Science - Long term plans

Year 7

Term	Autumn Term		Spring Term		Summer Term	
Half term	HT1	HT2	HT3	HT4	HT5	HT6
Unit Titles lengths:	Skills Biology: Cell Biology	Chemistry: Particle model	1. Physics: Energy Part 1	Biology: Ecology	Chemistry: Chemical changes	Physics: Forces
Learning objectives Substantive and procedural knowledge covered in the unit	To identify variables and collect and represent data using graphs. To describe how the skeleton, joints and muscles bring about movement in the human body. To compare the structure of plants with animal cells, describing the function of organelles. To describe diffusion and different exchange surfaces.	To describe the properties of solids, liquids and gases and investigate the changes in state. To compare the differences between pure substances and mixtures. To describe the factors that affect gas pressure. To describe different separating techniques for example filtration and chromatography.	To explain how one energy store is transferred to another energy store via energy pathways. To calculate the efficiency of energy transfers. To use the scientific formula to calculate power. To describe the advantages and disadvantages of using renewable and nonrenewable energy.	To describe the stages of the food chain in terms of trophic level. To describe how organisms are adapted to their environment. To describe plant reproduction and how seeds are dispersed. To explain the importance of biodiversity and methods to maintain biodiversity.	To describe the differences between a physical change and a chemical change. To describe neutralisation reactions. To describe the reactions between metals with oxygen and metals with acid. To describe displacement reactions.	To identify contact and non-contact forces. To calculate resultant force of different objects from force diagrams. To calculate speed using the scientific formula and distance-time graphs. To describe the difference between mass and weight.
Key ideas/ Themes:	Practical skills Movement Cells	States of matter Separating mixtures Pressure	Energy transfer Power Renewable/nonrenewable energy	Ecosystem Plant reproduction Biodiversity	Neutralisation Reactions of metals Chemical equations	Forces Speed Gravity
Prerequisite knowledge:	KS2: Working scientifically Year 3: Animals, including humans	Year 4: States of matter Year 5: properties and changes of materials	Year 4: Electricity	Year 2: Living things and their habitats Year 3: Plants	Year 5: properties and changes of materials	Year 3: Forces and magnets Year 5: Forces
Outcomes (Stickable-output that the student produces to demonstrate their knowledge)	Label diagram of skeleton. Write an explanation of how muscles work in the body. Label a diagram of a microscope. Complete table of functions of organelles. Write an explanation of how specialised cells are adapted for their functions.	Draw how particles are arranged in each state of matter. Label what each change of state is called. Plan an investigation to observe changes in state. Write an explanation of why different separating techniques are used for different mixtures. Write an explanation of what happens to gas particles when pressure changes.	Identify energy transfers of everyday objects Make calculations for energy efficiency using the scientific formula Draw and interpret Sankey diagrams Make calculations for power using the scientific formula Reading task to identify the advantages and disadvantages of renewable and nonrenewable energy.	Draw and interpret food chains and food webs. Label different parts of a flower. Write an explanation of how plants disperse their seeds. Match up the adaptation with how it helps predators and prey. Write an explanation of how we can maintain biodiversity.	Write word equations for neutralisation. Write word equations for the reactions of metals. Write a method and carry out the investigation for making salts. Draw a table and list the properties of metals and nonmetals. Use displacement to put metals in order of reactivity.	Draw a table to list examples of contact and no-contact forces. Draw force diagrams and use them to calculate resultant force. Make calculations for speed using the scientific formula. Draw and interpret distance time graphs. Make calculations for weight by using the scientific formula.

