Year 10 Curriculum Overview

Rationale: The Year 10 curriculum is designed to give students opportunities to develop their confidence and inquisitive thinking through the further exploration of specific modules knowledge in biological systems, chemical reactions, energy and forces. Students will experience a range of practical and research based activities which will help them to deepen their knowledge.

**Science units are taught on a rotation basis between each group*

Term/Length of Time	Outline	Assessment/Teacher Feedback Opportunities	Homework and Literacy resources
B2.2 9 lessons for both combined and triple Science (including assessment and responding to feedback lessons)	<u>The challenges of life:</u> Students should be familiar with the role of diffusion in the movement of materials in and between cells. They should also be familiar with the human gaseous exchange system. When organisms become multicellular, highly adapted structures are needed including gaseous exchange surfaces and transport systems, enabling living processes to be performed effectively. <u>Skills developed:</u> • explain everyday and technological applications of science • presenting observations using appropriate methods • Use ratios, fractions and percentages • Investigating heart structure by dissection • Investigating factors that affect pulse rate	**B2.2** end of topic assessment in the style of exam questions Written and verbal feedback given throughout module through in-class activities and homework.	Homework is set weekly and contains a mixture of simple recall exam-style questions often followed with a more detailed application based exam style question(s). All homework is reviewed with at least one detailed FAR (Feedback, Action, Response) marked by the teacher approximately once every 2 weeks **Optional homework tasks and Literacy resources:** SoL on science shared area, including PowerPoints, details of practical investigations, worksheets, revision resources, a range of AFL (assessment for learning) activities, research based tasks, simple model making, reports, short answer questions, newspaper style write-ups as well as homework.
B3	<u>Coordination and control – the nervous system</u>		

10 lessons for combined and 19 triple Science (including assessment and responding to feedback lessons)	Students should have a concept of the hierarchy of multicellular organisms from cells to tissues to organs to systems to organisms. The human nervous system is an important part of how the body communicates with itself and also receives information from its surroundings. **Understanding the structure of the eye allows us to explain some eye defects.** **Investigating brain function has limitations.** <u>Skills developed:</u> • communicating the scientific rationale for investigations, methods used, findings and reasoned conclusions • explain everyday and technological applications of science • evaluate risks both in practical science and the wider societal context • Investigation of eye structure by dissection • Research into a study of brain injury <u>Coordination and control – the endocrine system</u> Students should be aware of a number of hormones including adrenaline and insulin. Hormones are chemical messengers. In animals, hormones are transported around the body in the blood and affect target tissues and organs. Hormones have a variety of roles in the human body, including controlling reproduction. Plant hormones are chemicals that regulate plant growth and development. They can be used in agriculture to control the rate of growth.	**B3** end of topic assessment in the style of exam questions Written and verbal feedback given throughout module through in-class activities and homework.	The Sciences offer many opportunities to develop and extend students' literacy skills. There is a large amount of new, subject-specific vocabulary, and so each unit includes a PLC (Personnel Learning checklist) which students will engage with throughout the unit. Students will use texts to find out information for themselves, using the functional layout of such texts, including index, contents and glossary sections of text books used in class, and also at home in an online format. Students will also review and connect information within topics. Useful websites: www.bbcbitesize.co.uk www.senecalearning.com https://www.physicsandmathstutor.com/ https://www.footprints-science.co.uk/ https://www.youtube.com/@Freesciencelessons

B4	**Understanding the effects of plant hormones gives commercial use values.** <u>Skills developed:</u> • Construct and interpret frequency tables and diagrams, bar charts and histograms • Translate information between graphical and numeric form • Research into hormonal treatments for infertility <u>Maintaining internal environments</u> Students will build on the knowledge and understanding gained in coordination and control when considering the topics in this section. Homeostasis is crucial to the regulation of internal environments and enables organisms to adapt to change, both internally and externally. **Internal temperature**, blood sugar levels and **osmotic balance are regulated by a number of organs and systems working together**. <u>Skills developed:</u> • use scientific vocabulary, terminology and definitions • translating data from one form to another		

10 lessons for both combined and triple Science (including assessment and responding to feedback lessons) **B5**	Students should be familiar with the idea of a food webs. They should also recognise that organisms affect their environment and are affected by it. Microorganisms play an important role in the continuous cycling of chemicals in ecosystems. Biotic and abiotic factors interact in an ecosystem and have an effect on communities. Living organisms form populations of single species, communities of many species and are part of ecosystems. Living organisms are interdependent and show adaptations to their environment. Feeding relationships reflect the stability of an ecosystem. **The efficiency of biomass through the ecosystem decreases at each stage.** <u>Skills developed:</u> • Use ratios, fractions and percentages • Construct and interpret frequency tables and diagrams, bar charts and histograms • translating data from one form to another <u>Inheritance</u>	**B4** end of topic assessment in the style of exam questions Written and verbal feedback given throughout module through in-class activities and homework.	

