Science Curriculum Map

Year 7						
Learning Period	**Autumn 1**	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
Discipline	**Chemistry**	**Chemistry**	**Physics**	**Physics**	**Biology**	**Biology**
Topic title	Particles	Types of Reaction	Forces Space	Energy	Interdependence Cells	Reproduction Variation
Key questions	1. What are substances? 2. What gives substances their properties?	1. What gives substances their properties? 2. What is chemical change?	1. Why do things move and change? 2. Where are we in space?	1. Why do things move and change? 2. How does information and energy spread?	1. Why do organisms depend on each other and their environment? 2. What are living things made of?	1. How do organisms grow and reproduce? 2. Why are living things so diverse?
Substantive Knowledge	- What Scientists need to know to follow the Scientific method. - How Scientists present data and conclusions. - The particle model as an explanation of the properties of the states of matter. - Application of the particle model in plants. - How Scientists classify and represent substances.	- How Chemists classify changes. - The formation of solutions. - The different methods for separating different classes of mixtures. - The nature of and the reactions between acids and alkalis. - The periodic table of elements and its development. - Modifying the properties of materials.	- How forces are classified. - How forces work together and against each other. - The effect of forces on the motion of objects. - The benefits and disadvantages of drag. - Calculating and representing motion. - Forces deforming and turning objects. - Our place in the Universe.	- Storing and transferring energy. - Identifying, describing, and calculating both useful and wasteful energy transfers. - Reducing unwanted energy transfers. - The advantages and disadvantages of providing energy to our homes.	- Recognising and classifying living organisms. - The interaction and interdependence between organisms. - Ecological investigation of abundance. - Observing, describing, and explaining microscopic organisms. - How complex organisms are structured, from the micro to the macro scale.	- Reproduction in humans. - Reproduction in plants. - Ecological investigation of plant reproduction. - Understanding our genetics. - Explaining reproduction outcomes. - The evolution of species driven by natural selection and artificial selection. - The vulnerability and variety of species.
Disciplinary Knowledge	- Introduce accuracy, precision, repeatability, reproducibility - Evaluation of risks and laboratory skills Introduction of variables - Apply mathematical concepts - Present data using appropriate methods Interpret observations and data and draw conclusions - Understand use of chemical nomenclature	- Present data using appropriate methods Interpret observations and data and draw conclusions - Ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge and experience. - Identify further questions arising from their results.	- Changing scientific theories - Identifying types of variables - Use a range of methods to carry out investigations - Apply mathematical concepts - Present data using appropriate methods - Interpret observations and data, drawing appropriate conclusions - Evaluate data showing awareness of sources of error - Understand use of SI units	- Apply mathematical concepts - Present data using appropriate methods - Interpret observations and data and draw conclusions - Understand use of SI units - Use basic data analysis - Skills/working scientifically: - Apply sampling techniques - Apply mathematical concepts - Understand use of SI units - Ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge, and experience.	- Introduce biological concepts of organisms and the environment - Skills/working scientifically: - Apply sampling techniques - Changing scientific theories - Use basic data analysis and presentation	- Changing scientific theories - Identifying types of variables - Use a range of methods to carry out investigations - Apply mathematical concepts - Present data using appropriate methods - Interpret observations and data and draw conclusions - Evaluate data showing awareness of sources of error - Understand use of SI units
Lesson Sequence	1. Variables 2. Accuracy 3. Scientific equipment: Hazards and risks 4. Following a method 5. Drawing graphs 6. Maths in Science 7. States of matter 8. Changes of state 9. Melting and Boiling points 10. Expansion and contraction (EXT) 11. Particle model – states of matter 12. Brownian motion (EXT) 13. Particle model- advantages and disadvantages (EXT) 14. Diffusion, osmosis, active transport 15. Atoms and elements 16. Compounds and mixtures 17. Symbols and formulae 18. Structure of an atom	1. Physical and Chemical reactions 2. Pure substances and solubility 3. Rates of dissolving (Practical) 4. Filtration (Practical) 5. Crystallisation (linking to evaporation) (Practical) 6. Simple Distillation (Demonstration) 7. Chromatography (Practical) 8. Acids and Alkalis 9. Indicators (Practical) 10. Neutralisation (Practical) 11. The periodic table – structure 12. History of the periodic table 13. Metals and non-metals 14. Alloys (EXT) 15. Ceramics, Polymers, Composite	1. Identifying