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Year 8

Term	Autumn Term		Spring Term		Summer Term	
Half term	HT1	HT2	HT3	HT4	HT5	HT6
Unit Titles lengths:	Biology: Inheritance Physics: Electricity	Physics: Waves Part 1 Biology: Organisation	Chemistry: Atomic structure	Physics: Magnetism	Biology: Bioenergetics	Chemistry: Atmosphere
Learning objectives	To describe variation and explain how organisms are adapted to their environment. To describe the stages of human development and the menstrual cycle. To describe the difference between series and parallel circuits. To understand how to measure and calculate current, potential difference and resistance.	To describe the properties of waves and compare longitudinal and transverse waves. To describe how the structures of the eye and ear help us to see light and hear sound. To describe the respiratory system and the process of gas exchange. To describe the digestive system and the effect of a balanced diet.	To describe the structure of an atom using subatomic particles. To describe elements and compounds and use chemical formulas. To explain how elements are arranged in the periodic table. To explain the properties and trends of elements in different groups of the periodic table.	To describe how pressure in liquids changes with depth. To use the scientific formula to calculate pressure. To describe attraction and repulsion between two bar magnets. To compare the difference between an electromagnet and a permanent magnet.	To compare the difference between aerobic and anaerobic respiration. To describe the effect of exercise on respiration. To describe photosynthesis and the factors that affect the rate of photosynthesis. To describe the structure of the leaf and how it is adapted to carry out its function.	To describe the structure of the earth. To describe how igneous, metamorphic and sedimentary rocks are formed. To describe the different types of weathering. To compare the early atmosphere to the modern day atmosphere.
Key ideas/ Themes:	Variation Reproduction Circuits	Waves Light and sound Digestive system	Elements Periodic table Chemical formulas	Forces Pressure Magnets	Respiration Photosynthesis Plant organisation	Earth Rocks Atmosphere
Prerequisite knowledge:	Year 5: Living things and their habitats Year 6: Electrcity Year 7: Cell biology	Year 4: Sound Year 6: Light Year 6: Animals, including humans	Year 5: Properties and changes of materials Year 7: Chemical changes	Year 3: Forces and magnets Year 7: Forces	Year 6: Animals, including humans Year 8: Organisation	Year 3: Rocks Year 5: Earth and space
Outcomes (Stickable-output that the student produces to demonstrate their knowledge)	Label a diagram of male and female reproductive organs. Write the stages of human development and the menstrual cycle. Draw circuit diagrams using the correct circuit diagrams. Make calculations for resistance using Ohm's law. Write a method and carry out an investigation to measure resistance of a wire.	Label the different parts of transverse and longitudinal waves. Write a method and carry out an investigation to measure the angle of reflection. Label the different parts of the respiratory system, explain the adaptations of the alveoli. Label the different parts of the digestive system. Write a method and carry out an investigation for different food tests.	Draw and label the structure of an atom. Interpret chemical formula and use chemical formula to name compounds. Write an explanation of the development of the periodic table. Write an explanation for the trends of group 1,7 and 0 elements. Describe the uses of Group 0 elements, explaining their porperties.	Recap prior knowledge on calculating resultant force from force diagrams. Make calculations for pressure using the scientific formula. Draw and label the magnetic field around the earth. Write a method and carry out an investigation to make an electromagnet. Reading task on how turtles use the earth's magnetic field to navigate the ocean.	Write the word equation and balanced symbol equation for respiration and photosynthesis. Complete a table to compare anaerobic respiration between plants and animals. Make calculations for breathing rate using the scientific formula. Label the structure of the leaf. Write a method and carry out an investigation for the effect of light intensity on photosynthesis.	Label the structure of the earth. Reading task describing the properties of each layer of the earth. Complete a storyboard for how fossils are made. Fill in a table and use graphs to compare the early and modern atmosphere. Write a method and carry out an investigation for the stages of the rock cycle.

