodes (can be used to purify copper) **Practical ideas:** **3.17 Core Practical**: Investigate the preparation of pure, dry hydrated copper sulfate crystals starting from copper oxide including the use of a water bath 3.18 Describe how to carry out an acid-alkali titration, using burette, pipette and a suitable indicator, to prepare a pure, dry salt **3.31 Core Practical**: Investigate the electrolysis of copper sulfate solution with inert electrodes and copper electrodes	Electrolysis, electrolytes, electrodes, cations, anions, cathode, anode, copper sulfate, electrons, oxidation, reduction	
Week 3	**Chemistry**	**Key knowledge taught:** 4.2 Explain displacement reactions as redox reactions, in terms of gain or loss of electrons	Displacement, reactivity series,	

	Extracting Metals and Equilibria	4.3 Explain the reactivity series of metals (potassium, sodium, calcium, magnesium, aluminum, (carbon), zinc, iron, (hydrogen), copper, silver, gold) in terms of the reactivity of the metals with water and dilute acids and that these reactions show the relative tendency of metal atoms to form cations 4.5 Explain oxidation as the gain of oxygen and reduction as the loss of oxygen 4.6 Recall that the extraction of metals involves reduction of ores 4.8 Evaluate alternative biological methods of metal extraction (bacterial and phytoextraction) 4.9 Explain how a metal's relative resistance to oxidation is related to its position in the reactivity series 4.11 Describe that a life-cycle assessment for a product involves consideration of the effect on the environment of obtaining the raw materials, manufacturing the product, using the product and disposing of the product when it is no longer useful 4.12 Evaluate data from a life cycle assessment of a product **Reversibly reactions and equilibria** 4.13 Recall that chemical reactions are reversible, the use of the symbol ⇌ in equations and that the direction of some reversible reactions can be altered by changing the reaction conditions 4.14 Explain what is meant by dynamic equilibrium 4.15 Describe the formation of ammonia as a reversible reaction between nitrogen (extracted from the air) and hydrogen (obtained from natural gas) and that it can reach a dynamic equilibrium 4.16 Recall the conditions for the Haber process as: **a** temperature 450 °C **b** pressure 200 atmospheres **c** iron catalyst 4.17 Predict how the position of a dynamic equilibrium is affected by changes in: **a** temperature **b** pressure **c** concentration **Practical ideas:** Displacement reactions of metals Investigating reactivity of metals using water and weak acids	oxidation, reduction, ore, metal extraction, life cycle assessment, equilibrium, reversible, ammonia, nitrogen, Haber process, iron catalyst	
Week 4 and Week 5	Key Concepts in **Chemistry** (calculations) and Rates of Reaction	**Key knowledge taught:** **Calculations involving masses** 1.43 Calculate: **a** relative formula mass given relative atomic masses **b** percentage by mass of an element in a compound given relative atomic masses 1.44 Calculate the formulae of simple compounds from reacting masses or percentage composition and understand that these are empirical formulae 1.45 Deduce:	Relative atomic masses, empirical formula, reactions, products,	

		a the empirical formula of a compound from the formula of its molecule **b** the molecular formula of a compound from its empirical formula and its relative molecular mass 1.46 Describe an experiment to find the empirical formula of a simple compound e.g. magnesium oxide 1.47 Explain the law of conservation of mass applied to closed and non-enclosed systems (with gases) 1.48 Calculate masses of reactants and products from balanced equations 1.49 Calculate the concentration of solutions in g dm–3 1.50 Recall that one mole of particles of a substance is defined as: a the Avogadro constant number of particles (6.02 × 1023 atoms, molecules, formulae or ions) of that substance b a mass of 'relative particle mass' g 1.51 Calculate the number of: a moles of particles of a substance in a given mass of that substance and vice versa b particles of a substance in a given number of moles of that substance and vice versa c particles of a substance in a given mass of that substance and vice versa 1.52 Explain why, in a reaction, the mass of product formed is controlled by the mass of the reactant which is not in excess 1.53 Deduce the stoichiometry of a reaction from the masses of the reactants and products **Rates of Reaction** 7.2 Suggest practical methods for determining the rate of a given reaction 7.7 Explain how the addition of a catalyst increases the rate of a reaction in terms of activation energy **Heat Energy Changes in Chemical Reactions** 7.12 Recall that the breaking of bonds is endothermic and the making of bonds is exothermic 7.13 Recall that the overall heat energy change for a reaction is: **a** exothermic if more heat energy is released in forming bonds in the products than is required in breaking bonds in the reactants **b** endothermic if less heat energy is released in forming bonds in the products than is required in breaking bonds in the reactants 7.14 Calculate the energy change in a reaction given the energies of bonds (in kJ mol–1) 7.15/ 7.16 Draw and label reaction profiles for endothermic and exothermic reactions, identifying and explaining the term activation energy **Practical ideas:**	balanced equations, Avogadro's constant, moles, activation energy, endothermic, exothermic, energy profile	