12 lessons for combined and 14 for triple Science (including assessment and responding to feedback lessons)	Students should be familiar with the process by which genetic information is passed from one generation to the next. They should recognise a simple model of chromosomes, genes and DNA. Inheritance relies on genetic information being passed from one generation to the next, whether sexually or asexually. The characteristics of a living organism are influenced by genes and its interaction with the environment. **Changes to the genetic information may affect characteristics.** **The understanding of genetics has changed over time.** <u>Skills developed:</u> • understand how scientific methods and theories develop over time • discuss ethical issues arising from developments in science • Use ratios, fractions and percentages • Understand simple probability • Translate information between graphical and numeric form <u>Natural selection and evolution</u>	**B5** end of topic assessment in the style of exam questions Written and verbal feedback given throughout module through in-class activities and homework.	

	Students should appreciate that changes in the environment can leave some individuals, or even some entire species, unable to compete and reproduce leading to extinction. Variations and changes in the environment drive the process of natural selection, leading to changes in the characteristics of populations. Evolution accounts for both biodiversity and how organisms are all related to varying degrees. **Key individuals have played important roles in the development of our understanding of genetics.** <u>Skills developed:</u> • use models to solve problems, make predictions and to develop scientific explanations and understanding of familiar and unfamiliar facts • understand the power and limitations of science • make decisions based on the evaluation of evidence and arguments		

Chemistry C2.2 and 2.3 18 lessons (including assessment and responding to feedback lessons)	<u>Bonding</u> Students should be familiar with a simple electron shell model to explain the basic chemical properties of elements. This also will help students explain chemical reactions in terms of losing, gaining or sharing of electrons, depending on the atom's electronic structure. Students should be familiar with many types of bonding including ionic, covalent and metallic. **Students should be familiar with comparing nano dimensions to typical dimensions of atoms** <u>Skills developed:</u> • Use scientific vocabulary, terminology and definitions • Use models to solve problems, make predictions and to develop scientific explanations • Visualise and represent 2D and 3D forms • Translate information between graphical and numeric form <u>Properties of materials</u>	**C2.2 and 2.3** end of topic assessment in the style of exam questions Written and verbal feedback given throughout module through in-class activities and homework.	Homework is set weekly and contains a mixture of simple recall exam-style questions often followed with a more detailed application based exam style question(s). All homework is reviewed with at least one detailed FAR (Feedback, Action, Response) marked by the teacher approximately once every 2 weeks **Optional homework tasks and Literacy resources:** SoL on science shared area, including PowerPoints, details of practical investigations, worksheets, revision resources, a range of AFL (assessment for learning) activities, research based tasks, simple model making, reports, short answer questions, newspaper style write-ups as well as homework. The Sciences offer many opportunities to develop and extend students' literacy skills. There is a large amount of new, subject-specific vocabulary, and so each unit includes a PLC (Personnel Learning checklist) which students

	Students will explore the physical properties of elements and compounds and how the nature of their bonding is a factor in their properties <u>Skills developed:</u> • Use correct units in calculations • Explain every day and technological applications of science • Carrying out and representing mathematical and statistical analysis • Discuss ethical issues arising from developments in science • Evaluate risks both in practical science and the wider societal context		will engage with throughout the unit. Students will use texts to find out information for themselves, using the functional layout of such texts, including index, contents and glossary sections of text books used in class, and also at home in an online format. Students will also review and connect information within topics. Useful websites: www.bbcbitesize.co.uk www.senecalearning.com https://www.physicsandmathstutor.com/ https://www.footprints-science.co.uk/ https://www.youtube.com/@Freesciencelessons
C3 18 lessons (including assessment and responding to feedback lessons)	<u>Introducing chemical reactions</u> Students should be familiar with writing and analysing chemical equations using chemical symbols and formulae for elements and compounds. Students will describe the overall change in a chemical reaction and how new materials are formed through chemical reactions but mass will be conserved. This can be explained using a model involving the rearrangement of atoms. The amount of a substance can be explained using a scientific term, the mole. <u>Skills developed:</u> • Investigate conservation of mass using practical techniques	**C3** end of topic assessment in the style of exam questions Written and verbal feedback given throughout module through in-class activities and homework.	