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Year 9

Term	Autumn Term		Spring Term		Summer Term	
Half term	HT1	HT2	HT3	HT4	HT5	HT6
Unit Titles lengths:	Physics: Energy Part 2 Physics: Waves Part 2	Biology: Evolution	Chemistry: Energy changes	Chemistry: Resources Skills	AQA GCSE Combined Trilogy: Cell Biology	AQA GCSE Combined Trilogy: Atomic Structure & Periodic Table
Learning objectives	To calculate work done using the scientific formula. To compare the difference between conduction and convection. To calculate wave speed using the scientific formula. To describe the uses of the electromagnetic spectrum.	To describe the development of DNA. To compare dominant and recessive alleles and interpret punnett square diagrams. To describe how natural selection leads to evolution. To describe how to classify organisms.	To compare the differences between complete and incomplete combustion. To describe the law of conservation of mass. To describe exothermic and endothermic reactions. To describe how to test for different gases.	To describe the stages of the carbon cycle. To describe how humans are contributing to the greenhouse effect and climate change. To evaluate the advantages and disadvantages of different types of extraction methods. To describe variables, collect and represent data and calculate uncertainty.	To describe the difference between eukaryotic and prokaryotic cells. To describe the structure and function of specialised cells in plants and animals. To describe the stages of cell division. To evaluate the uses of stem cell technology.	To understand atoms, elements and compounds. To describe different separation techniques. To describe isotopes and calculate relative atomic mass. To describe how the model of the atom evolved over time.
Key ideas/ Themes:	Work done Radiation Electromagnetic spectrum	Inheritance Evolution Extinction	Combustion Catalyst Balancing equations	Carbon cycle Extraction of metals KS4 practical skills	Cells Mitosis Modes of transport	Atoms, elements, compounds Separating mixtures Periodic table
Prerequisite knowledge:	Year 7: Energy part 1 Year 8: Waves part 1	Year 7: Ecology Year 8: Inheritance	Year 7: Chemical changes	Year 7: Skills Year 8: Atmosphere	Year 7: Cell Biology	Year 8: Atomic structure
Outcomes (Stickable-output that the student produces to demonstrate their knowledge)	Match the energy store to its description. Make calculations for work done using the scientific formula. Write a method and carry out an investigation to see which material is the best insulator. Make calculations for wave speed using the scientific formula. Complete a table to show one use for each part of the electromagnetic spectrum.	Complete a table showing the contributions of different scientists in the development of DNA. Draw and interpret Punnett squares to predict characteristics. Complete a card sort activity to show the stages of natural selection. Reading activity describing the causes and effects of extinction. Identify names of species using binomial names.	Complete a table showing the differences between complete and incomplete combustion. Write word and symbol equations for thermal decomposition. Draw energy profiles for endothermic and exothermic reactions. Make calculations for the mass of reactants and products. Complete a table showing the tests for different gases	Complete a diagram and table showing the stages of the carbon cycle Reading task describing the greenhouse effect and impact of humans. Complete a table showing the advantages and disadvantages of different types of extraction methods. Identify variables and follow a method for a required practical to prepare for KS4. Draw graphs to represent data and calculate uncertainty. Explain how to improve the accuracy of results.	Label the plant, animal and bacteria cell. Complete a table of functions for specialised plant and animal cells. Use diagrams to put the stages of mitosis in the correct order. Complete a 6 mark exam style question evaluating the uses of stem cell technology. Write a method and carry out an investigation for the osmosis required practical.	Draw the electron configuration of different elements. Calculate relative atomic mass of isotopes using the scientific formula. Complete a table showing the contributions of different scientists in the development of the atomic model. Use the periodic table to describe the reactivity of elements in group 1 and 0. Use chemical symbols to balance equations.