		7.1 Core Practical: Investigate the effects of changing the conditions of a reaction on the rates of chemical reactions by: a measuring the production of a gas (in the reaction between hydrochloric acid and marble chips) b observing a colour change (in the reaction between sodium thiosulfate and hydrochloric acid) Measuring temperatures of endo- and exo-thermic reactions		
Spring two				
Week 1	**Chemistry** Fuels and Earth Science	**Key knowledge taught:** 8.5 Explain how hydrocarbons in different fractions differ from each other in: **the** number of carbon and hydrogen atoms their molecules contain **b** boiling points **c** ease of ignition **d** viscosity and are mostly members of the alkane homologous series 8.6 Explain an homologous series as a series of compounds which: **a** have the same general formula **b** differ by CH2 in molecular formulae from neighboring compounds **c** show a gradual variation in physical properties, as exemplified by their boiling points **d** have similar chemical properties 8.26 Describe: **a** the composition of today's atmosphere **b** the potential effects on the climate of increased levels of carbon dioxide and methane generated by human activity, including burning fossil fuels and livestock farming **c** that these effects may be mitigated: consider scale, risk and environmental implications **Practical ideas:** Modelling hydrocarbons with molymods	Hydrocarbo nfraction, molecular formula, atmosphere , homologous series	
Week 2	**Physics** Energy	**Key knowledge taught:** 3.1 Recall and use the equation to calculate the change in gravitational PE when an object is raised above the ground: $\Delta GPE = m \times g \times \Delta h$ *change in GPE (J) = mass (kg) × gravitational field strength (N/kg) × change in vertical height (m)* 3.2 Recall and use the equation to calculate the amounts of energy associated with a moving object: *kinetic energy (joule, J) = ½ × mass (kilogram, kg) × speed^2 (metre/second)* 3.6 Explain that where energy transfers in a closed system there is no net change to the total energy 3.7 Explain that mechanical processes become wasteful when they cause a rise in temperature so dissipating energy in heating the surroundings 3.8 Explain, using examples, how in all system changes energy is dissipated so that it is stored in less useful ways	GPE, KE, joules, energy, dissipated, work done, kilograms, useful energy, wasted energy	

		8.4 Identify the different ways that the energy of a system can be changed **a** through work done by forces **b** in electrical equipment **c** in heating 8.5 Describe how to measure the work done by a force and understand that energy transferred (joule, J) is equal to work done (joule, J) 8.6 Recall and use the equation: E = F x d *work done (joule, J) = force (newton, N) × distance moved in the direction of the force (metre, m)* 8.7 Describe and calculate the changes in energy involved when a system is changed by work done by forces **Practical ideas:** GPE and KE investigation with bouncing balls – relationship between drop height and bounce height		
Week 3	**Physics** Electricity	**Key knowledge taught:** 10.13 Recall and use the equation: V = I × R *potential difference (volt, V) = current (ampere, A) × resistance (ohm, Ω)* 10.14 Explain why two resistors are in series increases resistance, but two in parallel decreases 10.15 Calculate the currents, potential differences and resistances in series circuits 10.16 Explain the design and construction of series circuits for testing and measuring 10.18 Explain how current varies with potential difference for the following devices and how this relates to resistance **a** filament lamps **b** diodes **c** fixed resistors 10.19 Describe how the resistance of a light-dependent resistor (LDR) varies with light intensity 10.20 Describe how the resistance of a thermistor varies with change of temperature 10.25 Explain ways of reducing unwanted energy transfer through low resistance wires 10.26 Describe the advantages and disadvantages of the heating effect of an electric current 10.27 Use the equation: E = I × V × t *energy transferred (joule, J) = current (ampere, A) × potential difference (volt, V) × time (second, s)* 10.28 Describe power: the energy transferred per second, measured in watts 10.30 Explain how the power transfer in any circuit device is related to the potential difference across it and the current in it 10.32 Describe how energy is transferred from batteries and the a.c. mains to the energy of motors and heating devices 10.40 Recall the potential differences between the live, neutral and earth mains wires 10.41 Explain the dangers of providing any connection between the live wire and earth	Potential difference, current, resistance, volts, amps, ohms, series, parallel, LDR, thermistor, live wire, neutral wire, earth wire	

