

Yearly learning steps: Science (Chemistry)

The grade descriptors given here are indicative only. Please see the mastery learning goal sheets and PLCs for more detailed content and criteria.

Chemistry			
Year	Subject content and skills	Working scientifically	Assessments
7	<p>Grade 1: simply describe the properties of solids, liquids and gases. Explain what is meant by a pure substance and a mixture. Describe how metals and non-metals can react with oxygen. Describe in simple terms the meaning of PH</p> <p>Grade 2: Describe temperature changes in terms of particles gaining or losing energy. Explain why different separation techniques can be chosen based on the physical properties of the substance involved. Describe how metals can be arranged in a reactivity series. Describe the products of a neutralisation reaction.</p> <p>Grade 3: Explain the properties of solids, liquids and gases based on the arrangement and movement of their particles. Explain how substances dissolve using the particle model. Use word equations to describe simple reactions. Explain how neutralisation reactions are used in a range of situations.</p> <p>Grade 4: Explain changes in state in terms of the energy of the particles involved. Use information from chromatography to identify unknown substances in a mixture. Place an unfamiliar metal in to the reactivity series based on its properties. Identify the best indicator to use in a range of situations.</p>	<p>Grade 1: Make and record observations and measurements using a range of apparatus and methods</p> <p>Grade 2: Carry out experiments appropriately having due regard to the correct manipulation of apparatus, the accuracy of measurements and health and safety considerations. Use scientific vocabulary, terminology and definitions, including SI units</p> <p>Grade3: Apply the cycle of collecting, presenting and analysing data, including observation, analysis, interpretation and communication. Recognise the importance of scientific quantities and understand how they are determined. Use prefixes and powers of ten for orders of magnitude</p> <p>Grade 4: Plan experiments or devise procedures to make observations, produce or characterise a substance, test hypotheses, check data or explore phenomena. Recognise when to apply a knowledge of sampling techniques to ensure any samples collected are representative. Use an appropriate number of significant figures in calculations.</p>	One end of topic test and levelled task per unit.

8	<p>Grade 2: Describe chemical reactions in terms of bonds made and broken. Describe simple chemical reactions, for example combustion and thermal decomposition. That elements in a group in the periodic table react in similar ways and show a pattern in reactivity. Describe substances as elements, compounds or mixtures.</p> <p>Grade 3: Use experimental observations to distinguish endothermic and exothermic reactions. Explain why a reaction is an example of combustion or thermal decomposition. Use data to describe a trend in physical properties of elements. Name compounds given their chemical formula.</p> <p>Grade 4: Use diagrams to explain the relative energy levels of particles during reactions. Explain observations about changes in mass in chemical reactions. Describe the reactions of an unfamiliar group 1 or 7 element. Represent atoms, elements, compounds and mixtures using particle diagrams.</p> <p>Grade 5: Predict whether a reaction will be endothermic or exothermic given information about bond strengths. Balance a symbol equation. Choose elements for different uses from their position on the periodic table. Use particle diagrams to predict properties of elements and compounds.</p>	<p>Grade2: Carry out experiments appropriately having due regard to the correct manipulation of apparatus, the accuracy of measurements and health and safety considerations. Use scientific vocabulary, terminology and definitions, including SI units</p> <p>Grade3: Apply the cycle of collecting, presenting and analysing data, including observation, analysis, interpretation and communication. Recognise the importance of scientific quantities and understand how they are determined. Use prefixes and powers of ten for orders of magnitude</p> <p>Grade 4: Plan experiments or devise procedures to make observations, produce or characterise a substance, test hypotheses, check data or explore phenomena. Recognise when to apply knowledge of sampling techniques to ensure any samples collected are representative. Use an appropriate number of significant figures in calculations</p> <p>Grade 5: Understand how scientific methods and theories develop over time. Use scientific theories and explanations to develop hypotheses. Evaluate methods and suggest possible improvements and further investigations. Interconvert units. Apply a knowledge of a range of techniques, instruments, apparatus, and materials to select those appropriate to the experiment</p>	One end of topic test and levelled task per unit.
9	<p>Grade 2: Give a simple description of environmental processes, for example the carbon cycle and the greenhouse effect. Describe the different methods of</p>	<p>Grade2: Carry out experiments appropriately having due regard to the correct manipulation of apparatus, the accuracy of measurements and health</p>	One end of topic test and levelled task per unit.

	<p>extracting a metal from its ore.</p> <p>Grade 3: Use a diagram to explain how carbon is cycled in the environment. Explain why the recycling of some materials is especially important.</p> <p>Grade 4: Describe how global warming can impact on climate and local weather patterns. Justify the choice for the extraction method for a material, given information about its reactivity.</p> <p>Grade 5: Suggest ways in which waste products from industrial processes could be reduced. Compare the relative effects of human-produced and natural global warming</p> <p>Grade 6: Evaluate claims that human activity is causing climate change. Use data to evaluate proposals for recycling materials.</p>	<p>and safety considerations. Use scientific vocabulary, terminology and definitions, including SI units</p> <p>Grade3: Apply the cycle of collecting, presenting and analysing data, including observation, analysis, interpretation and communication. Recognise the importance of scientific quantities and understand how they are determined. Use prefixes and powers of ten for orders of magnitude</p> <p>Grade 4: Plan experiments or devise procedures to make observations, produce or characterise a substance, test hypotheses, check data or explore phenomena. Recognise when to apply a knowledge of sampling techniques to ensure any samples collected are representative. Use an appropriate number of significant figures in calculations</p> <p>Grade 5: Understand how scientific methods and theories develop over time. Use scientific theories and explanations to develop hypotheses. Evaluate methods and suggest possible improvements and further investigations. Interconvert units. Apply a knowledge of a range of techniques, instruments, apparatus, and materials to select those appropriate to the experiment</p> <p>Grade 6: Evaluate risks both in practical science and the wider societal context, including perception of risk in relation to data and consequences. Recognise the importance of peer review of results and of communicating results to a range of audiences.</p>	
10	<p>Grade3: Describe in simple terms, basic chemical principles, for example atomic structure, the periodic table, bonding and chemical reactions</p>	<p>Grade3: Apply the cycle of collecting, presenting and analysing data, including observation, analysis, interpretation and communication. Recognise the importance of scientific</p>	<p>End of topic tests and mock exams in years 10 and 11.</p>