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Year 10

Term	Autumn Term		Spring Term		Summer Term	
Half term	HT1	HT2	HT3	HT4	HT5	HT6
Unit Titles lengths:	B1 Organisation C1 Structure and bonding	P1 Energy B1 Infection and Response C1 Energy Changes	C1 Part 1 of chemical changes - reactivity of metals P1 Electricity B1 Bioenergetics	*Retrieval: C1 Atomic structure and the periodic table* P1 Particle model of matter C1 Quantitative Part 1 *B1 Retrieval: Cell and organisation*	P1 Atomic structure C1 Quantitative Part 2 (HT only) C1 Part 2 of chemical changes- Extraction of metals	*Biology, Chemistry and Physics Paper 1 mocks* B2 Homeostasis
Learning objectives	B1 Organisation: To know the structure and function of key organs in animals and plants, and explain how they are organised into systems to carry out life processes efficiently. C1 Structure and bonding: To know the properties and structures of ionic, covalent and metallic substances, and explain how bonding and structure affect their properties.	P1 Energy: To know how to describe different energy stores and transfers, and calculate energy efficiency and energy use in systems. B1 Infection and Response: To know how to explain how pathogens cause disease, and describe how the body defends itself and how diseases can be treated. C1 Energy Changes: To know how to describe exothermic and endothermic reactions and explain how energy changes are measured and used.	C1 Part 1 of chemical changes - reactivity of metals: To know how metals react with acids and how salts are made, and explain the reactivity series P1 Electricity: To know how to describe current, potential difference and resistance in circuits, and explain how electrical energy is used and transferred. B1 Bioenergetics: To know how to describe the processes of photosynthesis and respiration and explain how they are affected by different factors.	*Retrieval: C1 Atomic structure and the periodic table recap* P1 Particle model of matter: To know how to describe the arrangement and movement of particles in different states and explain changes of state and internal energy. C1 Quantitative Part 1: To know how to calculate relative formula masses, moles, and reactant/product quantities in chemical reactions. *B1 Retrieval: Cell and organisation topic recap*	P1 Atomic structure: To know how to describe the structure of the atom and explain the processes of radioactive decay and its uses and dangers. C1 Quantitative Part 2 (HT only): To know how to calculate moles, and reactant/product quantities in chemical reactions. C1 Part 2 of chemical changes- Extraction of metals: To know how the reactivity of metals determine the extraction of metals from their ores	*Biology, Chemistry and Physics Paper 1 mocks* B2 Homeostasis: To know how to explain how the body maintains stable internal conditions using the nervous and hormonal systems.
Key ideas/ Themes:	Cells, body systems and plant systems, Chemical reactions	Energy stores, cells, energy transfer	energy, Electricity, chemical reactions in plant and animal cells	Atoms, elements and compounds	Atoms, elements and compounds, chemical reactions	Cells and the human body
Prerequisite knowledge:	B1 Organisation: Cells and body systems C1 Structure and bonding: matter, atoms elements and compounds	P1 Energy: Energy stores B1 Infection and Response: cells and the human body C1 Energy Changes: chemical reactions and energy	C1 Part 1 of chemical changes - reactivity of metals P1 Electricity: electricity transfers energy B1 Bioenergetics: cells and plant organs	*Retrieval: C1 Atomic structure and the periodic table* P1 Particle model of matter: Atom C1 Quantitative Part 1: atoms elements and compounds and chemical reactions *B1 Retrieval: Cell and organisation*	P1 Atomic structure: Atom C1 Quantitative Part 2 (HT only): atom, element and compounds and chemical reactions C1 Part 2 of chemical changes- Extraction of metals: chemical reactions, Reactivity series	*Biology, Chemistry and Physics Paper 1 mocks* B2 Homeostasis: Cells and body systems
Outcomes (Stickable- output that the student produces to demonstrate	B1 Organisation: • A table filled in with the definition and examples of animal and plant cell organisation examples • Labelled digestion system and a description of the process	P1 Energy: • Table with examples of different energy stores • constructed energy transfer diagrams alongside examples of description • Correct use of the energy and work done formula	C1 Part 1 of chemical changes - reactivity of metals • Table summarising how metals react with water and acid • word and symbol chemical equations of the metals reactions • List of the reactivity series in order	*Retrieval: C1 Atomic structure and the periodic table (see year 9 LTP)* P1 Particle model of matter: • Define density • Correct use of the density formula • Write up of Required practical activity 17: use appropriate	P1 Atomic structure • Explained why atoms give out electromagnetic radiation • Defined what is an isotope • Worked examples of calculating the subatomic particles in isotopes	*Biology, Chemistry and Physics Paper 1 mocks* B2 Homeostasis • Defined homeostasis and stated 3 examples • reading task 'controlling body temperature'

