Planning Grid Groups 4,5,6,7 Science 2020-2021

Pupils are taught the AQA ELC Scheme of work which is linked to the AQA GCSE Combined Science Trilogy in years 9 and 10. In one academic year they will cover three components: 3.1 Biology, 3.3 Chemistry and 3.5 Physics. Pupils are assessed with 3 external examinations and 3 internal pieces of coursework. In the following year the other 3 components are taught: 3.2 Biology, 3.4 Chemistry and 3.6 Physics. Again pupils are assessed with 3 external examinations and 3 internal pieces of coursework.

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|  | Autumn | Spring | Summer |
|  | **3.3 Component 3 Chemistry**  **Elements, mixtures and compounds**  Matter is composed of tiny particles called atoms and there are about 100 naturally occurring types of atoms called elements.  Elements are shown in the periodic table and are either metals or non-metals. Atoms are the building blocks for all substances. When two or more elements combine chemically a compound is produced.  Different substances have different combinations of atoms joined together in different ways, which gives them different properties, such as whether they are solid, liquid or gaseous at room temperature. Many materials we use are mixtures. Mixtures can be separated by processes such as filtration. Polymers have many useful applications.  Coursework 3.3  Exam ELC 3.3 | **3.5 Component 5 Physics**  **Energy, forces and the structure of matter**  Forces are pushes or pulls, and if a force causes an object to move then work is done and energy is transferred. Energy can be transferred usefully, stored or dissipated, but cannot be created or destroyed. A braking force will cause an energy transfer that makes a vehicle slow down and heats the brakes. The braking distance of a vehicle depends on many different things, such as the speed of the vehicle.  The energy resources available to use may be divided into renewable and non-renewable. Energy can also be released from atoms, which contain smaller particles such as neutrons and protons in the nucleus, because atoms can break down to emit particles or gamma rays.  Coursework 3.5  Exam ELC 3.5 | **3.1 Component 1 Biology**  **The human body**  The human body is composed of structures called organs, which are organised into organ systems that carry out all of the key processes of life. These systems all require energy, which is contained in food and released in the cell by respiration. The organ systems are responsible for delivering food and oxygen to the cells and taking away waste.  All these key processes, including reproduction, are coordinated by the nervous system and a hormone system.  A healthy body can be maintained by a balanced diet, exercise and a healthy lifestyle. Health can be damaged by microbes, which can cause infectious diseases. The body can defend itself against most diseases but will sometimes need drugs in order to alleviate the symptoms and speed recovery.  Coursework 3.1  Exam ELC 3.1 |
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Planning Grid Group 8 Science 2020-2021

In year 11 pupils are taught extra content which will enable them to complete the AQA GCSE Combined Science Trilogy scheme of work.

Pupils will have access to required practical activities and will be assessed with mock AQA exam papers.

(NB: The disruption due to Covid has altered this plan, the following is the new plan which has developed during the infection.

There is a detailed and simplified version.)