	<p>Grade4: Describe in detail complex chemical processes, for example relative masses and moles, electrolysis, ions and isotopes and chemical equations.</p> <p>Grade 5: Describe in detail complex chemical processes and begin to make links between them. For example the extraction of metals and their properties, electrolysis of different substances and the factors which effect the rate of a chemical reaction.</p> <p>Grade6: compare and contrast complex Chemical processes, for example ionic and covalent bonding, endothermic and exothermic reactions and reversible and non-reversible reactions.</p> <p>Grade7: Evaluate complex chemical interactions, for example energy transfers in reactions and reaction profiles, bond energy calculations and yield and atom efficiency calculations.</p> <p>Grade8: Make informed suggestions and predictions about complex ethical issues, for example, the nature of matter and the use of raw materials from the Earth.</p>	<p>quantities and understand how they are determined. Use prefixes and powers of ten for orders of magnitude</p> <p>Grade 4: Plan experiments or devise procedures to make observations, produce or characterise a substance, test hypotheses, check data or explore phenomena. Recognise when to apply a knowledge of sampling techniques to ensure any samples collected are representative. Use an appropriate number of significant figures in calculations</p> <p>Grade 5: Understand how scientific methods and theories develop over time. Use scientific theories and explanations to develop hypotheses. Evaluate methods and suggest possible improvements and further investigations. Interconvert units. Apply a knowledge of a range of techniques, instruments, apparatus, and materials to select those appropriate to the experiment</p> <p>Grade 6: Evaluate risks both in practical science and the wider societal context, including perception of risk in relation to data and consequences. Recognise the importance of peer review of results and of communicating results to a range of audiences.</p> <p>Grade 7: Explain everyday and technological applications of science; evaluate associated personal, social, economic and environmental implications; and make decisions based on the evaluation of evidence and arguments.</p> <p>Grade 8: Use a variety of models such as representational, spatial, descriptive, computational and mathematical to solve problems, make predictions and to develop scientific explanations and</p>	
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		understanding of familiar and unfamiliar facts.	
11	<p>Grade3: Describe in simple terms, basic chemical principles, for example the composition of the atmosphere, the properties of crude oil and gas tests.</p> <p>Grade4: Describe in detail complex chemical processes, for example fractional distillation, climate change, use of the Earth's resources, complete and incomplete combustion and separation techniques.</p> <p>Grade 5: Describe in detail complex chemical processes and begin to make links between them. For example, properties of metals and their extraction from their ores, the effect of temperature, pressure, surface area and concentration on rates of reaction and the processes which have changes the composition of the Earth's atmosphere.</p> <p>Grade6: compare and contrast complex chemical processes and structures, for example cracking and polymerisation reactions, the structure of complex organic molecules complete and incomplete combustion.</p> <p>Grade7: Evaluate complex chemical interactions, for example the use of resources from the Earth and complex chemical analysis.</p>	<p>Grade3: Apply the cycle of collecting, presenting and analysing data, including observation, analysis, interpretation and communication. Recognise the importance of scientific quantities and understand how they are determined. Use prefixes and powers of ten for orders of magnitude</p> <p>Grade 4: Plan experiments or devise procedures to make observations, produce or characterise a substance, test hypotheses, check data or explore phenomena. Recognise when to apply a knowledge of sampling techniques to ensure any samples collected are representative. Use an appropriate number of significant figures in calculations</p> <p>Grade 5: Understand how scientific methods and theories develop over time. Use scientific theories and explanations to develop hypotheses. Evaluate methods and suggest possible improvements and further investigations. Interconvert units. Apply a knowledge of a range of techniques, instruments, apparatus, and materials to select those appropriate to the experiment</p> <p>Grade 6: Evaluate risks both in practical science and the wider societal context, including perception of risk in relation to data and consequences. Recognise the importance of peer review of results and of communicating results to a range of audiences.</p> <p>Grade 7: Explain everyday and technological applications of science; evaluate associated personal, social, economic and environmental implications; and make decisions based on the evaluation of evidence and</p>	End of topic tests and mock exams in years 10 and 11.

	<p>Grade8: Make informed suggestions and predictions about complex ethical issues, for example the implications of climate change and the environmental impacts of industrial processes.</p> <p>Grade 9: Evaluate complex and novel information and apply to new contexts. For example, the Haber process and instrumental analysis.</p>	<p>arguments.</p> <p>Grade 8: Use a variety of models such as representational, spatial, descriptive, computational and mathematical to solve problems, make predictions and to develop scientific explanations and understanding of familiar and unfamiliar facts.</p> <p>Grade 9: Appreciate the power and limitations of science and consider any ethical issues which may arise.</p>	
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