

## Rationale:

In Key Stage 4 we continue to teach Chemistry separately to Biology and Physics. These divisions are mirrored further in the Sixth Form at Level 3, in the structure of both A level courses and units of the Vocational BTEC Level 3 National Extended Certificate in Applied Science.

In Years 10 and 11, we continue the work started in Year 9 as we build on the knowledge and understanding of Chemistry gained during Key Stage 3. This follows the philosophy of a '5 Year Key Stage 4' inherent in the current Programme of Study and National Curriculum for KS3 and 4 Science. (In other words, both the knowledge and skills directly gained at KS3 and those developed further during KS4 are tested during the GCSE exams taken at the end of Year 11).

At Key Stage 4 we follow the AQA Scheme of Learning, in common with Biology and Physics. All students in Years 10 and 11 follow the Combined Science Trilogy course, with 11A1, 11A2 and 11A3 being taught the Separate Science content in addition. Final decisions about the specific exam route taken are made in Year 11 on an individual basis.

In Year 10, we move on to history and design of the Periodic Table, Bonding, Chemical Quantities and Chemical Changes – these topics expand on the knowledge and skills from KS3 and the material covered in Year 9, and allow students to develop their practical skills. In Year 11, we complete the course with Energy Changes, Rates of Reaction, Hydrocarbons and Chemical Analysis. Throughout the course, the scientific process is taught, with many opportunities to safely plan, risk assess, investigate, record, conclude and evaluate practical investigations, together with the relevant maths skills, and key subject-specific vocabulary that will enable students to be scientifically literate.

1. In the following Overview, the lesson numbers are approximate and will vary depending on the number of weeks in each term.
2. All in italic are for separate/ triple sciences only All in bold are for higher tier only
- 3.

**Reading in the curriculum:** 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 glossary which students will complete and learn during 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, so knowledge organisers are provided for each topic.

**Connected knowledge:** Topics in the Sciences do not stand alone. Each topic connects to prior knowledge from primary school, other topics learnt or still to be learnt at this school both in the Sciences and in other subjects and also in the outside world. Connected knowledge is discussed in class, starting with the Context Summary which is shared with students at the start of each topic.

**Diversity:** Science belongs to everyone, regardless of background, and people from all walks of life contribute to its development and reap its benefits. This is reflected in the examples used in lessons and the Scientists whose work we consider.

Term / Length of Unit	Outline	Assessment	Home Learning	Resources	Knowledge/Skills End Points	Reading in the curriculum
<p style="text-align: center;"><b>Year 10</b> Autumn Term 1 6 lessons (plus assessment and FAR)</p>	<p style="text-align: center;"><u>Chapter 1 Periodic Table</u></p> <p>Students learn about how the atomic structure of an element dictates the position on the Periodic Table. Students will look at the scientists and ideas behind the design of the Periodic Table and use these ideas to make predictions about properties and reactivity. Students will learn about the properties and trends in the Periodic Table including metals and non – metals plus Groups 1, 7 and 0. Transition metals for Triple only</p>	<p>There are 3 summative Science tests through the year, please see the poster in the Science tab of the Year 10 Blog for details. There are also a number of formative tests throughout the unit</p>	<p>In the Sciences, Educake quizzes, based on current and previous topics, are set every Monday to be done by the following Monday in a Biology – Chemistry – Physics rotation. Further information is available in the Year 10 Blog.</p>	<p>SoL on science shared area, including powerpoints, details of practical investigations and associated risk assessments, worksheets, revision resources, homework booklet and test. Chemistry Student Book</p>	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> <li>Explain how the electron arrangement of an atom allows it to be placed in the Periodic Table.</li> <li>Describe the steps and scientists in the development of the Periodic Table.</li> <li>Comparing metals and non-metals including physical and chemical properties</li> </ul> <p><u>Skills</u></p> <ul style="list-style-type: none"> <li>Using data to make predictions</li> <li>Practical work to investigate the properties of the different groups of the periodic table</li> </ul>	<p>Glossary, context summary, knowledge organiser and guided reading tasks <a href="#">C1 Part 2 Periodic table Glossary</a></p>
<p style="text-align: center;"><b>Year 10</b> Autumn Term 2 6 lessons (plus assessment and FAR)</p>	<p style="text-align: center;"><u>Chapter 2 Bonding</u></p> <p>Students will look at the three types of bonding, why atoms bond and the properties of the different types of substances</p>	<p>There are 3 summative Science tests through the year, please see the poster in the Science tab of the Year 10 Blog for details. There are also a number of formative tests throughout the unit</p>	<p>In the Sciences, Educake quizzes, based on current and previous topics, are set every Monday to be done by the following Monday in a Biology – Chemistry – Physics rotation. Further information is available in the Year 10 Blog.</p>	<p>SoL on science shared area, including powerpoints, details of practical investigations and associated risk assessments, worksheets, revision resources, homework booklet and test. Chemistry Student Book</p>	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> <li>Formation and properties of ionic compounds, covalent substances and metals/ alloys</li> <li>Drawing dot and cross diagrams to represent the bonding involved</li> </ul> <p><u>Skills</u></p> <ul style="list-style-type: none"> <li>Practical work and data analysis to determine the type of substance from physical and chemical properties</li> <li>Evaluation of the most appropriate type of model</li> </ul>	<p>Glossary, context summary, knowledge organiser and guided reading tasks <a href="#">C2 Bonding Glossary</a></p>