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their knowledge)	• Definition of an enzyme with examples. Explanation of the lock and key method with a diagram. • description and explanation of how Temperature and pH affect enzyme activity (application question) • Write up of Required practical activity 3: use qualitative reagents to test for a range of carbohydrates, lipids and proteins • Write up of Required practical activity 4: investigate the effect of pH on the rate of reaction of amylase enzyme. • Labelled diagram of the heart with a description of how blood moves through the heart • Labelled diagram of the respiratory system • Description and explanation of how the alveoli is adapted for gas exchange • Table comparing the artery, vein and capillary • 6 mark application question on blood vessels • Table comparing the components of blood • Description and explanation of CHD and ways its is treated using stains and stents • Definition of health and describe the difference between communicable and non communicable diseases • Explanation of the difference between malignant and benign tumours • Labelled structure of the leaf • Description of transpiration and translocation • Write up practical investigating different factors affecting the rate of transpiration. C1 Structure and bonding • Defined atom, element and compound • calculated number of atoms in a formula • Balanced equation • Describe and explain different methods of separating techniques using e.g. filtration, chromatography, evaporation, distillation and crystalisation • labelled structure of the atom • Table with subatomic particles calculated for different element • Defined isotope • Calculated relative formula mass	• Correct use of the kinetic energy, elastic potential and gravitational potential formulas. • write up of investigation calculating GPe of different balls • Correct use of the power and efficiency formulas • Write up of the Required practical activity 14: an investigation to determine the specific heat capacity of one or more materials. • Correct use of the specific heat capacity formula. • Describe and explain how to reduce unwanted energy transfer in a home • Table of renewable energy sources stating the advantages and disadvantages B1 Infection and Response • Description of how bacteria and viruses cause disease. • Table comparing animal and plant diseases • Description of how the body protects itself from disease. • A diagram with a description of how antibiotic resistance occurs • Describe and explain the stages of drug development. C1 Energy Changes • Defined exothermic and endothermic reaction with real life examples • Write up of the Required practical activity 10: investigate the variables that affect temperature changes in reacting solutions such as, eg acid plus metals, acid plus carbonates, neutralisations, displacement of metals • Describe the energy profile of an exothermic and endothermic reaction • HT- calculate the bond energies	• Practical write up of displacement reactions • Definition neutralisation with the equation • describe the use of universal indicator P1 Electricity • Table of electrical components symbols with a description • Correct use of the formula to calculate charge flow, current or time • Define resistance • Correct use of the formula to calculate resistance, current and potential difference • Write up of Required practical activity 15: use circuit diagrams to set up and check appropriate circuits to investigate the factors affecting the resistance of electrical circuits. This should include: -the length of a wire at constant temperature - combinations of resistors in series and parallel. • Write up of Required practical activity 16: use circuit diagrams to construct appropriate circuits to investigate the I–V characteristics of a variety of circuit elements, including a filament lamp, a diode and a resistor at constant temperature • describe the application of the thermistor and LDR • Construct a series and parallel circuit diagram • Calculate the resistance, current and potential difference in a series and parallel circuit • describe the difference between AC and DC • Labelled diagram of a plug with a description of each part • Correctly calculate power using the formula • Describe the purpose of the step up and step down transformer B1 Bioenergetics • State the word and symbol equation for photosynthesis • Describe the uses of glucose • Describe and explain how limiting factors affect the rate of photosynthesis using a graph • Write up of the Required practical activity 5: investigate the effect of light intensity on the rate of photosynthesis using an aquatic organism such as pondweed. • State the word and symbol equation for respiration • Describe the uses of respiration	apparatus to make and record the measurements needed to determine the densities of regular and irregular solid objects and liquids. • A labelled diagram with a description of the particle arrangement in a solid, liquid and gas • A labelled diagram with a description of how, when substances change state (melt, freeze, boil, evaporate, condense or sublimate), mass is conserved. • Define specific heat capacity and the correct use of the formula to calculate SHC • Correct use of the formula to calculate specific latent heat • Explain how the motion of the molecules in a gas is related to both its temperature and its pressure C1 Quantitative Part 1: • Describe a chemical reaction in terms of atoms • explain the law of conservation of mass using examples • Worked examples of calculating relative formula mass • Define concentration • correctly use the formula to calculate concentration, mass, volume. *B1 Retrieval: Cell and organisation (See year 9 and HT1 in y10 LTP)*	• Describes how the model of the atom has changed over time • A table with a description and explanation of the properties of the different types of radiation • Construct nuclear equations to calculate radioactive decay • Interpreted data from graphs to determine half life and recommend uses of radioactive materials • Compared irradiation and contamination C1 Quantitative Part 2 (HT only) • define moles • Correctly use Avogadro's constant to calculate the number of atoms/ molecules in a given mass • Correctly calculate the percentage and mass of elements in a given compound • Examples of correctly balanced equations using moles • Define a limiting reactant in terms of a chemical reaction • correctly calculate the limiting reactant from a balanced equation C1 Part 2 of chemical changes- Extraction of metals • Write up of the electrolysis practical • HT-worked examples of half equations	• Description of the nervous system • A labelled diagram of the reflex arc with a description of the reflex arc • Write up of Required practical activity 6: plan and carry out an investigation into the effect of a factor on human reaction time. • Labelled diagram of the endocrine system with named hormones and outline of function • Flow chart of how blood high sugar level are controlled • HT- Flow chart of how blood high and low sugar level are controlled • Table comparing Diabetes type 1 and 2. Analysis of a graph comparing the types • A labelled diagram describing the stages of menstruation • Table with named hormones of menstruation and their function • Table of named hormonal and non hormonal contraception methods with advantages and disadvantages • HT- description of IVF process with pro and cons • HT- description of the function of adrenaline and thyroxine • HT- Explanation how thyroxine is controlled by negative feedback

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	• Drawn the electron configuration of several elements • Explanation of how the periodic table has been developed over time • Described and explained the trends of group 1,7 and 0		• Describe and explain how the body responds to exercise using graphs • HT- explain how lactic acid is oxidised • Compare aerobic and anaerobic respiration using a table in plants and animals • Define metabolism			

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Year 11

Term	Autumn Term		Spring Term		Summer Term	
Half term	HT1	HT2	HT3	HT4	HT5	HT6
Unit Titles lengths:	B2 Inheritance and Variation: 10 Lessons C2 Rates: 8 Lessons B2 Ecology:8 Lessons	C2 Chemical analysis: 4 Lessons C2 Chemistry of the atmosphere: 4 Lessons P2 Waves: 8 Lessons P2 Forces PT1: 8 Lessons	C2 Using resources: 8 Lessons P2 Magnetism: 8 Lessons C2 Organic Chemistry: 8 Lessons	B2 Evolution: 4 Lessons P2 Forces Part 2: 8 Lessons *Revision*	*Revision*	*Revision*
Learning objectives	B2 Inheritance and Variation: To know that genes can lead to variation through inheritance. To be able to explain how genes can be manipulated for a desirable outcome. C2 Rates: To know that variables can be altered to increase the speed or slow down the speed of a reaction. To understand energy changes that accompany chemical reactions is an important part of the process. B2 Ecology: To know how energy flows and materials are recycled in ecosystems, the importance of biodiversity, and the impact of human activity on sustainability and ecosystem health.	