forces – contact vs non-contact 2. Balanced and unbalanced forces 3. Resultant force 4. Newton's Laws (EXT) 5. Friction- advantages and disadvantage 6. Streamlining- everyday examples and linked to particles (EXT) (Practical) 7. Speed calculations 8. Distance- time graph 9. Velocity-time graph 10. Hooke's Law- (Practical) 11. Moments 12. Gravity, weight and mass 13. Solar system 14. Day and night 15. Seasons 16. Galaxies and universe 17. Light year	1. Energy Stores 2. Energy transfers 3. Useful and wasted energy 4. Sankey diagrams (EXT) 5. Efficiency calculations 6. Energy in food 7. Heating and thermal equilibrium 8. Conduction, convection and radiation (Practical) 9. Preventing heat loss- practical skills 10. The National Grid 11. Renewable and non-renewable 12. Generating electricity from renewable and non-renewable sources 13. Renewables- advantages and disadvantages 14. Nuclear energy 15. Calculations: power and energy costs	1. Living things: MRS NERG 2. 5 Kingdoms and classes 3. Classification and keys 4. Food chains 5. Food webs 6. Pyramids of numbers 7. Pyramids of biomass (EXT) 8. Environment and habitats 9. Competition 10. Sampling techniques (EXT) (Practical) 11. Microscopes 12. Animal cells (Practical) 13. Plant cells (Practical 14. Microscope calculations (EXT) 15. Prokaryotic vs eukaryotic 16. Specialised cells 17. Stem cells 18. Cells, tissues, organs, systems	1. Male and female reproductive organs in humans and plants 2. Gametes – humans and plants 3. Fertilisation in humans 4. Pregnancy and gestation 5. Effect of maternal lifestyle 6. Menstrual cycle 7. Pollination and seed dispersal 8. Quantitative investigations of dispersal mechanisms 9. Genetic and environmental variation 10. Genetic cross diagrams (EXT) 11. Genetic diseases and sexual determination (EXT) 12. Variation 13. Adaptation 14. Natural Selection 15. Selective Breeding 16. Endangered species and extinction 17. Biodiversity 18. Extremophiles (EXT)
Assessment		Year 7 Chemistry Assessment		Year 7 Physics Assessment		End of Year 7 Assessment

Science Curriculum Map

Year 8						
Learning Period	**Autumn 1**	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
Discipline	**Physics**	**Physics**	**Chemistry**	**Chemistry**	**Biology**	**Biology**
Topic title	Pressure and Waves	Electricity and Magnetism	Chemical Reactions	Reactions and the Environment	Energy from Food	Keeping Healthy
Key questions	1. What is matter? 2. Why and how do things move? 3. How does energy spread?	1. What is matter? 2. What is electricity and magnetism? 3. How does information spread?	1. What are substances? 2. What gives substances their properties? 3. What is chemical change?	1. What is chemical change? 2. What is the Earth made of and how is it changing? 3. How does chemistry affect the Earth?	1. What are living things made of? 2. What keeps organisms healthy?	1. What are living things made of? 2. What keeps organisms healthy?
Substantive Knowledge	- The particle model of matter - The nature of waves and examples of waves, including sound and the electromagnetic spectrum. - How light interacts with materials. - Pressure on solids and in fluids	- Materials as conductors or insulators - Representing electric circuits - Constructing electric circuits - Measurements in electric circuits - The relationship between current, potential difference and resistance - The link between electricity and magnetism	- The modern atomic model - Elements of the periodic table - Representing elements and compounds using formulae - Energy changes in reactions - Tests for common gases - The reaction between common acids and metals, metal oxides, metal hydroxides, and metal carbonates - Combustion is a reaction between fuel and oxygen that forms carbon dioxide and water - Representing chemical change in word and chemical form - The law of conservation of mass.	- Reactivity governing chemical reactions and the extraction of metals from rocks - The role of catalysts in reactions - The composition and structure of our planet including how Earth's atmosphere developed over time - How humans are affecting our planets atmosphere and its impact - Some resources are finite and recycling is one way of slowing down our use of these resources.	- Food and nutrition - How our bodies gain nutrients through digestion including the role of major organs and enzymes - Plants as the foundation for life on this planet - The process of photosynthesis - How plants are specialised for photosynthesis - Iodine is a reagent used to test for starch	- How our bodies acquire oxygen for respiration through the processes of breathing and gas exchange - How the alveoli is adapted for gas exchange - How oxygen and glucose is delivered around the body by the heart through the circulatory system - Structure and function of the skeletal and muscular system - Aerobic & anaerobic respiration - The relationship between demand for energy and activity - Communicable and non-communicable diseases including examples - How antibiotics treat bacterial infections - Bodies defence against disease including specific and non-specific defences - How vaccinations prevent disease and therefore spread of disease in population. - Impact of drugs & lifestyle choices on health.
