Chemistry Year 8 Intent: During Key Stage 3 the aim of the chemistry curriculum is for students to have access to skills based learning opportunities. Our students will be presented with a broad and varied range of experiences that are centred on enquiry processes, taught and practised in a range of topics, based on the AQA KS3 curriculum. Scientific enquiry skills and subject specific knowledge are introduced and practised in a range of contexts so students make a seamless transition at the start of Year 10 when they begin studying for their GCSE chemistry examinations.

Curriculum:

There are 6 main foci that will be covered in Year 8 which incorporate many opportunities for pupils to work scientifically: **Physical changes: –** Recap of particle model from Y7 with the main focus on developing practial skills to investigate physical/reversible changes, and to encourage development of communication, numeracy, literacy and ICT skills; **Elements and the periodic table**: – Know that the periodic table of elements is a way of presenting a lot of information about atoms, which took many years to discover and is then organised using the properties of elements. Make links between observations and secondary data. **Signs of chemical changes:** -Recognise 8 signs of a chemical change, use key vocabulary to develop observation and recording skills. **Elements, compounds and mixtures**: - Develop particle models to represent elements, compounds and mixtures. Use secondary data to look for patterns and develop evaluation skills. **Chemical changes: –** Investigate chemical changes: how the atoms have become rearranged, use word and chemical symbols with opportunities to carry out risk assessments. **Oxygen and chemical changes**: – Apply models and concepts learnt during the year and become aware of how chemical ideas develop by studying the ideas and evidence linked to 'The Phlogiston Theory.'

Autumn Term:

1. Revise year 7 **Energy in matter** changes with temperature in motion and spacing of particles
2. Use techniques, apparatus and materials during laboratory work, paying attention to health and safety
3. Make and record observations and measurements
4. Present observations and data using appropriate methods, including tables and graphs
5. Changes of state in terms of particle kinetics and energy changes
6. Present reasoned explanations, including explaining data in relation to predictions and hypotheses
7. Evaluate data, showing awareness of potential sources of ***random*** and ***systematic error***
8. Use ICT to present data in graphs, tables and text
9. The Periodic Table: periods and groups; metals and non-metals
10. The varying physical and chemical properties of different elements
11. Recognise that scientific methods and theories develop as scientists modify earlier explanations to take account of new evidence and ideas
12. The principles underpinning the Mendeleev Periodic Table
13. Recognise and describe the difference between chemical and physical changes

Spring Term:

1. Use and apply the particle model linked to chemical changes.
2. The nature of atoms, elements, compounds and mixtures
3. Chemical symbols and formulae for elements and compounds.
4. Chemical reactions as the rearrangement of atoms
5. The chemical properties of metals and non-metals
6. Representing chemical reactions using word equations
7. Use and derive simple word equations
8. Conservation of mass in chemical changes
9. Present observations and data using appropriate methods, including tables and graphs
10. Evaluate risks
11. Interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions

Summer Term:

1. Recognise and describe chemical changes
2. Extend ideas about chemical reactions as the rearrangement of atom
3. Use the pH scale for measuring acidity/alkalinity; and indicators
4. Thermal decomposition
5. Reactions of acids with metals, bases and carbonates to produce new compounds and gases
6. Representing chemical reactions using formulae and equations, including state symbols
7. Exothermic and endothermic chemical reactions (qualitative)
8. Make predictions using scientific knowledge and understanding
9. Apply mathematical concepts and calculate results
10. Plan experiments to make observations and to test predictions, including ***identifying independent, dependent and control variables***
11. Make decisions about the most appropriate techniques, apparatus and materials to use during laboratory work, paying attention to health and safety
12. Make and record observations and measurements using a range of methods for different investigations; and evaluate the ***accuracy*** of methods and suggest possible improvements
13. Pay attention to objectivity and concern for ***validity, accuracy, precision*** and measurement of uncertainty
14. Extend knowledge of a range of scientific methods and theories that have developed as scientists modified earlier explanations to take account of new evidence and ideas

Key Objectives Autumn Term - To be able to:

1. **Recall** and use/write scientific vocabulary accurately.
2. **Recall** and use particle model to **describe** the 3 states of matter. b. **Refer** to energy transfers when **explaining** changes in state.
3. Use a particle model to **describe** what happens when a solute dissolves. b. **Describe** why mass is conserved when a solute is added to a solvent.
4. **Describe** how to dilute a concentrated solution using precisely measured volumes of solution and water.
5. Use labelled diagrams to **describe** how the distribution of solute particles changes when a solution is diluted with water.
6. **Recall and apply** models **to explain** observations and patterns in data. b. **Explain why** mass is conserved when a solute is added to a solvent.
7. **Use** Excel to **construct** a graph which is fully labelled and has a line of best fit.
8. **Recall** the names and symbols for between ten to twenty elements. b. **Recall** that elements contain one type of particle called atoms.
9. **Recall** that the periodic table in divided into metals and non-metals. b. **Describe** and **compare** the properties of metallic and non-metallic elements.
10. **Classify** elements as metals or non-metals and **describe** their location on a periodic table.
11. **Identify** elements whose properties do not fit the general pattern of metals and non-metals
12. **Identify** evidence which shows a chemical reaction has taken place b. **Recognise** the 8 signs of a chemical change
13. Demonstrate competence in practical techniques. b. Make sets of observations or measurements, identifying the range and intervals used.
14. Use **scientific** ideas and models, or processes involving more than one step, in **descriptions**.
15. **Recognise** when and **explain how** scientists use evidence and creative thinking to develop scientific ideas.
16. Make, and act on, suggestions to control obvious risks to yourself and other people.
17. **Evaluate** the effectiveness of your methods and make practical suggestions to improve them.

