

## Curriculum Map Year 10: Chemistry Separate Science AQA

| Examination Papers – End of Yr 11 | % of GCSE | Question style                                                     |
|-----------------------------------|-----------|--------------------------------------------------------------------|
| Paper 1 – Topics 1-5              | 50        | Multiple choice, structured, closed short answer and open response |
| Paper 2 – Topics 6-10             | 50        | Multiple choice, structured, closed short answer and open response |

|             | Topic                       | Key Knowledge<br><i>What will students know by the end of this topic?</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Key Skills<br><i>What skills will students have developed by the end of this topic?</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Assessment Opportunities<br><i>How will student progress be measured?<br/>What are the key assessment pieces?</i>                                                               |
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| Half Term 1 | Topic 8 – Chemical Analysis | <ul style="list-style-type: none"> <li>- The metal ions: <ul style="list-style-type: none"> <li>• Lithium, Sodium, Potassium, Calcium and Copper can be identified using flame tests and the positive tests and problems associated with these tests</li> </ul> </li> <li>- The use of sodium hydroxide to test for as well as the absence of, metal ions</li> <li>- The carbonate ions test</li> <li>- The halide ions test</li> <li>- The sulfate ions test</li> <li>- How instrumental methods including flame emission spectroscopy are used to identify metal ions in solution</li> </ul> | Recalling key terminology.<br>Interpreting analytical tests<br>Determining composition of compounds (ionic)<br>Use of a range of practical chemistry equipment safely<br><br>Explaining how agriculture has an impact on the use of resources<br>Explaining how water (from a range of sources) is treated and made potable<br>Using simple laboratory equipment to make pure water by distillation. Carry out and interpret chemical tests to the water before and after<br>Explaining how polymers are produced and the different properties of polymers<br>Qualitative comparisons of glass, ceramics, polymers, composites and metals<br>Applying understanding of sustainable development to a range of familiar and unfamiliar examples<br>How to carry out a simple Life Cycle Assessment<br>Processing data from a wide range of sources relating to a wide range of products, services and processes<br>Developing graph drawing and interpretation skills | Homework<br>Starter tasks to review prior learning<br>Regular PPQ practice<br>Competence completing<br>Required Practical 7 (SEP)<br>Required Practical 8 (SEP)<br>Topic 9 test |
|             | Topic 10 – Using Resources  | <ul style="list-style-type: none"> <li>- A range of renewable and finite resources and their origins.</li> <li>- What sustainable development is</li> <li>- How water treated and is made potable</li> <li>- How ceramics, polymers and composites are made as well as their properties</li> <li>- Ways of reducing the use of resources</li> <li>- What a Life Cycle Assessment is</li> <li>- How recycling, re-using and reducing can all have an impact on sustainability</li> </ul> Consolidation of topic 16 (to include time to review work completed in lockdown)                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                 |

