Science - Chemistry Target Related Expectation (TReE)

	Pathway 1 (Target Grade 1-3)													
	5.1.1 The particle model	5.1.2 States of matter	5.1.3 Melting and freezing	5.1.4 Boiling	5.1.5 More changes in state	5.1.6 Diffusion	5.1.7 Gas pressure	5.1.8 Inside particles	5.2.1 Pure substances and mixtures	5.2.2 Solutions	5.2.3 Solubility	5.2.4 Filtration	5.2.5 Evaporation and distillation	5.2.6 Chromatography
5 Matter	• State that the properties of substances can be described in terms of particles in motion.	• Make relevant observations about particle arrangement in order to decide is a substance is in its solid, liquid or gas state.	• Recognise an energy transfer during a change of state.	• Draw straightforward conclusions from boiling point data presented in tables and graphs.	• Write a fair test enquiry question on evaporation, and plan the method and how to control the variables.	• Describe examples of diffusion and state that observations about diffusion can be explained in terms of particles in motion.	• Use words to explain gas pressure simply.	• State definitions of atoms, elements, molecules and compounds.	• With help, choose a simple technique to separate the substances in a mixture.	• Use observations or data to draw a conclusion to distinguish a solution from a pure liquid.	• Suggest a reason for the effect of temperature on solubility for a given solute.	• With support, use the correct techniques to filter a mixture.	• Label distillation apparatus and describe what happens in distillation.	• Describe what happens to a mixture when it undergoes chromatography.
	6.1.1 Chemical reactions	6.1.2 Acids and alkalis	6.1.3 Indicators and pH	6.1.4 Acid strength	6.1.5 Neutralisation	6.1.6 Making salts	6.2.1 More about elements	6.2.2 Chemical reactions of metals and non-metals	6.2.3 Metals and acids	6.2.4 Metals and oxygen	6.2.5 Metals and water	6.2.6 Metal displacement reactions		
6 Reactions	• Describe some features of chemical reactions and know the difference between a physical and chemical change.	• Name some common properties of acids and alkalis, and be able to identify hazard symbols.	• State that acids have a pH below 7, neutral solutions have a pH of 7, alkalis have a pH above 7. Use an indicator to identify acid, alkali and neutral solutions.	• State the pH range for acidic solutions and relate this to indicaotor colour.	• State simply what happens during a neutralisation reaction.	• State the type of substances made when an acid and alkali react then match the type of salt that will form from the type of acid used.	• State what an element is then present some simple facts about an element.	• State that many elements react with oxygen to form oxides.	• Describe what happens when metals react with acids.	• Name one metal that reacts vigorously with oxygen and one metal that does not react with oxygen.	• State how you could find out if a metal is more or less reactive than another metal.	• Use observations from experiment to state whether or not a displacement reaction has occurred.		
	7.1.1 The structure of the Earth	7.1.2 Sedimentary rocks	7.1.3 Igneous and metamorphic rocks	7.1.4 The rock cycle	7.1.5 Ceramics	7.2.1 The night sky	7.2.2 The Solar System	7.2.3 The Earth	7.2.4 The Moon and changing ideas					
7 Earth	• Design a simple model of the Earth using information about its structure.	• Describe how sedimentary rocks are made.	• Describe how igneous and metamorphic rocks are formed.	• Give simple facts about how a rock can be changed from one type to another.	• List the properties and uses of some ceramics.	• Name some objects seen in the night sky.	• Explain how we see planets.	• Describe differences between seasons and the motion of the Sun, stars, and Moon across the sky.	• Explain simply why we see the Moon from Earth.					