C2 Chemical analysis: To know how to describe and explain how qualitative tests can be used to identify specific chemicals based on their chemical reactions. C2 Chemistry of the atmosphere: To know how to explain how the earth atmosphere has adapted over time through natural cycles and man made influences. P2 Waves: To know how mechanical and electromagnetic waves transfer energy and information in natural and man-made systems. Recognise the applications of wave behaviour in designing structures and modern technologies such as imaging and communication systems. P2 Forces PT1: To know how to explain how forces interact on objects	C2 Using resources: To know how natural resources are used in industry and the importance of sustainable manufacturing practices in chemistry. To know how to explain the environmental impact of human activities and how chemists aim to reduce pollution, waste, and disruption to natural cycles. P2 Magnetism: To know the principles of magnetism in induced and permanent magnets. Understand how electromagnetic effects are used to generate electricity and produce movement in devices (Higher). C2 Organic Chemistry: To know crude oil can be separated into fractions called hydrocarbons and these have trends affecting their physical and chemical properties. To know how these hydrocarbons are used.	B2 Evolution: To know the theory of evolution via natural selection. To explain how fossils and other evidence gives us information about the development of life on earth. P2 Forces Part 2: To know that forces can affect the speed, shape or direction of an object. To know that this can be interpreted in the form of distance time graphs and velocity time graphs. *Revision- this will include a bespoke intervention plan to revisit content, address gaps, retrieval practice and provide opportunities for exam practice through walking talking mocks.*		
Key ideas/ Themes:	Cells, Characteristics are inherited, Species show variation, Reactions, Organisms are independent	Chemical reactions, Earth systems, Radiation transfers energy, Forces predict motion	Earth systems, Fields predict motion	Species show variation, Forces predict motion		
Prerequisite knowledge:	B2 Inheritance and Variation: cells and genes C2 Rates: states of matter, reactions B2 Ecology: Ecosystems, food chains and food webs	C2 Chemical analysis: Atoms, Element and compounds, Chemical reactions C2 Chemistry of the atmosphere: the earth and its structure P2 Waves: sound and light P2 Forces PT1: Forces and motion	C2 Using resources: the earth and its resources P2 Magnetism: magnets C2 Organic Chemistry: atoms, elements, compounds	B2 Evolution: cells, characteristics are inherited P2 Forces Part 2: Forces and motion		
Outcomes	B2 Inheritance and Variation:	C2 Chemical analysis: • Definition of a pure substance	C2 Using resources: • Definition of potable water	B2 Evolution: • Define evolution		

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(Stickable- output that the student produces to demonstrate their knowledge)	• Define and compare asexual and sexual reproduction. • Complete application on asexual vs sexual reproduction • Annotated diagram of meiosis • Comparison of mitosis vs meiosis • 6 marks question on mitosis vs meiosis • Definition of DNA with a labelled diagram • Definition of genome and stated 3 benefits of the 'Human genome project' • Definition gene, allele, chromosome, Dominant and recessive • Construct punnett square diagrams of a dominant vs recessive • Comprehension task- cystic fibrosis and polydactyl • Interpret family tree diagram • HT- evaluate use of embryo screening • Listed examples of genetical, environmental variations • Description of the process of selective breeding • Pros and cons of selective breeding • Annotated diagram of GE for producing insulin • listed examples of uses of GE • Pros and cons of GE C2 Rates: • Written the formula to calculate the rate of a reaction • Worked examples of calculating the rate of reaction using formula and drawing tangents • Describe, predict and explain how temperature, concentration, catalyst, pressure can affect the rate of a reaction through collision theory • Write up of Required practical 5: investigate how changes in concentration affect the rates of reactions by a method involving measuring the volume of a gas produced and a method involving a change in colour or turbidity. • Definition of reversible reaction and identified the symbol • Demo write up of the reversible reaction of anhydrous copper sulphate • HT- State the factors that can affect an equilibrium reaction Predict the effect of changing conditions on an equilibrium reaction using Le Chateliers principle	• Heating or cooling graph of a pure and impure substance • Definition of a 'formulation' with everyday examples • Write up of Required practical activity 12: investigate how paper chromatography can be used to separate and tell the difference between coloured substances. Students should calculate Rf values. • Write up demonstrations to identify common gases (Hydrogen, oxygen, chlorine, and carbon dioxide). C2 Chemistry of the atmosphere: • story board of how the earth's atmosphere has evolved over time. • stated the names and percentage of the gases found in today's atmosphere. • Application- extended question 3rd rock from the sun • Describe the greenhouse effect using a diagram. • Named 3 greenhouse gases and described how it has affected the earth though droughts, melting ice caps, desertification, and flooding • Described and explained the difference between