Disciplinary Knowledge	- Apply mathematical concepts - Present data using appropriate methods - Interpret observations and data and draw conclusions - Understand use of SI units	- Apply mathematical concepts - Changing scientific theories - Understand use of SI units - Present data using appropriate methods - Interpret observations and data and draw conclusions - Ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge, and experience. - Evaluate risks - Make predictions using scientific knowledge and understanding	- Understand that scientific methods and theories develop as earlier explanations are - modified to take account of new evidence and ideas, together with the importance of - publishing results and peer review Understand use of chemical nomenclature - Present data using appropriate methods - Interpret observations and data and draw conclusions - Identify further questions arising from their results.	- Accuracy, prevision, repeatability, reliability - Evaluation of risks - Making scientific predictions - Carry out scientific enquires to test predictions - Types of variables - Use basic data analysis - Use appropriate techniques, apparatus, and materials during fieldwork and laboratory - work, paying attention to health and safety	- Changing scientific theories - Present data using appropriate methods - Interpret observations and data and draw conclusions - Evaluate data showing awareness of sources of error - Use appropriate techniques, apparatus, and materials during fieldwork and laboratory - work, paying attention to health and safety	- Apply mathematical concepts - Present data using appropriate methods - Interpret observations and data and draw conclusions - Understand use of SI units - Identify further questions arising from their results
Lesson Sequence	1. Particle model and states of matter 2. Pressure over area 3. Pressure (in liquids) 4. Pressure (in gases) 5. Transverse and longitudinal Waves 6. Producing sounds 7. How sound travels 8. Hearing sounds 9. Using sound (EXT) 10. Electromagnetic Spectrum 11. Introduction to light 12. Comparing sound & light waves 13. Wave Calculations 14. Reflection (Theory) 15. Reflection (Practical) 16. Refraction (Theory) 17. Refraction (Practical) 18. Seeing colour (EXT)	1. Conductors and Insulators (Theory) 2. Conductors and Insulators (Practical) 3. Electrical circuits 4. Series and Parallel Circuits 5. Current 6. Current in Series & Parallel (Practical) 7. Potential difference 8. Measuring potential difference (Practical) 9. Resistance in Circuits 10. Power in Circuits 11. Static electricity 12. Magnets 13. Magnetic Fields 14. Electromagnets 15. Making Electromagnets (Practical) 16. Uses of Electromagnets	1. Atomic Structure 2. Electronic Configuration 3. Ar and Mr (EXT) 4. Alkali metals (group 1) 5. Halogens (Group 7) 6. Noble Gases (Group 0) 7. Reactivity of Group 1 and 7 (EXT) 8. Naming compounds (EXT) 9. Writing formulae (EXT) 10. Exothermic and endothermic reactions 11. Testing for gases 12. Metals and oxygen (Practical) 13. Metals and acid reactions (Practical) 14. Acids and hydroxides 15. Acids and carbonates (Practical) 16. Combustion (Demonstration) 17. Word and symbol equations 18. Balancing equations 19. Conservation of mass	1. The Reactivity series (Practical) 2. Displacement reactions 3. Extracting metals 4. Rates of reaction (EXT) 5. Thermal decomposition and catalysts (Practical) 6. Composition of the Earth 7. Structure of the Earth 8. The Rock Cycle 9. Igneous rocks 10. Sedimentary rocks 11. Metamorphic rocks (Practical) 12. Fossil fuel formation 13. The Earth's Atmosphere 14. The carbon cycle 15. Climate change and the greenhouse effect 16. Finite resources and recycling	1. Food groups 2. Balanced and unbalanced diets 3. Energy in food (Practical) 4. Tissues and organs of the digestive system (Demonstration) 5. Digestion 6. Absorption – diffusion, active transport, osmosis (EXT) 7. Enzymes in the digestive system 8. Photosynthesis 9. Investigating Photosynthesis (Practical) 10. Leaf adaptations – Gas exchange 11. Root adaptation - Absorption of water 12. Transpiration/translocation (EXT) (Practical) 13. Testing for starch (Practical)	1. Sub cellular structures (recap) 2. Cells, tissues, organs and systems 3. The lungs (Demonstration) 4. Breathing 5. Gas exchange 6. The heart and blood (Demonstration) 7. The circulatory system 8. The skeletal & muscular system 9. Aerobic respiration 10. Anaerobic respiration 11. Exercise and respiration (Practical) 12. Communicable vs non communicable diseases 13. Microorganisms 14. Pathogens 15. Antibiotics 16. Human defences 17. Vaccination 18. Drugs & lifestyle choices
Assessment		Year 8 Physics Assessment		Year 8 Chemistry Assessment		End of Year 8 Assessment

Science Curriculum Map

Year 9

Learning Period	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Discipline	**Chemistry**	**Chemistry**	**Physics**	**Physics**	**Biology**	**Biology**
Topic	Chemistry Fundamentals	Investigative Chemistry	Energy & Waves	Forces	Cell Biology	Communicable Diseases
Key questions	1. What are substances? 2. What gives substances their properties?	1. What gives substances their properties? 2. What is chemical change?	1. Why do things move and change? 2. How does information and energy spread?	1. Why do things move and change?	1. What are living things made of? 2. How do organisms grow and reproduce?	1. What keeps organisms healthy?