		10.42 Describe, with examples, the relationship between the power ratings for domestic electrical appliances and the changes in stored energy when they are in use **Practical ideas:** 10.17 Core Practical: Construct electrical circuits to: a investigate the relationship between potential difference, current and resistance for a resistor and a filament lamp b test series and parallel circuits using resistors and filament lamps 10.21 Explain how the design and use of circuits can be used to explore the variation of resistance in the following devices **a** filament lamps **b** diodes **c** thermistors **d** LDRs Wiring a plug		
Week 4		science week - TBC		
Week 5		**Consolidation, revision and assessment** *GCSE style exam questions taken from the topics covered, 60-minute paper covering anything except magnets in physics. 20 marks for each science, mixture of paper 1 and 2 questions.*		
Week 6	**Magnets**	**Key knowledge taught:** 12.9 Explain how inside a solenoid (an example of an electromagnet) the fields from individual coils **a** add together to form a very strong almost uniform field along the centre of the solenoid **b** cancel to give a weaker field outside the solenoid 12.10 Recall that a current carrying conductor placed near a magnet experiences a force and that an equal and opposite force acts on the magnet 12.11 Explain that magnetic forces are due to interactions between magnetic fields 12.12 Recall and use Fleming's left-hand rule to represent the relative directions of the force, the current and the magnetic field for cases where they are mutually perpendicular 12.13 Use the equation: F = B × I × l *force on a conductor at right angles to a magnetic field carrying a current (newton, N) = magnetic flux density (tesla, T or newton per ampere metre, N/A m) × current (ampere, A) × length (metre, m)* 13.2 Recall the factors that affect the size and direction of an induced potential difference, and describe how the magnetic field produced opposes the original change 13.5 Explain how A.C in one circuit can induce a current in another circuit (used in transformers) 13.9 Explain where and why step-up and step-down transformers are used in the national grid 13.10 Use the power equation (for transformers with 100% efficiency): *potential difference across primary coil (volt, V) × current in primary coil (ampere, A) = potential difference across secondary coil (volt, V) × current in secondary coil (ampere, A)*	Solenoid, magnetic field, Fleming's left-hand rule, magnetic flux, transformer, national grid, potential difference	

		Practical ideas: Making simple (homopolar) motors Demonstration of a transformer		
Summer one				
Week 1 Week 2	Biology Revision	**Week 1 – Paper 1 focus:** cells and control, genetics, natural selection and genetic modification, health, disease and development of medicines **Week 2 – Paper 2 focus:** plant structure and their functions, animal co-ordination, control and homeostasis, exchange and transport in animals, ecosystems and material cycles		
Week 3 Week 4	Chemistry Revision	**Week 1 – Paper 3 focus:** states of matter & mixtures, chemical changes, extracting metals & equilibria **Week 2 – Paper 4 focus:** groups in the periodic table, rates and reaction and energy changes, fuels and Earth science		
Week 5 Week 6	Physics Revision	**Week 1 – Paper 5 focus:** key concepts, motion and forces, conservation of energy, waves, light and the electromagnetic spectrum, radioactivity **Week 2 – Paper 6 focus:** energy – forces doing work, forces and their effects, electricity and circuits, magnetism and the motor effect, electromagnetic induction, particle model, forces and matter		
Summer two				
Up until final exam		**Key knowledge taught:** Revision – tailored around specific exam dates. Focus on exam technique and preparing students for formal GCSE exams. **Practical ideas:** Revisit all core practical's		