|                    | Topic                                                | Key Knowledge<br><i>What will students know by the end of this topic?</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Key Skills<br><i>What skills will students have developed by the end of this topic?</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Assessment Opportunities<br><i>How will student progress be measured?<br/>What are the key assessment pieces?</i>                                                    |
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| <b>Half Term 2</b> | Topic 2 – Bonding Structure and Properties of Matter | <ul style="list-style-type: none"> <li>- The difference between atoms and ions</li> <li>- How ionic compounds form</li> <li>- Properties of ionic compounds</li> <li>- How covalent compounds form</li> <li>- Properties of covalent compounds</li> <li>- Properties of metals and alloys and metallic bonding</li> <li>- Types of alloys, steels and gold</li> <li>- Types of giant covalent structure</li> <li>- Properties of giant covalent compounds</li> <li>- Powers of 10</li> <li>- Uses of nanoparticles</li> <li>- The size and scale of nanoparticles compared with other bulk materials</li> <li>- The relationship between surface area and volume as a ratio</li> </ul> | Determining numbers of sub-atomic particles<br>Drawing dot-cross diagrams<br>Calculating charges on ions<br>Determining formulae of ionic compounds<br>Writing balanced chemical equations<br>Use of a range of practical chemistry equipment safely<br>Identifying the state of a range of substances at different temperatures<br>Describing limitations of the ionic model<br>Describing limitations of a range of covalent models<br>Drawing and interpreting dot-cross diagrams for covalent compounds<br>Explaining how different substances conduct electricity<br>Explaining the properties and uses of alloys<br>Comparing alloys to other similar materials<br>Researching a range of allotropes of carbon<br>Explaining the properties of giant covalent compounds<br>Drawing and interpreting graphs<br>Evaluate the uses of nanoparticles for specific purposes<br>Explain the possible risks associated with using nanoparticles<br>Recognise and use expressions in standard form<br>Use ratios, fractions and percentages<br>Change the subject of a variety of equations<br>Convert units<br>Use appropriate numbers of significant figures | Homework<br>Starter tasks<br>Regular PPQ practice to include extended response questions<br>Topic 10 test                                                            |
| <b>Half Term 3</b> | Topic 3 – Quantitative Chemistry                     | <ul style="list-style-type: none"> <li>- Consolidation of writing and balancing equations</li> <li>- Be familiar with specific key terms e.g. relative atomic mass/formula mass, mole, limiting reactant</li> <li>- The conservation of mass law</li> <li>- Avogadro's number</li> <li>- Amounts of substance can be measured in moles</li> <li>- How conservation of mass can be understood using formula masses and moles in balanced equations</li> <li>- How to calculate % of an element in a compound</li> <li>- How to calculate reacting masses in balanced equations</li> </ul>                                                                                               | Investigating mass changes using various apparatus<br>Writing, balancing and interpreting chemical equations<br>Use formula mass to calculate moles and vice versa<br>Recognising and use expressions in standard form<br>Using ratios, fractions and percentages<br>Changing the subject of a variety of equations<br>Converting units<br>Using appropriate numbers of significant figures                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Homework<br>Starter tasks<br>Regular PPQ practice to include ratios, standard form, use of significant figures and changing the subject of equations<br>Topic 2 test |

|                    | Topic                                            | Key Knowledge<br><i>What will students know by the end of this topic?</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Key Skills<br><i>What skills will students have developed by the end of this topic?</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Assessment Opportunities<br><i>How will student progress be measured?<br/>What are the key assessment pieces?</i>                                                                                                                                                                                                                                                                    |
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| <b>Half Term 4</b> | Continuation of Topic 3 – Quantitative Chemistry | <ul style="list-style-type: none"> <li>- What limiting reactants are and their effect on reacting mass calculations</li> <li>- Percentage yield and atom economy</li> <li>- How concentration of solutions is measured in chemistry</li> <li>- What a titration is and how to carry one out</li> <li>- The relationship between moles, concentration and volume and the link between this and moles, mass and Mr</li> <li>- Be familiar with specific key terms e.g. relative atomic mass/formula mass, mole, limiting reactant, yield, concentration</li> <li>- The uncertainty associated with any measurements taken</li> <li>- Equal moles of gases occupy the same volume (at RTP)</li> <li>- The volume of 1 mole of any gas is 24dm<sup>3</sup></li> </ul><br><ul style="list-style-type: none"> <li>- Content from Yr 9/10 work in preparation for Yr 10 examination</li> </ul> | Writing, balancing and interpreting chemical equations<br>Using formula mass to calculate moles and vice versa<br>Recognising and use expressions in standard form<br>Using ratios, fractions and percentages<br>Changing the subject of a variety of equations<br>Converting units<br>Using appropriate numbers of significant figures<br>Identifying anomalous results and making estimations of uncertainty<br>Calculating the mean of a data set and use the range as a measure of uncertainty<br>Describing how to carry out titrations using strong acids and strong alkalis<br>Calculating the chemical quantities in titrations in both mol dm <sup>-3</sup> and g dm <sup>-3</sup><br>Competent use of technical laboratory equipment (pipette, pipette filler and burette)<br>Calculating the volumes of gaseous reactants and products from balanced equations | Homework<br>Starter tasks<br>Regular PPQ practice to include ratios, standard form, use of significant figures and changing the subject of equations<br>PPQs of previous topics in preparation for examination (to cover range of question styles e.g. extended response, extended calculation, recall, describe, explain, evaluate, compare<br>Required practical 2<br>Topic 3 test |
| <b>Half Term 5</b> | Topic 4 – Chemical Changes                       | <ul style="list-style-type: none"> <li>- Yr 10 examinations during this half term.</li> <li>- How metals react with oxygen, water and acids</li> <li>- The order of metals, including carbon and hydrogen, in the reactivity series</li> <li>- What oxidation and reduction are in terms of electrons, oxygen and hydrogen</li> <li>- How metals are extracted from their ores using carbon reduction</li> <li>- Corrosion and it's prevention</li> </ul><br><ul style="list-style-type: none"> <li>- Work experience offered to students this half term</li> </ul>                                                                                                                                                                                                                                                                                                                     | All studied and covered so far from GCSE specification<br><br>Mixing reagents to explore chemical changes and products<br>Applying the reactivity of metals including carbon and hydrogen to displacement reactions<br>Elucidation of chemical formulae<br>Writing and balancing general and ionic equations<br>Writing and balancing ionic half equations<br>Identifying species that have been oxidised or reduced<br>Predicting products from given reactants<br>Planning and carry out an investigation into what factors affect rusting                                                                                                                                                                                                                                                                                                                              | <b>Year 10 examination</b><br><br>Homework<br>Starter tasks<br>Regular PPQ practice to include ratios, equations and competence with formulae<br>Year 10 examination                                                                                                                                                                                                                 |