Substantive Knowledge	- Representing the structure of matter and how substances change state - Difference between pure and impure substances - Difference between an element, mixture, and a compound - Separating mixtures to produce useful substances including crystallisation, distillation, filtration, and chromatography. - The development of the model of the atom over time - The nuclear model of an atom - That atoms can exist as different isotopes - The structure of the periodic table - The trends in properties of group 1, 7 and 0 - How Scientists can determine the identify of various gases.	- The bonding between atoms. Including ionic, covalent, and metallic bonds - Properties of ionic compounds - Properties of simple covalent molecules - Properties of giant covalent structures - Properties of metallic substances - Representing chemical change in word and chemical form. - Common metal reactions with oxygen, common acids, water, hydroxide, and carbonates - That neutralisation produces a salt and water. - Method scientists can use to produce pure, dry soluble salts.	- Energy stores and transfers - Law of conservation of energy - Comparing energy transfers - That energy is transferred when work is done - Resources humans use to produce energy for consumption including their advantages and disadvantages. - The types of wave motion - Calculating the properties of waves. - Investigating how light interacts with transparent materials.	- How forces are classified. - How forces work together and against each other including calculating the resultant force acting on an object. - The effect of forces on the motion of objects. - Objects falling reach terminal velocity - Calculating and representing motion. - Newton's Laws of Motion - Factors that affect the stopping distance of a vehicle	- Differences and similarities between animal, plant and bacterial cells including categorising them as eukaryotic or prokaryotic - How cells can be specialised for a function including examples in plants and animals - Organisation of an organism - Using microscopes to study microscopic organisms including light and electron microscopes - The role of DNA in organisms - How organisms produce new cells for growth and repair through the process of mitosis - Role of stem cells and process of specialisation - Use of stem cells in medical treatment - Process of asexual and sexual reproduction and the advantages and disadvantages of each.	- Types and examples of communicable diseases - How bacterial and viral infections make animals feel ill - How our bodies respond to communicable diseases including barrier and immune responses - How vaccinations work and prevent illness - The source and use of different medical drugs including examples - Process of antibiotic resistance and how humans can slow the spread of resistance
Disciplinary Knowledge	- Calculate the number of protons, - neutrons and electrons for different elements - Naming apparatus - Selecting appropriate apparatus - Explaining why certain apparatus is used - Accuracy (comparison to true value) - Select the best hypothesis based on results - That scientific theories develop over time due to experimental discoveries - Apply mathematical concepts and calculate results - Use and derive simple equations and carry out appropriate calculations - Understand and use SI units and IUPAC (International Union of Pure and Applied Chemistry) chemical nomenclature	- Writing a method - Reproducibility and repeatability - Following a given method - Following a given risk assessment - Writing a risk assessment (hazards, risks, precautions) - Explaining properties of types of bonding - Reproducibility and repeatability	- Independent, dependent and control variables - Explaining differences between waves - Stating the resolution - Using a manual or digital scale - Explaining why certain apparatus is used - Bar chart - Understand and use SI units and IUPAC (International Union of Pure and Applied Chemistry) chemical nomenclature - Use and derive simple equations and carry out appropriate calculations	- Using a manual or digital scale - Stating the resolution - Explaining why certain apparatus is used - Sketch graph - Using a manual or digital scale - Making predictions from data - Ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge and experience. - Identify further questions arising from their results. - Use and derive simple equations and carry out appropriate calculations - Present observations and data using appropriate methods, including tables and graphs	- Use appropriate techniques, apparatus, and materials during fieldwork and laboratory - work, paying attention to health and safety - Select, plan and carry out the most appropriate types of scientific enquiries to test predictions. - Calculate uncertainty - Creating own hypothesis - Making scientific drawings - Explaining why certain apparatus is used - Understand and use SI units and IUPAC (International Union of Pure and Applied Chemistry) chemical nomenclature - Use and derive simple equations and carry out appropriate calculations	- Present observations and data using appropriate methods, including tables and graphs - Plot and interpret scatter graphs - Analyse data from frequency tables and histograms - Using a given result table - Undertake basic data analysis including simple statistical techniques. - Identifying further questions arising from their results
Lesson Sequence	1. Changing states of matter 2. Atoms and elements 3. Compounds and formulae 4. Pure substances and solutions 5. Separation techniques 6. RP: Chromatography 7. Changing Atomic Theories 8. Protons, Neutrons and Electrons 9. Electron configuration 10. Isotopes and relative atomic mass 11. The periodic table 12. The modern periodic table 13. Alkali metals 14. Halogens 15. Noble Gases 16. Gas Tests (demonstration)	1. Ionic bonding part 1 2. Ionic bonding part 2 3. Properties of ionic bonding 4. Covalent bonding 5. Properties of covalent structures 6. Giant covalent structures 7. Metallic Bonding 8. Comparing and contrasting types of bonding 9. Word and symbol equations 10. Balancing equations 11. Conservation of mass 12. Metals and oxygen 13. Metals and acid 14. Metals and water 15. Acids and bases 16. Neutralisation 17. RP: Soluble Salts	1. Energy Stores and Transfers 2. Open and closed systems 3. Insulation 4. Non-renewable resources 5. Renewable resources 6. Comparison of energy resources 7. Work done 8. Power 9. Efficiency calculations 10. Gravitational potential energy 11. Kinetic energy 12. Elastic potential energy 13. Conservation of Energy (Higher only) 14. Transverse Waves 15. Longitudinal Waves 16. Wave equation 17. Calculating period of a Wave 18. Refraction of Light	1. Scalar and vector quantities 2. Types of forces 3. Weight 4. Resultant forces 5. Vector diagrams 6. Speed and velocity 7. Distance time graphs 8. Acceleration and deceleration 9. Velocity time graphs 10. Terminal Velocity 11. Newton's First Law 12. Newton's Second law 13. Investigate Newton's Second Law of motion (R. Practical) 14. Newton's third law 15. Stopping distances 16. Factors that Effect Thinking Distance	1. Types of cells 2. Specialised cells 3. Tissues, organs, and systems 4. Introducing microscopes 5. RP: Using Microscopes 6. Types of microscopes 7. DNA 8. The Human Genome 9. The Cell Cycle 10. Mitosis 11. Incredible stem cells 12. Therapeutic cloning 13. Asexual reproduction 14. Sexual Reproduction	1. Viral diseases 2. Bacterial diseases 3. Fungal and protists 4. Our barriers to diseases 5. The immune system 6. Vaccinations 7. Medicines 8. Antibiotic resistance 9. Developing new drugs (part 1) 10. Developing new drugs (part 2) 11. Scatter Graphs and Health 12. Frequency tables and histograms 13. Analysis data