<p style="text-align: center;">Year 10 Spring Term 1 lessons (plus assessment and FAR)</p>	<p style="text-align: center;"><u>Chapter 2 Bonding</u></p> <p>Students will continue to learn about the different substances and how their bonding affects their properties including looking at giant covalent substances such as diamond, graphite and graphene plus polymers and nanoparticles</p>	<p>There are 3 summative Science tests through the year, please see the poster in the Science tab of the Year 10 Blog for details. There are also a number of formative tests throughout the unit</p>	<p>In the Sciences, Educake quizzes, based on current and previous topics, are set every Monday to be done by the following Monday in a Biology – Chemistry – Physics rotation. Further information is available in the Year 10 Blog.</p>	<p>SoL on science shared area, including powerpoints, details of practical investigations and associated risk assessments, worksheets, revision resources, homework booklet and test. Chemistry Student Book</p>	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> <li>Types and properties of different substances including ionic, simple molecular, metals and alloys.</li> <li>Comparison of the properties of giant covalent substances and relating the bonding they involve.</li> <li>Structures, properties and uses of polymers and nanoparticles</li> </ul> <p><u>Skills</u></p> <ul style="list-style-type: none"> <li>Concept of scale and orders of magnitude of for atoms and nanoparticles</li> </ul>	<p>Glossary, context summary, knowledge organiser and guided reading tasks and analysis of properties using descriptions of materials. <a href="#">C2 Bonding Glossary</a></p>
<p style="text-align: center;">Year 10 Spring Term 2 6 lessons (1 for Triple) (plus assessment and FAR)</p>	<p style="text-align: center;"><u>Chapter 3 Chemical Quantities</u></p> <p>Students will revisit ideas on conservation of mass met at KS3 and move onto learn about different chemical calculations including balancing equations, uncertainty, moles, concentration, percentage yield and atom economy Maths skills in rearranging equation and working out units will be practiced.</p>	<p>There are 3 summative Science tests through the year, please see the poster in the Science tab of the Year 10 Blog for details. There are also a number of formative tests throughout the unit</p>	<p>In the Sciences, Educake quizzes, based on current and previous topics, are set every Monday to be done by the following Monday in a Biology – Chemistry – Physics rotation. Further information is available in the Year 10 Blog.</p>	<p>SoL on science shared area, including powerpoints, details of practical investigations and associated risk assessments, worksheets, revision resources, homework booklet and test. Chemistry Student Book</p>	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> <li>Explain the law of conservation of mass and apply to reactions involving gases. □ Balancing equations</li> <li>Calculating relative formula mass using data from Periodic Table</li> <li>Estimate uncertainty from practical data</li> <li>Mole and concentration calculations</li> <li>Percentage yield and atom economy calculations</li> <li>Calculating theoretical yields, titration and gas volume calculations.</li> </ul> <p><u>Skills</u></p> <ul style="list-style-type: none"> <li>Changing the subject of an equation</li> <li>Ideas of ratios for mole and reacting mass calculations</li> </ul>	<p>Glossary, context summary, knowledge organiser and guided reading tasks <a href="#">C3 Chemical calculations Glossary</a></p>