|             | Topic                                      | Key Knowledge<br><i>What will students know by the end of this topic?</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Key Skills<br><i>What skills will students have developed by the end of this topic?</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Assessment Opportunities<br><i>How will student progress be measured?<br/>What are the key assessment pieces?</i>                                   |
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| Half Term 6 | Continuation of Topic 4 – Chemical Changes | <ul style="list-style-type: none"> <li>- The pH scale and the use of a variety of indicators</li> <li>- The link between pH, <math>[H^+]</math> and orders of magnitude</li> <li>- Neutralisation of acids and salt production</li> <li>- The general equation for neutralisation</li> <li>- The difference between strong and weak acids</li> <li>- The process of electrolysis including all key terms</li> <li>- How the electrolysis of molten ionic compounds yields products</li> <li>- How electrolysis can be used to extract more reactive metals</li> <li>- How the electrolysis of aqueous solutions yields products</li> </ul> | Mixing reagents to explore chemical changes and products<br>Applying the reactivity of metals including carbon and hydrogen to displacement reactions<br>Elucidation of chemical formulae<br>Writing and balancing general and ionic equations<br>Writing and balancing ionic half equations<br>Identifying species that have been oxidised or reduced<br>Predicting products from given reactants<br>Competence of carrying out a multistep procedure, preparation of a pure, dry sample of a soluble salt<br>Using the pH scale to identify acidic or alkaline solutions<br>Measuring the pH of different acids and bases at different concentrations<br>Making orders of magnitude calculations<br>Using the words, weak, strong, dilute and concentrated and neutral when applied to acids and their reactions<br>Setting up a simple electrochemical cell<br>Applying redox to write and balance half equations<br>Evaluation of the processes involved in extracting of metals from the ground and then by electrolysis | Homework<br>Starter tasks<br>Regular PPQ practice to include ratios, equations and competence with formulae<br>Required Practical 1<br>Topic 4 test |

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|             | Topic                                      | Key Knowledge<br><i>What will students know by the end of this topic?</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Key Skills<br><i>What skills will students have developed by the end of this topic?</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Assessment Opportunities<br><i>How will student progress be measured?<br/>What are the key assessment pieces?</i>                                   |
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| Half Term 1 | Continuation of Topic 4 – Chemical Changes | <ul style="list-style-type: none"> <li>- How the electrolysis of aqueous solutions yields products</li> <li>- The explanation for the products produced at each electrode during electrolysis of aqueous solutions</li> <li>- The electrolysis of brine</li> </ul>                                                                                                                                                                                                                                                                                                                                                | <ul style="list-style-type: none"> <li>Writing and balancing ionic half equations</li> <li>Identifying species that have been oxidised or reduced</li> <li>Predicting products from given reactants</li> <li>Setting up simple electrochemical cells</li> <li>Competence of carrying out electrolysis of aqueous solutions</li> <li>Applying redox to write and balance half equations</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Homework<br>Starter tasks<br>Regular use of PPQs to recap topic 4 and include extended response questions: plan & calculate<br>Required practical 4 |
|             | Topic 5 – Energy Changes                   | <ul style="list-style-type: none"> <li>- Energy is conserved during chemical reactions</li> <li>- What exothermic and endothermic reactions are including everyday examples of them</li> <li>- How reaction profiles are used to represent chemical reactions</li> <li>- What activation energy is</li> <li>- Energy is needed to break chemical bonds</li> <li>- Energy is released when new bonds are formed</li> <li>- Chemical cells and fuel cells</li> <li>- Alkaline cells and batteries</li> <li>- Rechargeable cells and batteries</li> <li>- Fuel cells and the overall reaction within them</li> </ul> | <ul style="list-style-type: none"> <li>Writing, balancing and interpreting chemical equations</li> <li>Measuring temperature changes of simple chemical reactions and classifying them as exo or endothermic</li> <li>Investigating the variables that affect temperature changes</li> <li>Drawing and interpreting reaction profiles for exothermic and endothermic reactions</li> <li>Calculating energy changes in reactions using supplied data</li> <li>Applying the reactivity of metals to displacement reactions</li> <li>Elucidation of chemical formulae</li> <li>Writing and balancing general and ionic equations</li> <li>Writing and balancing ionic half equations</li> <li>Identifying species that have been oxidised or reduced</li> <li>Predicting products from given reactants</li> <li>Interpreting data relating to relative reactivity of metals used in cells</li> <li>Evaluating the use of hydrogen fuel cells compared to other cells and batteries</li> </ul> | Topic 4 (Chemical changes and / or Electrolysis) test                                                                                               |