	• use scientific vocabulary, terminology and definitions • Recognise and use expressions in decimal form • Use an appropriate number of significant figures <u>Energetics</u> Students should be familiar with the concept that chemical reactions are accompanied by an energy change. A simple model involving the breaking and making of chemical bonds can be used to interpret and calculate the energy change. Students should be familiar with exothermic and endothermic chemical reactions <u>Skills developed:</u> • Carrying out exothermic and endothermic chemical reactions • Calculating energy changes • Interpreting observations and other data • Translating data from one form to another <u>Types of chemical reactions</u> Students should be familiar with chemical reactions including reduction, oxidation, neutralisation, combustion, thermal decomposition and displacement reactions. Students should be familiar with acids and alkalis from Year 7 and will deepen their knowledge and understanding of this area by looking at the reactions of acids. <u>Skills developed:</u>		

	• Using indicators to identify acids and alkalis • Testing for gases • Carrying out acid reactions such as neutralisation • Investigating the production of salts • Use scientific vocabulary, terminology and definitions <u>Electrolysis</u> Students will learn that decomposition of a liquid during the conduction of electricity is a chemical reaction called electrolysis. This section explores the electrolysis of various liquids and solutions <u>Skills developed:</u> • Investigating electrolysis practicals • Writing chemical equations • Apply a knowledge of a range of techniques, equipment and materials to select those appropriate to the experiment		
C4 9 lessons combined 18 lesson triple science (including assessment and responding	<u>Predicting Chemical Reactions</u> Students should be familiar with the periodic table from Year 7-9. The current periodic table was developed based on observations of the similarities and differences in the properties of elements and is arranged into groups and periods. These reveal the trends and patterns in the behaviour, properties and observations of the elements. **Students should be familiar with the properties and reactions of the Transition Metals**	**C4** end of topic assessment in the style of exam questions Written and verbal feedback given throughout module through in-class	

to feedback lessons)	<u>Skills developed:</u> • Interpret observations from reactions of Group 1 and Group 7 elements • **Plan, investigate and analyse transition metals** • Use scientific theories and explanations to develop hypotheses • Analyse observations from experiments to order reactivity of metals <u>Identifying the products of chemical reactions</u> Students should be familiar with classifying substances according to their general physical and chemical properties. This section explores the tests such as the gas tests that can be used to identify the products of reactions by looking at their physical and chemical properties. **Students should be familiar with the chemical tests and observations for negative and positive ions** <u>Skills developed:</u> • **Interpreting data and observations from ion testing to conclude which ions are present** • **Interpreting chemical analysis charts** • **Translate information between graphical and numeric form** • Performing gas tests	activities and homework.	
C5 13 lessons combined	<u>Monitoring and Controlling Chemical Reactions</u>	**C5** end of topic assessment in the	

20 lesson triple science (including assessment and responding to feedback lessons)	Students should be familiar with explaining how the mass of a solute and the volume of the solution is related to the concentration of the solution. **Students should be familiar with the relationship of moles to the concentration of a solution and the volume of a gas. The topic then moves on to look at using equations to make predictions about yield by calculations and to calculate atom economy. Students will learn how to perform titrations experiments in order to work out the unknown concentration of a substance.** <u>Skills developed:</u> • Use ratios, fractions and percentages • Recognise and use expressions in decimal form • **Making standard solutions** • **Recognise and use expressions in standard form** • **Perform titration experiments** • **Calculate unknown concentrations from experimental data** • **Use an appropriate number of significant figures** • **Find arithmetic means** • Change the subject of an equation <u>Controlling reactions</u> Students should be familiar with the rate and yield of a chemical reaction being altered by changing the physical	style of exam questions Written and verbal feedback given throughout module through in-class activities and homework.	

	conditions including temperature, concentration, surface area and the use of a catalyst <u>Skills</u> • Conducting rates of reaction experiments to gather and analyse rate data • Determining how physical factors effect of rate of reaction • Interpreting rate of reaction graphs • Draw and use the slope of a tangent to a curve as a measure of rate of change <u>Equilibria</u> Students should be familiar with reversible reactions and conditions that affect how balanced these reactions are. Students should be familiar with representing chemical reactions using formulae and using equations. <u>Skills</u> • Predicting the effect of changing conditions on a chemical reaction • Use scientific vocabulary, terminology and definitions • Use scientific theories and explanations to develop hypotheses		
P2 20 lessons combined	<u>Motion</u> Pupils have studied forces and motion in year 7 and 8. Having looked at the nature of matter which makes up objects in year 9, we move on to consider the effects of	**P2** end of topic assessment in the style of exam questions	Homework is set weekly and contains a mixture of simple recall exam-style questions often followed with a more detailed application based exam style question(s).