	Pathway 2 (Target Grade 4-6)													
	5.1.1 The particle model	5.1.2 States of matter	5.1.3 Melting and freezing	5.1.4 Boiling	5.1.5 More changes in state	5.1.6 Diffusion	5.1.7 Gas pressure	5.1.8 Inside particles	5.2.1 Pure substances and mixtures	5.2.2 Solutions	5.2.3 Solubility	5.2.4 Filtration	5.2.5 Evaporation and distillation	5.2.6 Chromatography
5 Matter	• Use models to investigate the relationship between the properties of a material and the arrangement of its particles.	• Explain the properties of solids, liquids, and gases based on the arrangement and movement of their particles.	• Draw annotated before and after diagrams of particles, and use words, to explain observations about melting and freezing.	• Explain why different substances boil at different temperatures in terms of changes to the energy of particles.	• Explain differences between evaporation, sublimation and boiling based on the arrangement and movement of particles.	• Draw annotated before and after diagrams of particles, and use words, to explain diffusion.	• Draw annotated particle diagrams, and use words, to explain gas pressure.	• Represent atoms, molecules and elements using models.	• Devise suitable techniques to separate mixtures, based on their properties.	• Explain how substances dissolve using the particle model • Draw annotated before and after particle diagrams to represent dissolving • Use data to draw a conclusion about the mass of solute dissolved in a solution.	• Use the solubility curve of a solute to describe and explain simply observations about solutions.	• Choose the most suitable technique(s) to separate a mixture of substances.	• Identify the physical property that must be different in order to separate a mixture by evaporation or distillation.	• Use evidence from chromatography to explain how to identify unknown substances in mixtures, and to identify the pen or plant a sample is from.
	6.1.1 Chemical reactions	6.1.2 Acids and alkalis	6.1.3 Indicators and pH	6.1.4 Acid strength	6.1.5 Neutralisation	6.1.6 Making salts	6.2.1 More about elements	6.2.2 Chemical reactions of metals and non-metals	6.2.3 Metals and acids	6.2.4 Metals and oxygen	6.2.5 Metals and water	6.2.6 Metal displacement reactions		
6 Reactions	• Deduce whether described change is a physical change or a chemical reaction.	• Compare the properties of acids and alkalis and describe differences between concentrated and dilute solutions of an acid.	• Use the pH scale to measure acidity and alkalinity and describe how indicators categorise solutions as acidic, alkaline, or neutral.	• Use models to explain the difference between a strong acid and a weak acid.	• Explain how neutralisation reactions are used in a range of situations.	• Choose the correct name of the salt formed in a neutralisation reaction from a list of possible salts.	• Compare the properties of typical metals and non-metals and be able to identify an unknown element.	• Describe an oxidation reaction with a word equation and diagrams.	• Predict the names of the products formed in a metal-acid reaction, and describe the reaction with a word equation. Decide which metals react more vigorously from practical observations.	• Describe an oxidation reaction with a word equation.	• Compare the reactions of different metals with water.	• Use the reactivity series to explain displacement reactions using word equations.		
	7.1.1 The structure of the Earth	7.1.2 Sedimentary rocks	7.1.3 Igneous and metamorphic rocks	7.1.4 The rock cycle	7.1.5 Ceramics	7.2.1 The night sky	7.2.2 The Solar System	7.2.3 The Earth	7.2.4 The Moon and changing ideas					
7 Earth	• Describe properties of the different layers of the Earth's structure.	• Explain why a sedimentary rock has a particular property based on how it was formed.	• Explain why igneous and metamorphic rocks have particular properties based on how they were formed.	• Use the rock cycle to explain how the material in rocks is recycled.	• Explain why properties of ceramics make them suitable for their uses.	• Describe how space observation of stars is affected by the scale of the Universe.	• Explain why we see objects in the Solar System, and describe how they appear to move.	• Explain the motion of the Sun, stars, and Moon across the sky and explain why seasonal changes happen.	• Describe evidence that led to a change in the model of the Solar System.					

	Pathway 3 (Target Grade 7-8)													
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5 Matter	• Use data about particles to predict and explain differences in properties such as density.	• Argue for how to classify substances which behave unusually as solids, liquids, or gases, justifying your ideas.	• Explain why there is a period of constant temperature during melting and freezing based on the arrangement and movement of particles, and energy transfers.	• Suggest reasons for the different boiling points of different substances based on the arrangement, movement, and energy transfers of their particles.	• Make predictions about what will happen during an unfamiliar physical process.	• Draw annotated before and after diagrams of particles, and use words, to predict the relative speed of diffusion when the value of a given independent variable is changed.	• Predict what will happen to gas pressure as conditions are changed in terms of particles and their energy.	• Use diagrams to compare molecules of an element and a compound.	• Justify the suitability of separation techniques in terms of the properties of constituent substances.	• Justify whether a given particle diagram represents a solution or a pure substance.	• Justify the procedure and evaluate the results in a solubility investigation.	• Justify a chosen technique for separating a mixture of substances.	• Justify whether evaporation or distillation would be suitable for obtaining given substances from solution.	• Justify the use of chromatography in different scenarios.
	6.1.1 Chemical reactions	6.1.2 Acids and alkalis	6.1.3 Indicators and pH	6.1.4 Acid strength	6.1.5 Neutralisation	6.1.6 Making salts	6.2.1 More about elements	6.2.2 Chemical reactions of metals and non-metals	6.2.3 Metals and acids	6.2.4 Metals and oxygen	6.2.5 Metals and water	6.2.6 Metal displacement reactions		
6 Reactions	• Compare chemical reactions to physical changes and deduce whether an observed or described change is a physical change or a chemical reaction.	• Compare the different particles found in acids and alkalis then explain what 'concentrated' and 'dilute' mean, in terms of the numbers of particles present.	• Compare the use of a variety of indicators and a pH probe to measure acidity and alkalinity and deduce the hazards of different acids and alkalis using data about their pH.	• Evaluate models for strong and weak acids, and suggest improvements.	• Interpret a graph of pH changes during a neutralisation reaction.	• Predict the names of salts formed when acids react with metals or bases and write word equations to represent the reactions.	• Deduce the relationship between the position of an element in the periodic table and its properties.	• Interpret a word and symbol equation to name reactants and products.	• Suggest how temperature changes may be linked with differences in reactivity between metals with acid.	• Explain the reactivity of metals according to how they react with oxygen.	• Deduce a rule from data about which reactions will occur or not, based on the reactivity series.	• Explain predictions about displacement reactions using word and symbol equations.		
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7 Earth	• Compare the different layers of the Earth in terms of their properties.	• Explain in detail each stage in the formation of a sedimentary rock.	• Predict observations when a substance representing lava is cooled, using knowledge about igneous rock formation to explain the answer.	• Give a detailed description and explanation of the journey of material through the rock cycle.	• Justify decisions made from property data about which materials might be ceramics.	• Describe the structure of the Universe in detail, in order of size and of distance away from the Earth. Be able to use and understand light years.	• Explain why we see objects in the Solar System, and why they appear to move as they do.	• Interpret data to predict how the Earth's tilt affects temperature and day length.	• Compare explanations about the motion and structure of the Universe from different periods in history.					