<p style="text-align: center;"><b>Year 10</b> Summer Term 1 6 lessons (plus assessments and FAR)</p>	<p><u>Chapter 4 Chemical Changes</u></p> <p>In the first half of this module, students will learn about the reactivity series and concepts around metal extractions and making salts.</p> <p>There is lots of practical work in this topic including an RP on making soluble salts.</p> <p>To include work on Fertilisers from C10 (triple only)</p>	<p>There are 3 summative Science tests through the year, please see the poster in the Science tab of the Year 10 Blog for details. There are also a number of formative tests throughout the unit</p>	<p>In the Sciences, Educake quizzes, based on current and previous topics, are set every Monday to be done by the following Monday in a Biology – Chemistry – Physics rotation. Further information is available in the Year 10 Blog.</p>	<p>SoL on science shared area, including powerpoints, details of practical investigations and associated risk assessments, worksheets, revision resources, homework booklet and test. Chemistry Student Book</p>	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> <li>Explain oxidation and reduction in terms of oxygen and electrons including half equations</li> <li>Explain how extraction of metals depend on reactivity</li> <li>Reactions of metals with acids and salt production</li> </ul> <p><u>Skills</u></p> <ul style="list-style-type: none"> <li>RP Preparing a pure, dry sample of a soluble salt</li> <li>Interpret and evaluate information about extraction processes</li> </ul>	<p>Glossary, context summary, knowledge organiser and guided reading tasks <a href="#">C4 Chemical changes glossary</a></p>
<p style="text-align: center;"><b>Year 10</b> Summer Term 2 6 lessons (plus assessment and FAR)</p>	<p><u>Chapter 4 Chemical Changes (cont)</u></p> <p>The second half of the module covers concepts about acids and electrolysis again including lots of practical work and an RP on electrolysis and one on titration</p>	<p>There are 3 summative Science tests through the year, please see the poster in the Science tab of the Year 10 Blog for details. There are also a number of formative tests throughout the unit</p>	<p>In the Sciences, Educake quizzes, based on current and previous topics, are set every Monday to be done by the following Monday in a Biology – Chemistry – Physics rotation. Further information is available in the Year 10 Blog.</p>	<p>SoL on science shared area, including powerpoints, details of practical investigations and associated risk assessments, worksheets, revision resources, homework booklet and test. Chemistry Student Book</p>	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> <li>Use of pH scale to identify acids and alkalis, and the process of neutralisation</li> <li>Determining concentration of solutions by titration</li> <li>Explain weak and strong acids in terms in ionisation including titration curves</li> <li>Process of electrolysis of both molten compounds and aqueous solutions including half equations.</li> </ul> <p><u>Skills</u></p> <ul style="list-style-type: none"> <li>RP Investigating what happens when aqueous solutions are electrolysed</li> <li>RP Finding the reacting volumes of solutions of acids and alkalis by titration</li> <li>Orders of magnitude</li> </ul>	<p>Glossary, context summary, knowledge organiser and guided reading tasks <a href="#">C4 Chemical changes glossary</a></p>