|             | Topic                                                                           | Key Knowledge<br><i>What will students know by the end of this topic?</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Key Skills<br><i>What skills will students have developed by the end of this topic?</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Assessment Opportunities<br><i>How will student progress be measured?<br/>What are the key assessment pieces?</i>                     |
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| Half Term 2 | Topic 6 – Rate and extent of chemical change                                    | <ul style="list-style-type: none"> <li>- What rate of reaction is and the different ways that it can be monitored, measured and calculated</li> <li>- The factors that affect the rate of chemical reactions</li> <li>- How changing these factors affects the rate of chemical reactions</li> <li>- Collision theory</li> </ul>                                                                                                                                                                                                                                                                                                                                         | Writing, balancing and interpreting chemical equations<br>Explaining why rate of reaction changes using the “Collision theory”<br>Drawing and interpreting graphs from given or experimental data<br>Calculating the mean rate of reaction<br>Drawing tangents to curves                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Homework<br>Starter tasks<br>Regular PPQ practice (Topic 5 test)                                                                      |
|             | Revision of work from start of GCSE course<br>Preparation for mock examinations | <ul style="list-style-type: none"> <li>- A variety of revision techniques exist and that no one technique is suitable for all topics</li> <li>- Best practice answering extended response questions: Plan, Explain, Calculate, Evaluate, Compare</li> <li>- Yr 11 mock examination fortnight</li> </ul>                                                                                                                                                                                                                                                                                                                                                                  | Develop examination technique using PPQs with particular focus on Plan, Explain, Calculate, Evaluate, Compare<br>Improve use of scientific terminology through revisiting key terms such as accurate, reliable, valid<br>Using of modelling to explain processes<br>Applying knowledge to extended response questions, all command words (but especially, Plan, Calculate, Evaluate, Compare)                                                                                                                                                                                                                                                                                                                                                                                                         | Use of a variety of styles of PPQs<br>Starter tasks revisiting previous topics<br>Year 11 mock examinations (cover all previous work) |
| Half Term 3 | Continuation of Topic 6 – Rate and extent of chemical change                    | <ul style="list-style-type: none"> <li>- Collision theory</li> <li>- Activation energy</li> <li>- What catalysts are and how they affect the rate of reactions and reaction profiles</li> <li>- That some reactions are reversible and examples of reversible reactions</li> <li>- Energy changes in reversible reactions</li> <li>- The concept of chemical equilibrium</li> <li>- Le-Chatleiers principle</li> <li>- The effect of changing conditions on equilibrium</li> <li>- The effect of changing concentration on equilibrium</li> <li>- The effect of changing temperature on equilibrium</li> <li>- The effect of changing pressure on equilibrium</li> </ul> | Explaining why rate of reaction changes using the “Collision theory”<br>Measuring the gradient of tangents<br>Interpreting graphs of reaction conditions versus rate<br>Using a wide range of laboratory equipment to investigate rates of reaction: loss of mass, the gas syringe, inverted measuring cylinder, colour change.<br>Selecting appropriate techniques for monitoring the rate of a reaction<br>Investigating how changing concentration affects the rate of reaction<br>Predicting and explaining the effect on the rate of reaction when changing variables<br>Comparing data and results quantitatively<br>Explaining catalytic activity in terms of activation energy<br>Investigate catalytic effects on the decomposition of hydrogen peroxide<br>Identifying reversible reactions | Homework<br>Starter tasks<br>Regular PPQ practice<br>Required Practical 5 x 2<br>Topic 5 test                                         |