incomplete and complete combustion P2 Waves: • Identify features of a longitudinal and transverse wave using a diagram • Calculate Periods and Wave Speed given data • Write up of Required practical activity 20: make observations to identify the suitability of apparatus to measure the frequency, wavelength and speed of waves in a ripple tank and waves in a solid and take appropriate measurements. • Labelled diagram of the EM spectrum • Identified key properties of the EM spectrum • Described the uses of each type of waves P2 Forces PT1: • Identify scalar and vector quantities • describe forces as non contact and contact forces with examples • Describe the effect of resultant forces • HT- Calculate the resultant force in a straight line • HT- draw and interpret vector diagrams representing multiple forces • write up of Required practical activity 18: investigate the	• Description of the process of acquiring potable water • Describe and explain desalination and reverse osmosis using a diagram • Describe the process of sewage treatment using a diagram • HT- describe phytomining and bioleaching • Write up of Required practical activity 13: analysis and purification of water samples from different sources, including pH, dissolved solids and distillation. • Description of the LCA of a product and explain the problems of the process. P2 Magnetism: • Identify key features of a magnet • Draw magnetic fields around a magnet using iron fillings and a compass • Describe how electromagnets are formed • Explain how a solenoid can be made stronger (practical) • HT- describe the motor effect • HT-describe flemings left hand rule • HT- calculate the force on a conductor at right angles to a magnetic field and carrying a current C2 Organic Chemistry: • Definition of a hydrocarbon • Drawn structural diagrams of the first 4 alkanes • Calculated the formulae of alkanes with more than four carbons. • Description of fractional distillation using a labelled diagram • Describe the properties of the fractions • Written a balanced equations for the complete combustion of hydrocarbons with a given formula. • Describe the process and products of cracking and their uses • Describe the test for alkenes and its positive results • Write word equations for the complete combustion of hydrocarbons	• Describe natural selection using examples • Describe the evidence for evolution including fossils and antibiotic resistance in bacteria. • Interpret information from charts, graphs and tables such as evolutionary trees. • Define extinction and describe causes of extinction • Define classification • Describe Linnaeus classification system and Woese '3 domain system' P2 Forces Part 2: • Explained what is meant by average speed • Recall and applied formula to calculate speed, distance or time • Stated the typical speeds of walking, running and cycling • Interpret graphs and use data to calculate speed from distance-time graphs. • Calculate acceleration accurately using given formulae. • Interpret graphs and use data to calculate acceleration from velocity-time graphs. • HT- determine the distance travelled by an object from a velocity time graph • Define terminal velocity • Explain why falling objects have different terminal velocities • Describe the 3 Newton's law of motion • Calculate force, acceleration and mass accurately using the given formulae. • HT-defined inertia • Write up required practical activity 19: investigate the effect of varying the force on the acceleration of an object of constant mass, and the effect of varying the mass of an object on the acceleration produced by a constant force. • Explain how speed and reaction time affect stopping distance. • HT- define momentum • HT- calculate momentum • HT- Applied the conservation of momentum to collisions and explosions		

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	Interpret data to make qualitative predictions of the effect B2 Ecology: • Defined an ecosystem • Definition of abiotic and biotic factors with listed examples • Described what plant and animals compete for • Interpreted information from charts, graphs and tables relating to the effect of abiotic and biotic factors on organisms within a community • Defined 3 types of adaptations and identified this of pictures of different organisms • Defined an extremophile and stated examples of an extreme habitat • A labelled image of the carbon cycle. Described and explained how combustion, photosynthesis, respiration and decomposition affects the cycle. • 6 mark question describing the carbon cycle • Write up required practical 7: measure the population size of a common species in a habitat. Use sampling techniques to investigate the effect of a factor on the distribution of this species. • Defined biodiversity • Described how humans have reduced biodiversity • Described and explained examples of programmes to reduce the negative impact of humans on biodiversity.	relationship between force and extension for a spring.				