<p style="text-align: center;">) <b>Year 11</b> Autumn Term 1 lessons (5 for triple plus assessment and FAR) (</p>	<p style="text-align: center;"><u>Chapter 5 Energy Changes</u></p> <p>Students will recap concepts around endothermic and exothermic reactions already met at KS3 and carry out RP investigating the effects of different factors on the temperature changes in a reaction.</p> <p>For triple, students will also go on to consider cells and batteries including fuel cells.</p>	<p>There are 3 summative Science tests through the year, please see the poster in the Science tab of the Year 11 Blog for details. There are also a number of formative tests throughout the unit</p>	<p>In the Sciences, Educake quizzes, based on current and previous topics, are set every Monday to be done by the following Monday in a Biology – Chemistry – Physics rotation. Further information is available in the Year 11 Blog.</p>	<p>SoL on science shared area, including powerpoints, details of practical investigations and associated risk assessments, worksheets, revision resources, homework booklet and test.</p> <p>Chemistry Student Book</p>	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> <li>Recap meanings of the terms endo and exothermic and give examples</li> <li>Draw reaction profiles for both types of reaction, and explain the energy changes in bond making and breaking</li> <li>Carry out bond energy calculations to determine if a reaction is endo or exothermic</li> <li>Explain and evaluate the use of cells and batteries</li> <li>Describe how fuel cells work including equations and compare with conventional cells</li> </ul> <p><u>Skills</u></p> <ul style="list-style-type: none"> <li>Use data to identify endo and exothermic reactions.</li> <li>RP investigate the variables that affect temperature changes</li> </ul>	<p>Glossary, context summary, knowledge organiser and guided reading tasks</p> <p><a href="#">C5 Energy changes glossary</a></p>
<p style="text-align: center;"><b>Year 11</b> Autumn Term 1 6 lessons (plus assessment and FAR)</p>	<p style="text-align: center;"><u>Chapter 6 Rates of Reaction</u></p> <p>Students will learn about the collision theory and the factors that affect the rate of a reaction including lots of practical opportunities and an RP</p>	<p>There are 3 summative Science tests through the year, please see the poster in the Science tab of the Year 11 Blog for details. There are also a number of formative tests throughout the unit</p>	<p>In the Sciences, Educake quizzes, based on current and previous topics, are set every Monday to be done by the following Monday in a Biology – Chemistry – Physics rotation. Further information is available in the Year 11 Blog.</p>	<p>SoL on science shared area, including powerpoints, details of practical investigations and associated risk assessments, worksheets, revision resources, homework booklet and test.</p> <p>Chemistry Student Book</p>	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> <li>How rates can be measured and use of graphs to calculate rate</li> <li>Factors affecting rates of reaction including temp, concentration, surface area and catalysts and how this relates to the collision theory.</li> </ul> <p><u>Skills</u></p> <ul style="list-style-type: none"> <li>Graph and data analysis</li> <li>RP Investigating how changes in concentration affects the rate of a reaction involving production of a gas and a colour change.</li> </ul>	<p>Glossary, context summary, knowledge organiser and guided reading tasks</p> <p><a href="#">C6 Rates of reaction glossary</a></p>

