

Science Curriculum Map

Year 11 (2022-23)

Learning Period	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Discipline	Physics and Chemistry	Biology	Chemistry	Physics		
Topic	Forces Humans and the Earth	Evolving Organisms	Organic Chemistry	Applications of Electricity and Magnetism	Revision	
Our Big Questions in Science	1. Why do things move and change? 2. What is Chemical change?	1. Why are living things so diverse? 2. What keeps organisms healthy?	What are substances?	1. What is electricity and magnetism? 2. How does information and energy spread?		
Substantive knowledge	<ul style="list-style-type: none"> - A force is a push or a pull that acts on an object due to interactions with other objects. - Objects will remain stationary or moving at a constant speed when resultant forces are zero. - Object direction will change if there is a resultant force acting on an object. - Acceleration of an object is proportional to the resultant force acting on it. - Stopping distance of a vehicle depends on thinking distance and breaking distance. - All moving objects have momentum, the amount depends on their mass and velocity. - In a closed system the momentum before an event is equal to the momentum after an event. - Objects can be cause to rotate by applying a force. - Gears and levers can be used to transmit rotational effects of forces. - Composites are made from two materials. - The Haber Process is used to manufacture ammonia which is used to produce nitrogen-based fertilisers. - Haber process is a reversible reaction. The conditions ammonia is produced at us a trade-off between rate of production and position of equilibrium. 	<ul style="list-style-type: none"> - Characteristics are inherited from parents. - Organisms evolve by natural selection. Individuals with characteristics suitable to the environment are favoured and are passed onto offspring. - Characteristics are inherited through genes. - Fossils provide evidence for evolution. - Fossils are remains of organisms that lived millions of years ago. Extinction occurs when there are no remaining individuals of a species alive. - A variety of factors including climate, volcanic eruptions, and meteorite impacts may have influenced extinction events within Earth's history. - Homeostasis is the regulation of the internal condition of a cell or organism. - Body temperature is monitored and controlled by the thermoregulatory centre in the brain. - Hormones controls the water level in the body 	<ul style="list-style-type: none"> - Three types of chemical bonds (ionic, covalent, metallic) are formed between different elements - Carbon forms a range of compounds, including chains and ring structures. - Crude oil is a finite resource found in rocks, main from the remains of plankton over millions of years. - Crude oil is composed of hydrocarbons, made from hydrogen and carbon atoms. - Alkanes are hydrocarbons with the general formula C_nH_{2n+2}. - Alkenes are hydrocarbons with a double carbon-carbon bond. - Alkenes react with hydrogen, water and halogens by the addition atoms across the carbon-carbon-double bond, becoming a single carbon-carbon bond. - Alcohols contain the OH functional group. - Carboxylic acids have the COOH functional group. - Polymers are made from alkenes by addition polymerisation. - Monomer with two functional groups can be joined through condensation polymerisation and releasing a water molecule. 	<ul style="list-style-type: none"> - Electromagnetics effects are used in a wide variety of devices. - Sound waves can travel through solids causing vibrations - Describe how the ear works to detect sound - Radio waves are produced by oscillations in electrical circuits - Ultra sound and seismic waves can be used to detect different substances and for exploration. - Electric magnets are produced when current flows through a wire and this may produce movement. - A solenoid produces a magnetic field similar to a bar magnet. - A coil of wire carrying a current in a magnetic field, rotates and this is the basis of an electric motor. - The motor effect can be used to convert variations in current in electrical circuits to pressure variations in sound waves. This is how loudspeakers and headphones work. 		
Disciplinary Knowledge	<ul style="list-style-type: none"> - Use good scientific vocabulary to clearly articulate scientific concepts. - Interpreting observations and other data, including patterns and trends making inferences and drawing conclusions. - Manipulating mathematical equations to analyse results - Able to express answers in standard form (HT) - Present calculated values to an appropriate number of significant figures. 	<ul style="list-style-type: none"> - Use good scientific vocabulary to clearly articulate scientific concepts. - Understand how scientific methods and theories develop over time. - Appreciate the power and limitations of science and consider any ethical issues which may arise. 	<ul style="list-style-type: none"> - Use good scientific vocabulary to clearly articulate scientific concepts. - Understand how scientific methods and theories have developed over time. - Use a variety of models and diagrams to assist in the formulation of clear and concise explanations of core scientific concepts. - Describe a practical procedure that uses observations to lead to a valid outcome. - Explain every day and technological applications of sciences, evaluate associated personal, social, economic and environmental implications. 	<ul style="list-style-type: none"> - 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. - Explain every day and technological applications of sciences, evaluate associated personal, social, economic and environmental implications. 		
Lesson Sequence	<ol style="list-style-type: none"> Recap on forces (SS, SHO) Resultant forces recap (SS, SHO) Newton Laws Part 1 (SS, SHO) Newton Laws Part 2 (SS, SHO) Stopping distances recap (SS, SHO) 	<ol style="list-style-type: none"> Evolution revision (SS, SHO) Comparing theories of evolution 1 (SS) Comparing theories of evolution 2 (SS, SHO) 	<ol style="list-style-type: none"> Ionic Bonding recap (SS) Covalent Bonding recap (SS) Metallic Bonding recap (SS) Crude oil recap (SS, SHO) Alkene reactions (SS) 	<ol style="list-style-type: none"> Waves revision (SS, SHO) Radio waves (SS, some HT) Sounds waves (SS) Seismic waves (SS, SHO) Uses of electromagnets (SS) 		

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	6. Momentum Part 1 (SS, HT) 7. Momentum Part 2 (SS, HT) 8. Moments (SS, SHO) 9. Levers and gears (SS, SHO) 10. Ceramics and polymers (SS) 11. Reversible Reactions revision (SS, SHO) 12. The Haber Process (SS) 13. Le Chatelier's Principle and the Haber Process (SS) 14. NPK Fertilisers (SS)	4. Speciation (SS, SHO) 5. Genetic cross diagram recap (SS, SHO) 6. Gregor Mendel (SS) 7. Fossils (SS, SHO) 8. Extinction (SS, SHO) 9. Revision Homeostasis (SS, SHO) 10. Thermoregulation (SS) 11. Controlling water part 1 (SS) 12. Controlling water part 2 (SS)	6. Alcohols (practical), (SS) 7. Making alcohols by fermentation (practical) 8. Carboxylic acids and their reactions (SS) 9. Esters (SS) 10. Polymers Revision (SS, SHO) 11. Addition Polymerisation (SS) 12. Condensation polymerisation (SS) 13. Naturally occurring polymers (SS)	6. The Generator effect (SS) 7. Application of motor effect and generator (SS)		
Assessment & Educational Visit Opportunities		Paper 1 Mocks		Paper 2 Mocks		

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