Assessment		Year 9 Chemistry Assessment		Year 9 Physics Assessment		End of Year 9 Assessment

Science Curriculum Map

Year 10						
Learning Period	**Autumn 1**	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
Discipline	**Biology**	**Biology**	**Physics**	**Physics**	**Chemistry**	**Chemistry**
Topic	Human Biology	Plant Biology	Nuclear & Thermal Physics	Electricity	Reacting Substances	Humans & The Earth
Our Big Questions in Science	1. What are living things made of? 2. What keeps organisms healthy?	1. Why do organisms depend on each other and their environment? 2. What are living things made of? 3. What keeps plants healthy?	1. What is matter? 2. How does energy spread?	1. What is electricity? 2. How is energy transferred?	1. What are substances? 2. What is chemical change?	1. How does chemistry affect the earth? 2. What is the earth made of and how is it changing?
Substantive knowledge	- How animal, plant, and bacterial cells release energy for life processes. - Respiration without oxygen in animals and plants/yeast. - Anatomy and physiology of human organs including those in the digestive, circulatory, and respiratory systems. - The role of specific enzymes in digestion - How cells, tissues, organs, and organ systems are adapted for their function. - The mechanical process of breathing - The process of diffusion and its links to gas exchange. - The composition of the blood and the structural adaptations of blood vessels. - The impact of coronary heart disease (CHD), and other non-communicable diseases, on health. - What is cancer and how does it impact health. - The function of enzymes and how conditions affect their function. - That difference reagents are used to test food products for presence of food groups. - Metabolism and examples of reactions that both build and break down molecules.	- The interaction between organisms, and the environment. - Energy transfers between organisms within an ecosystem. - The relationship between predator and prey in a stable community. - Techniques used to sample the distribution and abundance of species within an ecosystem. - The structure of a plant and how it is adapted to carry out specific functions. - How plants make their own food through photosynthesis - The processes that move water, mineral ions and glucose through a plant. - Abiotic and biotic factors that affect a plants ability to photosynthesise. - How carbon and water is cycled through the environment	- Energy can transferred by waves without the presence of particles. - The features of the electromagnetic spectrum. - The properties and uses of waves that constitute the electromagnetic spectrum. - That different surfaces emit different levels of IR radiation - How light is refracted through different mediums - The structure of the current model of an atom and how the theories relating to the model of the atom have developed over time. - Types of radioactive decay and their properties. - Writing equations that illustrate radioactive decay - The difference between irradiation and contamination. - Using the particle model to understand density, changes of state and pressure. - The structure of metals and nonmetals and their associated properties. - The structure and function of alloys - Energy changes during changes of state, heating, and cooling. - The role of temperature and volume in gas pressure	- Knowledge of appropriate symbols to illustrate circuit components. - Understanding of current, charge, potential difference, and resistance in relation to electricity. - The rule for current in series and parallel circuits. - The rule for potential difference in series and parallel circuits. - Ohms law and the components that it is applicable to. - The rule for resistance in series and parallel circuits. - The IV characteristics of different components. - Difference between alternating and direct current. - How electricity is transported across the national grid efficiently and how it safely enters our homes. - The components within a plug and how this allows for their safe operation. - That the total energy transferred to an appliance depends on how long the appliance is on for and its power. - The construction and use of electromagnets.	- The difference between exothermic and endothermic reactions and how this can be illustrated with a reaction profile diagram. - That bond breaking and bond forming occur in all reactions. - Methods to measure the rate of a reaction - Factors that determine the rate at which reactions progress. - The mole as a measure of concentration and using this value to determine the limiting reactants in a chemical reaction. - How catalysts increase the rate of a reaction. - Certain reactions are reversible and will reach a point of equilibrium. - Knowledge of Le Chatelier's principles. - Writing word equations to illustrate the reactants and products - The law of conservation of mass and the relationship with balanced equations. - Determining the relative formula mass of a compound. - Calculating the mass produced in a reaction from knowledge of reactants and vice versa. - That concentration is a measure of the mass of a substance in a certain volume of a solution.	- The composition of earth's atmosphere compared to its early atmosphere. - How the earth's atmosphere has changed over time. - The greenhouse effect and its association with global warming. - Methods of reducing our carbon footprint. - Utilisation of global resources by humans and their impact on the environment. - The harmful effects of combustion. - That elements can be placed into a reactivity series and knowledge of this is used to displace other elements from their compounds. - Writing ionic half equations for displacement reactions. - The electrolysis of molten and aqueous compounds. - Reusing, reducing and recycling resources helps to prevent finite natural resources running out. - Generating potable water from both fresh and saline water sources. - Treatment of waste water and sewage. - The process of phytomining and bioleaching as an extraction method. - The impact of resources can be assessed using a life cycle assessment.