|             | Topic                                                        | Key Knowledge<br><i>What will students know by the end of this topic?</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Key Skills<br><i>What skills will students have developed by the end of this topic?</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Assessment Opportunities<br><i>How will student progress be measured?<br/>What are the key assessment pieces?</i> |
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| Half Term 4 | Continuation of Topic 6 – Rate and extent of chemical change | <ul style="list-style-type: none"> <li>- The Haber process</li> <li>- The production and uses of NPK fertilisers</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <p>Making qualitative predictions about changes made to systems at equilibrium</p> <p>Applying principles of dynamic equilibrium to the Haber process including the trade-off between rate of production and position of equilibrium</p> <p>Comparing the industrial production and laboratory preparation of compounds that can be used as fertilisers the production and use of NPK fertilisers</p>                                                                                                                                                                                                                                                      | <p>Homework</p> <p>Starter tasks</p> <p>Regular PPQ practice</p> <p>Topic 6 test</p>                              |
|             | Topic 7 – Organic Chemistry                                  | <ul style="list-style-type: none"> <li>- The origin and composition of crude oil</li> <li>- The Alkanes are a homologous series</li> <li>- The general formula and structure of the alkanes</li> <li>- How fractional distillation is used to refine crude oil</li> <li>- Uses of the fractions from crude oil</li> <li>- Properties of hydrocarbons: boiling points, viscosity and flammability - The processes of thermal and steam cracking</li> <li>- Products of cracking including alkenes</li> <li>- Chemical reactions of alkenes</li> <li>- Usefulness of cracking in terms of supply and demand of molecules in crude oil</li> <li>- The unsaturated nature of alkenes and the chemical test for alkenes</li> </ul> | <p>Building and interpreting models of organic molecules</p> <p>Making predictions of properties based upon regularly changing patterns</p> <p>Explaining the process of fractional distillation</p> <p>Using molecular models to represent alkanes, alkenes and overall chemical reactions</p> <p>Evaluating the process of cracking in terms of sustainability</p> <p>Using molecular models to represent alkanes and alkenes,</p>                                                                                                                                                                                                                       |                                                                                                                   |
| Half Term 5 | Continuation of Topic 7 – Organic Chemistry                  | <ul style="list-style-type: none"> <li>- Structures and names of alcohols and carboxylic acids</li> <li>- Uses of alcohols</li> <li>- Chemical reactions of alcohols</li> <li>- Production of alcohols via fermentation</li> <li>- The functional groups for a range of organic molecules</li> <li>- Chemical reactions of carboxylic acids</li> <li>- The process and chemical notation for addition polymers</li> <li>- The process and chemical notation for condensation polymerisation</li> <li>- The role of amino acids in the production of naturally occurring and synthetic condensation polymers</li> </ul>                                                                                                        | <p>Building and interpreting models of organic molecules</p> <p>Making predictions of properties based upon regularly changing patterns</p> <p>Using molecular models to represent alkanes and alkenes, alcohols, carboxylic acids, esters, addition polymers and condensation polymers as well as overall chemical reactions</p> <p>Describing the reactions of and interpreting formulaic reactions of alkenes, alcohols, carboxylic acids and amino acids</p> <p>Recognising addition and condensation polymers from their monomers, repeating units and polymer structures</p> <p>The basic principles of addition and condensation polymerisation</p> | <p>Homework</p> <p>Starter tasks</p> <p>Regular PPQ practice</p> <p>Topic 7 test</p> <p>External examinations</p> |

|                      | Topic                                 | Key Knowledge<br><i>What will students know by the end of this topic?</i>   | Key Skills<br><i>What skills will students have developed by the end of this topic?</i>                                                                                                                                                                                                                                                                                   | Assessment Opportunities<br><i>How will student progress be measured?<br/>What are the key assessment pieces?</i> |
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| Half Term 5 cont.... | Preparation for external examinations | -Using specific revision sessions to consolidate ideas from previous topics | Developing examination technique using PPQs focusing on Plan, Explain, Calculate, Evaluate, Compare<br>Improving the use of scientific terminology through revisiting key terms such as accurate, reliable, valid<br>Interpreting data from tables and graphs and applying it to extended response questions<br>All skills to be revisited prior to external examinations |                                                                                                                   |
| Half Term 6          | External exams                        |                                                                             |                                                                                                                                                                                                                                                                                                                                                                           | External examinations                                                                                             |