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| Detailed | Autumn | Spring | Summer |
| Unit (s) | **3.2 Component 2 Biology**  **Environment, evolution and inheritance**  Life on Earth is dependent on photosynthesis to fix carbon dioxide and produce the organic molecules used as the fuels for respiration and life processes.  Living organisms interact with one another and their environment in many different ways. Human behaviours may have beneficial or detrimental effects on natural populations and the environment. The chemicals in the environment are continually cycling through the natural world.  Life on Earth has evolved over time by natural selection, which accounts for biodiversity and how organisms are related. The characteristics of living things depend on both their environment and their genome.  Humans can now use genetic engineering to modify organisms.  Coursework 3.2  Exam ELC 3.2  **Elements,mixtures and compounds -additional content**  Atomic symbols (first 20, Group 1 and Group 7)  Arrangement of the periodic table in terms of electronic structure.  Development of the model of the atom.  Development of the periodic table.  Relative electrical charges of subatomic particles.  Size and mass of atoms  Relative atomic mass  Electronic structure  Metals and non-metals in terms of electronic structure.  Group 0  Group 1  Group 7  Formulae and naming compounds;  Relative molecular mass  symbol equations.  State symbols  Chemical bonds, ionic, covalent, metallic. Giant covalent structures  Diamond/Graphite Details of bonding  Graphene and fullerenes  Pure substances  Formulations  Chromatography – definitions of phases; use of Rf and correct use of significant figures; differences between pure and impure substances  Reactivity series of metals  Extraction of metals  Definition of reduction and oxidation  Electrolysis  Test for hydrogen, oxygen, carbon dioxide and chlorine  5.3 Quantitative chemistry  Properties of metals and alloys  Polymers – recognition of polymers from diagrams showing bonding and structure  Reaction profiles and activation energy  Factors which affect the rates of chemical reactions.  Catalysts: much more detail regarding how catalysts work.  Calculating rates of reaction including use of graphs.  Collision theory and activation energy  Reversible reactions and dynamic equilibrium.  Crude oil, hydrocarbons and alkanes: structural formulae; names of first four alkanes.  Fractional distillation and petrochemicals: additional details of the process and the families of compounds. Properties of hydrocarbons: additional details relating to trends, properties and molecule size.  Cracking and alkenes  Properties of hydrocarbons: balanced equation for combustion of hydrocarbons.  Potable water: additional detail.  Using the Earth’s resources and sustainable development.  Waste water treatment.  Life cycle assessment.  Ways of reducing the use of resources. | **Energy, forces and the structure of matter – additional content**  Energy stores and systems: calculations required.  Specific heat capacity  Power: Equation and calculations.  Internal energy: changes of state  Temperature changes in a system and specific heat capacity: equations and calculations.  Changes of heat and specific latent heat: equations and calculations.  Particle motion in gases  Energy transfers in a system:  Efficiency Equation and calculations  Contact and non-contact forces: vectors  Gravity: equations and calculations  Resultant forces: free body diagrams  Work done and energy transfer: additional detail; equations and calculations.  Hookes law - Forces and elasticity: equations and calculations  Distance and displacement: scalar and vector quantities.  Velocity: distinguish between scalar and vector quantities.  The distance-time relationship: graphical representations  Acceleration: Equations  Newtons laws  Standard circuit diagram symbols  Resistors: ohmic conductors, diodes, thermistors  Series and parallel circuits: resistance calculations  Power: Equations and calculations.  Energy transfers in everyday appliances: Equations and calculations  The National Grid  Properties of waves: equations and calculations; measurement of speed of waves.    **The Human body – additional content**    Microscopy benefits of electron microscope.  Cell structure - eukaryotic and prokaryotic cells. Location of genetic material in prokaryotic cells.  Mitosis and meiosis.  Transport in cells: diffusion, osmosis, active transport.  Names of structures within the lungs Pacemaker cells  Coronary heart disease  Cancer  Enzymes – definition, function. Variables that effect how enzymes work. Optimal conditions for enzymes. Simple lock and key theory  Details of specific enzyme reactions – amylase, proteases and lipases; the role of bile.  Metabolism  Additional pathogens – fungi. How pathogens infect and spread disease The reduction or prevention of spread of disease.  Types of viral diseases: measles and HIV  Types of bacterial diseases – salmonella and gonorrhoea  Additional pathogens – protists  Other types of viral disease eg Tobacco mosaic virus  Types of fungal and protist diseases  Defence against the entry of pathogens The role of the immune system white blood cells – antibody production – phagocytosis – ingestion – antitoxin production  Additional content: Global vaccination  Antibiotics and painkillers  Discovery and development of drugs  How the CNS coordinates the response of effectors  Reflex arc: why it is important; extract and interpret data about the functioning of the nervous system | How hormones are released and transported.  Exemplified using menstrual cycle  Human endocrine system – location of glands and how the pituitary gland in the brain stimulates the release of other hormones  Hormones in human reproduction – additional details of the menstrual cycle including FSH, LH and puberty.  Homeostasis  Uses of hormones in controlling fertility  Oral contraceptives to inhibit fertility. Fertility drugs to stimulate eggs. Benefits and problems of using fertility hormones.  Contraception Evaluation of the different hormonal and non–hormonal methods of contraception.  Homeostasis  Control of blood glucose concentration. Type 1 and 2 diabetes  GCSE Combined Science Trilogy exams |

Planning Grid Group 8 Science 2020-2021

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| Simplified | Autumn | Spring | Summer |
| Unit (s) | **3.2 Component 2 Biology**  **Environment, evolution and inheritance**  Life on Earth is dependent on photosynthesis to fix carbon dioxide and produce the organic molecules used as the fuels for respiration and life processes.  Living organisms interact with one another and their environment in many different ways. Human behaviours may have beneficial or detrimental effects on natural populations and the environment. The chemicals in the environment are continually cycling through the natural world.  Life on Earth has evolved over time by natural selection, which accounts for biodiversity and how organisms are related. The characteristics of living things depend on both their environment and their genome.  Humans can now use genetic engineering to modify organisms.  **Coursework 3.2**  **Exam ELC 3.2**  **Elements,mixtures and compounds -additional content**  Atoms  Periodic table  Relative atomic mass  Electronic structure  Metals and non-metals in terms of electronic structure.  Group 0  Group 1  Group 7  Formulae and naming compounds;  Relative molecular mass  Symbol equations.  State symbols  Bonding  Pure substances  Formulations  Chromatography –recap  Extraction of metals  Test for hydrogen, oxygen, carbon dioxide and chlorine  5.3 Quantitative chemistry  Alloys  Polymers  Rates of reaction  Catalysts  Crude oil  Alkanes  Alkenes  Potable water  Waste water treatment.  Life cycle assessment. | **Energy, forces and the structure of matter – additional content**  Energy stores and systems  Specific heat capacity  Power:  Internal energy  Particle motion in gases  Energy transfers  Efficiency  Forces vectors  Gravity:  Resultant forces  Work done and energy transfer  Hooke’s law  Scalar and vector quantities  Speed  Acceleration  Newton’s laws  Circuit diagram symbols-recap  Resistors  Resistance  Power  The National Grid  Energy transfers in everyday appliances  Waves    **The Human body – additional content**  Electron microscope.  Eukaryotic and prokaryotic cells.  Mitosis and meiosis.  Transport in cells  Names of structures within the lungs Pacemaker cells  Coronary heart disease  Cancer  Enzymes  Metabolism  Pathogens  Measles and HIV  Salmonella and gonorrhoea  Tobacco mosaic virus  Malaria  White blood cells  Vaccination  Antibiotics and painkillers  Discovery and development of drugs  Nervous system  Reflex arc | Hormones  Menstrual cycle  Human endocrine system  Hormones in human reproduction  Contraception  Homeostasis  Type 1 and 2 diabetes  Revision/exam practice  **GCSE Combined Science Trilogy exams** |