Disciplinary Knowledge	- Use good scientific vocabulary to clearly articulate scientific concepts. - Use a variety of models and diagrams to assist in the formulation of clear and concise explanations of core scientific concepts. - Use scientific theory and explanations to develop an accurate hypothesis. - Identify during experimental procedure the variables that are being changed, measured, and kept constant. - Carry out experiments with due regard for the correct use of apparatus and the health and safety considerations associated with this. - Plan an experiment to make observations and be able to characterise a substance. - Apply knowledge of suitable apparatus and material use to carry out	- Use good scientific vocabulary to clearly articulate scientific concepts. - Use a variety of models and diagrams to assist in the formulation of clear and concise explanations of core scientific concepts. - Recognise when to apply a knowledge of sampling techniques to ensure that samples collected are representative. - Describe a practical procedure that uses observations to lead to a valid outcome. - Evaluate methods used to obtain data and make suggestions for their improvement in further investigations.	- Use good scientific vocabulary to clearly articulate scientific concepts. - Use a variety of models and diagrams to assist in the formulation of clear and concise explanations of core scientific concepts. - Understand how scientific theory changes and develop over time. - Explain how experimental data can lead to changes in models or theories. - Evaluate whether data supports or limits scientific theory. - Using models to illustrate scientific concepts - Interpreting graphs. - Evaluating the risks in practical science and applying it to the wider scientific context.	- Use good scientific vocabulary to clearly articulate scientific concepts - Carry out and represent mathematical and statistical analysis. - Recognise the importance of scientific quantities and understand how they are determined. - Use appropriate units during mathematical calculations. - Understand the meaning of prefixes in scientific units and utilise this knowledge to confidently convert between units in a variety of scientific contexts. - Present calculated values to an appropriate number of significant figures. - Use electrical equipment to test scientific hypotheses.	- Use good scientific vocabulary to clearly articulate scientific concepts - Apply a knowledge of a range of techniques and instruments that can be used to gather data and use these to make observable measurements. - Evaluate data in terms of its accuracy, precision, repeatability, and reproducibility. - Identify in experimental method potential sources of random and systematic error. - Drawing graphs - Carry out and represent mathematical and statistical analysis. - Use appropriate units during mathematical calculations. - Understand the meaning of prefixes in scientific units and utilise this knowledge to confidently convert between units in a variety of scientific contexts.	- Use good scientific vocabulary to clearly articulate scientific concepts. - Understand how scientific theory changes and develop over time. - Explain how science is applied to the context of everyday life and evaluate the personal, social, economic, and environmental impact of this. - Describe the impact of humans on the environment and evaluate methods used to counteract this effect. - Recognise the important of scientific results being peer reviewed and understand the impact of non-peer reviewed science on the target audience. - Interpret and analyse trends in data and use this to draw conclusions.

Science Curriculum Map

	- Use good technique and safety precautions to dissect organs.				- Present calculated values to an appropriate number of significant figures.	