<p style="text-align: center;"><b>Year 11</b> Autumn Term 2 4 lessons (plus assessment and FAR)</p>	<p style="text-align: center;"><u>Chapter 6 Equilibria</u></p> <p>Students will also look at reversible reactions and the factors affecting the position of equilibrium To include work on Haber process from C10 for Triple</p>	<p>There are 3 summative Science tests through the year, please see the poster in the Science tab of the Year 11 Blog for details. There are also a number of formative tests throughout the unit</p>	<p>In the Sciences, Educake quizzes, based on current and previous topics, are set every Monday to be done by the following Monday in a Biology – Chemistry – Physics rotation. Further information is available in the Year 11 Blog.</p>	<p>SoL on science shared area, including powerpoints, details of practical investigations and associated risk assessments, worksheets, revision resources, homework booklet and test. Chemistry Student Book</p>	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> <li>• How rates can be measured and use of graphs to calculate rate</li> <li>• Factors affecting rates of reaction including temp, concentration, surface area and catalysts and how this relates to the collision theory.</li> <li>• Reversible reactions and how the direction of the reaction can be changed.</li> <li>• Idea of dynamic equilibrium and the factors that affect the position.</li> </ul> <p><u>Skills</u></p> <ul style="list-style-type: none"> <li>• Graph and data analysis including tangents. RP Investigating how changes in concentration affects the rate of a reaction involving production of a gas and a colour change.</li> </ul>	<p>Glossary, context summary, knowledge organiser and guided reading tasks <a href="#">C6 Rates of reaction glossary</a></p>
<p style="text-align: center;"><b>Year 11</b> Spring Term 1 5 lessons (plus assessment and FAR)</p>	<p style="text-align: center;"><u>Chapter 7 Hydrocarbons</u></p> <p>Students will learn about crude oil, composition and uses including how fractional distillation can be used to separate crude oil. Students will also look at the structures and properties of hydrocarbons. Triple students will complete the topic started by looking at other organic compounds such as alkenes, alcohols, acids and polymers</p>	<p>There are 3 summative Science tests through the year, please see the poster in the Science tab of the Year 11 Blog for details. There are also a number of formative tests throughout the unit</p>	<p>In the Sciences, Educake quizzes, based on current and previous topics, are set every Monday to be done by the following Monday in a Biology – Chemistry – Physics rotation. Further information is available in the Year 11 Blog.</p>	<p>SoL on science shared area, including powerpoints, details of practical investigations and associated risk assessments, worksheets, revision resources, homework booklet and test. Chemistry Student Book</p>	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> <li>• Description of formation and composition of crude oil</li> <li>• Structure and properties of alkanes</li> <li>• Process of fractional distillation and the uses of the fractions.</li> <li>• Comparison of combustion – observations and equations</li> <li>• Role of cracking in meeting need for fuels</li> <li>• Structure and properties of different homologous series and polymers – both natural and synthetic</li> </ul> <p><u>Skills</u></p> <ul style="list-style-type: none"> <li>• Advantages and disadvantages of different models</li> </ul>	<p>Glossary, context summary, knowledge organiser and guided reading tasks <a href="#">C7 Hydrocarbons glossary</a></p>

<p style="text-align: center;"><b>Year 11</b> Spring term 2 4 lessons for triple (plus assessment and FAR)</p>	<p style="text-align: center;"><u>Chapter 8 Chemical Analysis</u></p> <p>Students will learn about purity and formulations, and how to use chromatography to analyse mixtures. Students will also recap the tests for common gases previously met in KS3</p> <p>Students will have plenty of practical opportunities in this module including RP on Chromatography Triple students will complete the topic started by carrying out lots of practical work on analysing substances including an RP</p>	<p>There are 3 summative Science tests through the year, please see the poster in the Science tab of the Year 11 Blog for details. There are also a number of formative tests throughout the unit</p>	<p>In the Sciences, Educake quizzes, based on current and previous topics, are set every Monday to be done by the following Monday in a Biology – Chemistry – Physics rotation. Further information is available in the Year 11 Blog.</p>	<p>SoL on science shared area, including powerpoints, details of practical investigations and associated risk assessments, worksheets, revision resources, homework booklet and test. Chemistry Student Book</p>	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> <li>Recap of separation techniques from KS3 and how to determine purity by use of melting point data</li> <li>Identification of formulations and why they are used</li> <li>Use of R<sub>f</sub> values in chromatography</li> <li>Recall tests for common gases</li> <li>Methods for and analysis of results from tests for cation and anions including equations</li> <li>Comparison of instrumental methods and flame emission spectroscopy with chemical tests</li> <li>Structure and properties of different homologous series and polymers – both natural and synthetic</li> </ul> <p><u>Skills</u></p> <ul style="list-style-type: none"> <li>RP- how to safely set up and analyse chromatography investigations</li> <li>Carry out gas tests Flame tests and precipitation reactions for cations</li> <li>Precipitation reactions for anions</li> <li>RP to identify unknown compounds by using tests for cations and anions.</li> <li>Comparison of different types of models</li> </ul>	<p>Glossary, context summary, knowledge organiser and guided reading tasks <a href="#">C8 Chemical analysis glossary</a></p>
<p style="text-align: center;"><b>Year 11</b> Summer Term Revision</p>	<p style="text-align: center;"><u>REVISION</u></p>			<p>Homework booklets, past exam questions, SENECA Tassomai, BBC Bitesize SMH quiz's</p>		