24 lesson triple science (including assessment and responding to feedback lessons)	forces. Some of the interactions involve contact between the objects, others involve no contact. We will also consider the importance of the direction in which forces act to allow understanding of the importance of vector quantities when trying to predict the action. <u>Skills</u> • use models to solve problems, make predictions and to develop scientific explanations and understanding of familiar and unfamiliar facts • evaluate methods and suggest possible improvements and further investigations • carry out experiments into motion • communicating the scientific rationale for investigations, methods used, findings and reasoned conclusions • Investigate acceleration of a trolley down a <u>Newton's Laws</u> Newton's laws of motion essentially define the means by which motion changes and the relationship between these changes in motion with force and mass. <u>Skills</u> • use scientific theories and explanations to develop hypotheses • apply a knowledge of a range of techniques, instruments, apparatus, and materials to select those appropriate to the experiment	Written and verbal feedback given throughout module through in-class activities and homework	All homework is reviewed with at least one detailed FAR (Feedback, Action, Response) marked by the teacher approximately once every 2 weeks **Optional homework tasks and Literacy resources:** SoL on science shared area, including PowerPoints, details of practical investigations, worksheets, revision resources, a range of AFL (assessment for learning) activities, research based tasks, simple model making, reports, short answer questions, newspaper style write-ups as well as homework. The Sciences offer many opportunities to develop and extend students' literacy skills. There is a large amount of new, subject-specific vocabulary, and so each unit includes a PLC (Personnel Learning checklist) which students will engage with throughout the unit. Students will use texts to find out information for themselves, using the functional layout of such texts, including index, contents and glossary sections of text books used in class, and also at home in an online format. Students will also review and connect information within topics.

P4 (Triple P5) 14 lessons combined 22 lesson triple science (including assessment and responding to feedback lessons)	• carrying out and representing mathematical and statistical analysis <u>Forces in action</u> Forces acting on an object can result in a change of shape or motion. Having looked at the nature of matter, we can now introduce the idea of fields and forces causing changes. This develops the idea that force interactions between objects can take place even if they are not in contact. Learners should be familiar with forces associated with deforming objects, with stretching and compressing (springs). <u>Skills</u> • explain everyday and technological applications of science • use scientific theories and explanations to develop hypotheses • presenting observations and other data using appropriate methods <u>Wave behaviour</u> Waves are means of transferring energy and the two main types of wave are introduced in this section: mechanical and electromagnetic. This module considers both what these types of waves are and how they are used. <u>Skills</u>	**P4 (Triple P5 and P6)** end of topic assessment in the style of exam questions Written and verbal feedback given throughout module through in-class activities and homework	Useful websites: www.bbcbitesize.co.uk www.senecalearning.com https://www.physicsandmathstutor.com/ https://www.footprints-science.co.uk/ https://www.youtube.com/@Freesciencelessons

	• use scientific theories and explanations to develop hypotheses • presenting observations and other data using appropriate methods • presenting reasoned explanations • use of a ripple tank to measure the speed, • investigate the reflection of light off a plane mirror and the refraction of light through <u>The electromagnetic spectrum</u> Having looked at mechanical waves, waves in the electromagnetic spectrum are now considered. This section includes the application of electromagnetic waves with a specific focus on the behaviour of light. Alongside this, it explores the application of other types of electromagnetic radiation for use in medical imaging. <u>Skills</u> • understand how scientific methods and theories develop over time • understand the power and limitations of science • discuss ethical issues arising from developments in science • evaluate associated personal, social, economic and environmental implications **<u>Wave interactions</u>** **Having studied the electromagnetic spectrum learners now go on to look at the interactions of waves with materials, this will include absorption, refraction and reflection.**		

P4.3 (Triple P6) **P5 (Triple P7)** 12 lessons (including assessment and	**Learners will also be expected to draw ray diagrams to illustrate the refraction of rays through lenses.** <u>Skills</u> • use models to solve problems, make predictions and to develop scientific explanations and understanding of familiar and unfamiliar facts • apply a knowledge of a range of techniques, instruments, apparatus, and materials to select those appropriate to the experiment • presenting observations and other data using appropriate methods <u>Radioactivity</u> Having considered the general characteristics of waves and particles, we now move on to look at radioactive decay which combines these two ideas. The idea of isotopes is introduced, leading into looking at the different types of emissions from atoms. **Triple students will study the processes of fission and fusion as a source of energy.** <u>Skills</u> • understand how scientific methods and theories develop over time • understand the power and limitations of science • evaluate risks both in practical science and the wider societal context	**P5 (Triple P7)** end of topic assessment in the style of exam questions Written and verbal feedback given	

responding to feedback lessons)	• recognise the importance of peer review of results and of communicating results to a range of audiences <u>Energy</u> We now move on to consider how energy can be stored and transferred. Pupils will study the idea of conservation and dissipation of energy in systems and how this leads to the efficiency. Ways of reducing unwanted energy transfers and thereby increasing efficiency will be explored. <u>Skills</u> • presenting observations and other data using appropriate methods • apply a knowledge of a range of techniques, instruments, apparatus, and materials to select those appropriate to the experiment • carrying out and representing mathematical and statistical analysis	throughout module through in-class activities and homework		