Lesson Sequence	1. Types of Cells (Recap) 2. Aerobic respiration 3. Anaerobic respiration 4. The lungs & Ventilation 5. Diffusion 6. Gas Exchange 7. Diffusion & Surface Area 8. Diffusion in Action 9. Fermentation 10. The Heart – Theory 11. The Heart – Dissection 12. Blood Flow & Heart Rate 13. Composition of blood 14. Coronary Heart Disease (CHD) 15. Non Communicable Diseases 16. Cancer 17. Disease Data 18. The Digestive System 19. Enzymes 20. Enzymes in Digestion 21. Optimal Conditions for Enzymes 22. RP – Testing for Food Groups (1) 23. RP – Testing for Food Groups (2) 24. RP – pH & Enzymes (1) 25. RP – pH & Enzymes (2) 26. Rates of Reaction in the Body	1. Food webs 2. Ecosystems 3. Predator Prey 4. Sampling techniques 5. RP - Quadrats 6. Plant Cells, Tissues, and Organs 7. Structure of a Leaf 8. Osmosis 9. Osmosis in Action 10. RP – Osmosis (1) 11. RP – Osmosis (2) 12. Active Transport 13. Transpiration 14. Transpiration Experiments 15. Translocation 16. Photosynthesis 17. Limiting Factors 18. RP – Factors Affecting Photosynthesis (1) 19. RP – Factors Affecting Photosynthesis (2) 20. Using Glucose & Nitrogen in Plants 21. Carbon Cycle 22. Water Cycle	1. Types of Electromagnetic Waves 2. Properties & Uses of EM waves 3. RP – Investigating IR Radiation 4. Refraction of Light 5. Atoms (Recap) 6. Changing Atomic Theories 7. Physics of Atoms 8. Introducing Radioactive Decay 9. Types of Radioactive Decay 10. Decay Equations 11. Half Life 12. Modelling Radioactive Decay 13. Irradiation & Contamination 14. Particle Model – Density & States 15. RP – Calculating Density 16. Changes of State 17. Metals and Non Metals 18. Uses of Metals 19. Alloys 20. Heating & Cooling Graphs 21. Latent Heat 22. Specific Heat Capacity 23. Comparing SHC & SLH (HT only) 24. Pressure in Gases	1. Circuit Symbols & Drawing Circuits 2. Calculating Current & Charge Flow 3. Series & Parallel – Current 4. Series & Parallel – Potential Difference 5. Ohms Law 6. Resistance in Series & Parallel 7. RP – Resistance in lengths of wire (1) 8. RP – Resistance in lengths of wire (2) 9. Thermistors 10. RP – IV Characteristics (1) 11. RP – IV Characteristics (1) 12. Mains Electricity (AC & DC) 13. Plugs 14. Calculating Power (P=IV & P=I2R) 15. Calculating Energy Transferred 16. Equations Practice (optional) 17. Electromagnets (Recap) 18. National Grid & Transformers	1. Acids & Bases 2. Strong & Weak Acids (HT) 3. Exothermic & Endothermic Reactions 4. RP – Temperature Changes (1) 5. RP – Temperature Changes (2) 6. Reaction Profiles 7. Bond Energy (HT only) 8. Measuring the Rate of Reaction 9. Factors Affecting Rates of Reaction 10. Introducing Moles 11. Limiting Reactants (HT only) 12. Drawing Rates of Reaction Graphs 13. RP – Investigating Effect of Concentration on the ROR (1) 14. RP – Investigating Effect of Concentration on the ROR (2) 15. Catalysts 16. Reversible Reactions 17. Chatelier Principles (HT only) 18. Word Equations and Conservation of Mass 19. Relative Formula Mass 20. Reacting Masses (HT only) 21. Concentration	1. Resources used by humans 2. Reactivity series and displacement reactions (Practical) 3. Ionic half equations for displacement (Higher only) 4. Reactivity series and extraction methods 5. REDOX reactions 6. Electrolysis of molten compounds (ionic half equations - higher only) 7. Electrolysis of aqueous compounds (ionic half equations - higher only) 8. RP - Electrolysis (1) 9. RP - Electrolysis (2) 10. The Early Earth's Atmosphere 11. Theories of the atmosphere 12. The Greenhouse Effect 13. Effects of global warming 14. Reducing our carbon footprint 15. The Harmful Effects of Combustion 16. Sustainable development 17. Potable Water 18. Desalination 19. Evaluating potable water methods 20. RP - Analysing water samples 21. Waste Water 22. Sewage Treatment 23. Phytomining and bioleaching 24. Life Cycle Assessment 25. Reduce, Reuse, Recycle
Assessment		Year 10 Biology Assessment		Year 10 Physics assessment		Summer Mock Exams – Paper 1 only

Science Curriculum Map

Year 11						
Learning Period	**Autumn 1**	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
Discipline	**Chemistry & Biology**	**Biology**	**Physics**	**Physics**	**Chemistry**	**Chemistry**
Topic	Organic Chemistry & Cell Biology	Evolving Organisms	Electricity & Magnetism & Energy & Waves			
Big Ideas in Science	1. How does chemistry affect the Earth? 2. What gives substances their properties? 3. What are living things made of? 4. How do organisms grow and reproduce?	1. Why are living things so diverse? 2. What are living things made of? 3. What keeps organisms healthy?	1. What is electricity and magnetism? 2. How does information and energy spread?			