Key Objectives Spring Term - To be able to:

1. **Name** some elements, and represent those using symbols.
2. **Name** some simple compounds from their formula. b. **Distinguish** between symbols for elements and formulae for compounds.
3. **Recognise** particle diagrams of some examples of some common elements, compounds and mixtures.
4. **Distinguish** between elements, mixtures and compounds. b. **Distinguish** between models for elements and compounds.
5. **Work out** the name of a compound from the elements in it. b. **Work out** the number and type of atoms in a compound from its formula.
6. **Identify** evidence which shows a chemical reaction has taken place b. **Describe** tests for carbon dioxide, hydrogen and oxygen gas
7. Use key scientific vocabulary and terminology in discussions and written work. b. Use appropriate scientific terminology to communicate abstract ideas
8. **Describe** how different elements join together to form compounds. b. Accurately use atom, bond, molecule, element and compound in written work.
9. **Write** word equations represent simple chemical reactions. b .Deduce the compounds made when a metal reacts with an acid
10. **Explain** how to classify materials as elements, compounds or mixtures b. **Identify** the gases produced when acids react with a metal or with a metal carbonate
11. **Explain** why water has the formula H_2O and carbon dioxide has the formula CO_2. b. **Explain** why compounds NaCl and CuS have those formulae.
12. **Represent** some compounds by formulae and **explain** what these show about the number and type of atoms present.
13. **Identify** when scientific evidence is used to support or disprove ideas.
14. Use **abstract** ideas to **describe** processes or ideas in unfamiliar situations. b. Make **clear connections** between abstract ideas to **explain** ideas and processes.

Key Objectives Summer Term - To be able to:

1. **Recall** that oxygen in the air is needed when materials burn, and that water and oxygen in the air are needed for iron to rust.
2. **Describe** burning as a reaction with oxygen during which oxides are formed and heat is given out.
3. **Describe** what happens when elements burn in air and iron rusts.
4. Use a model to **describe** how different elements join together to form compounds.
5. **Identify** and **explain** evidence which indicates a chemical reaction has taken place.
6. **Recall** the Phlogiston theory and use it to **explain** what **was** believed to happen to materials when they burnt in air.
7. **Compare** the Phlogiston theory and current particle model to **explain** what happens when materials burn in air.
8. **Identify** and **explain** the limitations of the Phlogiston theory.
9. **Describe** how bias and lack of evidence caused scientists to use the Phlogiston theory for almost 100 years.
10. **Explain** how Lavoisier's data **provided scientific evidence to disprove** the Phlogiston theory and have it replaced with a new theory.
11. **Explain,** in terms of particles, what happens when a chemical reaction takes place.
12. **Explain** why there is no overall change in mass when reactions take place, for example when iron rusts in air.
13. Use models about particles to **explain** how mass is conserved in a chemical reaction.
14. **Write/construct** equations to summarise a chemical reaction.
15. Use symbols to **construct** equations to summarise a chemical reaction.

Key Performance Standards

1. Recall and use a range of chemical vocabulary during discussion and in written work.
2. Use scientific language, verbs (doing) and adjectives (describing) to record observations, avoid the use of similes.
3. Use and apply an increasing range of scientific models and concepts.
4. Use a particle model to draw the three states of matter.
5. Recall, describe and explain how changes in temperature affect particles in different states
6. Use and apply a particle model to represent materials as elements, compounds or mixtures in unfamiliar contexts.
7. Locate metallic and non-metallic elements on a copy of the periodic table.
8. Recall and describe the properties of metals and non-metals.
9. Describe and explain how Mendeleev used the properties of the known elements to organise them into the first periodic table.
10. Recall and describe how evidence was used to develop scientists understanding of combustion and oxidation. (Phlogiston and rusting)
11. With reference to secondary sources and guidance, recall how scientists collect and use evidence and why methods have changed over the past two millennia.
12. With guidance make simple links between observations and abstract particle models to begin to write clear descriptions. (eg matter cannot be created or destroyed)
13. Make links between evidence and predictions based on simple chemical ideas to present increasingly detailed explanations. (particle and collision theory)
14. Begin to apply chemical conventions about how to name compounds to construct summary equations for the chemical reactions that are observed or in less familiar contexts.
15. Work safely to collect a range of observations and data; making more decisions about the equipment they use over the year.
16. Organise observations clearly and present data in graphs and tables, including the accurate application of ICT skills when appropriate.
17. Begin to recognise the limitations of the equipment and methods used during practical and make simple evaluative statements about the reproducibility and validity of collected data.
18. Use numeracy skills to demonstrate ability to calculate averages, percentages and carry out simple dilution calculations.