Key knowledge and concepts	- Bonds form between two non-metal atoms. - The composition and uses of crude oil. - Testing for the presence of alkenes. - How crude oil can be separated into different useful fractions. - The composition and function of polymers. - The role of DNA in biological organisms. - How cells replicate and the stages of the cell cycle. - What are stem cells and how can they be used in therapeutic treatments. - The process od cloning plants - How organisms reproduce by asexual and/or sexual reproduction. - New gametes are formed through the process of meiosis. - The difference between genotype and phenotype and its application when drawing genetic cross diagrams. - Causes and inheritance probability of genetic diseases. - Determining the sex of the offspring from sexual reproduction. - Using family tree diagrams to determine links between parents and offspring. - The process of genetically engineering organisms - The process of selectively breeding organisms for advantageous genotypic and phenotypic traits.	- Organisms are grouped into different classifications. - The theory of evolution by natural selection and how it relies upon variation and random mutations. - The evidence supporting Darwin's Theory of evolution. - The lineage of organisms can be displayed using evolutionary trees. - How fossils are formed and used as evidence for evolution. - The structure and function of the human nervous system. - The difference between a conscious and unconscious decision. - Caffeine as a stimulant that can effect an individuals reaction time. - The regulation of conditions inside the human body. - The structure and function of the human endocrine system. - The role of adrenaline and thyroxine inside the human body. - How the body maintains blood glucose levels. - Causes and treatments of diabetes. - The role of the menstrual cycle and the hormones that control it. - Both hormonal and non-hormonal types of contraception. - The process of IVF and embryonic screening. - Comparing the human nervous and hormonal systems.	- The properties of magnets and the magnetic fields they generate. - Creating and using electromagnets. - Using electromagnets to generate the motor effect. - Using Fleming's left hand rule. - How do DC motors work. - Calculating force using magnetic flux density. - What is inertia, inertial mass and how it can be calculated. - How stopping distances are calculated and the factors that effect it. - How energy is transferred when an object stops. - The concept of momentum. - Describing the relationship between force and extension. - How energy and not matter is transferred using waves. - How to measure wave speed and the period of a wave. - The features of the electromagnetic spectrum. - Uses of Radio waves and Microwaves.		-	
Skills	- Use good scientific vocabulary to clearly articulate scientific concepts. - Use a variety of models and diagrams to assist in the formulation of clear and concise explanations of core scientific concepts. - Considering the ethical limitations and issues associated with science.	- Use good scientific vocabulary to clearly articulate scientific concepts. - Use a variety of models and diagrams to assist in the formulation of clear and concise explanations of core scientific concepts. - Considering the ethical limitations and issues associated with science. - Understand how scientific theory changes and develop over time. - Explain how experimental data can lead to changes in models or theories. - Evaluate whether data supports or limits scientific theory. - Formulate and test hypotheses - Explain the need for control variables within an experimental context.	- Use good scientific vocabulary to clearly articulate scientific concepts - Use a variety of models and diagrams to assist in the formulation of clear and concise explanations of core scientific concepts. - Use an appropriate method to gather data and display results using a graph. - Carry out mathematical equations. - Use appropriate units during mathematical calculations. - Understand the meaning of prefixes in scientific units and utilise this knowledge to confidently convert between units in a variety of scientific contexts. - Present calculated values to an appropriate number of significant figures. - Use specific equipment to demonstrate and prove scientific theory.			

Science Curriculum Map

Lesson Sequence	1. Covalent Bonding (recap) 2. Crude Oil, Alkanes & Alkenes 3. Properties of Hydrocarbons 4. Testing for Alkenes 5. Combustion 6. Fractional Distillation 7. Cracking 8. Polymers 9. DNA 10. Cell Cycle & Mitosis 11. Stem Cells 12. Therapeutic Cloning 13. Asexual Reproduction 14. Sexual Reproduction 15. Meiosis 16. Genotypes & Phenotypes 17. Genetic Cross Diagrams 18. Genetic diseases 19. Sex determination 20. Family trees	1. Classification 2. Variation & Mutation 3. Natural Selection & Evolution 4. Evidence for Evolution 5. Evolutionary trees 6. Fossils 7. Genetic Modification & Engineering 8. Selective Breeding 9. The Nervous System 10. Conscious & Unconscious Decisions 11. RP – Reaction time (1) 12. RP – Reaction time (2) 13. Homeostasis 14. The Endocrine System 15. Adrenaline & Thyroxine (HT) 16. Controlling Blood Glucose 17. Diabetes 18. Puberty and The Menstrual Cycle 19. Hormones of The Menstrual Cycle 20. Contraception 21. IVF 22. Embryo Screening 23. Comparing Hormonal & Nervous System	1. Magnets 2. Magnetic Fields 3. Electromagnets 4. Motor Effect 5. Fleming's Left Hand Rule 6. DC Motors 7. Calculating Force (Magnetic Flux Density) 8. Inertia and Inertial Mass (higher only) 9. Stopping distances 10. Energy transfers in stopping 11. Momentum 1 (HT) 12. Momentum 2 (HT) 13. RP – relationship between force and extension (1) 14. RP – relationship between force and extension (2) 15. Introduction to waves 16. Waves equation 17. Measuring speed of sound 18. Measuring period of a wave 19. RP: Measuring speed of a wave using a ripple tank (1) 20. RP: Measuring speed of a wave using a ripple tank (2) 21. RP: Measuring the speed of a wave using a piece of string. 22. EM spectrum 23. Uses of Radio waves & Microwaves (Recap)	**Interleaved practice and application to different contexts** Address gaps in knowledge and build on links between different topics when applied to a range of scenarios Biology Paper 2 Chemistry Paper 2 Physics Paper 2 Paper 2 Mock Exams	**Interleaved practice and application to different contexts** Address gaps in knowledge and build on links between different topics when applied to a range of scenarios Biology Paper 1 Chemistry Paper 1 Physics Paper 1	
Assessment		Autumn Mock Exams – Paper 1 only	Spring Mock Exams – Paper 2 only		Final GCSE Exams	Final GCSE Exams