



AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2	AREs
<p>TOPIC 1: INTRO TO SCIENCE MOVING ONTO NON ARE PRACTICAL SCIENCE BASICS</p> <p>Big question(s) of the unit: Unit one: How do I perform an experiment?</p> <p>Overview of knowledge, understanding and skills (key concepts)</p> <p>Knowledge:</p> <ul style="list-style-type: none">• How to work safely in a lab.• Identifying and describing hazard symbols.• How to label and use a Bunsen burner.• What are variables when carrying out an experiment. <p>Understanding:</p> <ul style="list-style-type: none">• How to read scales and understanding measuring units. Understanding what safety and roaring flames are used for when using a Bunsen Burner. Identifying variables in different experimental scenarios. <p>Skills:</p> <ul style="list-style-type: none">• Research skills - researching potential careers in science.• Practical skills - using a Bunsen Burner.• Practical skills - identifying lab equipment.• Maths skills - units of measurement.• Teamwork skills - working in pairs for practical work.• Problem solving skills - applying knowledge to practical problems. <p>TOPIC 2: ARE 1: BIOLOGY UNIT (STRUCTURE AND FUNCTION OF LIVING ORGANISMS)</p>	<p>TOPIC 3: ARE 2 PHYSICS UNIT (FORCES)</p> <p>TOPIC 4: ARE 3 CHEMISTRY UNIT (PARTICULATE NATURE OF MATTER)</p> <p>Big question(s) of the unit: Why do snowmen melt?</p> <p>Overview of knowledge, understanding and skills (key concepts)</p> <p>Knowledge:</p> <ul style="list-style-type: none">• How to draw solids, liquids and gases.• The properties of solids liquids and gases.• The changes of state that can take place between solids, liquids, and gases. <p>Understanding:</p> <ul style="list-style-type: none">• How the arrangement of particles in solids liquids and gases relates to their function.• How and why substances change state. <p>Skills:</p> <ul style="list-style-type: none">• Practical skills: Observing ice melt into a liquid and then evaporate into a gas• Using scientific diagrams to explain how particles behave. Using key scientific language in explanations.	<p>TOPIC 5: ARE 4 BIOLOGY UNIT (REPRODUCTION)</p>	<p>TOPIC 6: ARE 5: PHYSICS UNIT (WAVES)</p>	<p>TOPIC 7 ARE 6 CHEMISTRY UNIT (EARTH AND ATMOSPHERE)</p> <p>Big question(s) of the unit: What is the Earth Made of?</p> <p>Overview of knowledge, understanding and skills (key concepts):</p> <p>Knowledge:</p> <ul style="list-style-type: none">• What is the Earth made of. How igneous, sedimentary, and metamorphic rocks are formed. What is a resource and where our resources come from. What is the carbon cycle. What is the composition of the Earth's atmosphere. <p>Understanding:</p> <ul style="list-style-type: none">• Recognising that Earth's resources are limited. Understanding of what recycling is and why it is important. Knowledge that the carbon dioxide levels are increasing due to human activities. Increasing carbon levels affects the climate which leads to global warming. <p>Skills:</p> <ul style="list-style-type: none">• Practical and Scientific skills - modelling the rock cycle. Interpreting data from graphs. Literacy - convey and apply your science knowledge by using key scientific language in explanation.	<p>TOPIC 8 NON - ARE UNIT (RECAP AND CONSOLIDATION OF PRACTICAL SKILLS IN SCIENCE)</p> <p>Big question(s) of the unit: What is the scientific method?</p> <p>Overview of knowledge, understanding and skills (key concepts):</p> <p>Knowledge:</p> <ul style="list-style-type: none">• How to draw a line graph, how to draw a bar graph, identifying practical equipment. <p>Understanding:</p> <ul style="list-style-type: none">• How to plan an experiment correctly, how to identify variables in an experiment, why it is necessary to have only one independent variable in an experiment. <p>Skills:</p> <ul style="list-style-type: none">• Measuring, analysing and interpretation of data, graph drawing, handling of scientific equipment, safety in the lab. <p>MOVE ONTO YEAR 8 CURRICULUM</p>	<p>Autumn 2 ARE: Particles. I can apply my understanding of arrangement of particles to explain how substances separate.</p> <p>Spring 2 ARE: Reactions I can apply my understanding of chemical reactions to explain trends in reactivity.</p>



AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2	AREs
<p>TOPIC 1: ARE 1: CHEMISTRY UNIT (ACIDS AND ALKALIS)</p> <p>Big question(s) of the unit: Can we predict chemical reactions?</p> <p>Overview of knowledge, understanding and skills (key concepts):</p> <p>Knowledge:</p> <ul style="list-style-type: none">• What ions are contained in acids and alkalis. What are neutralisation reactions.• How metals react with acids and an introduction to the reactivity series.• What is an indicator. A knowledge that the pH scale measures the relative acidity or alkalinity of a substance. How to measure pH.• How metals react using displacement reactions. <p>Understanding:</p> <ul style="list-style-type: none">• Recognise the general neutralisation equation. How a salt is formed. Predicting the products of acid + metal reactions. Predicting the products of acid + metal oxide reactions. Why metals are grouped using the reactivity series. How displacement reactions can be used to predict reactivity of metals. <p>Skills:</p> <ul style="list-style-type: none">• Writing word equations. Predict products of reactions given reactants. Developing practical skills. Problem solving skills - applying knowledge to practical problems. <p>TOPIC 2: ARE 2: BIOLOGY UNIT (GENETICS AND EVOLUTION)</p>	<p>TOPIC 3: ARE 3 PHYSICS UNIT (ENERGY) TOPIC 4: ARE 4 CHEMISTRY UNIT (CHEMICAL REACTIONS)</p> <p>Big question(s) of the unit: What energy changes take place during chemical reactions?</p> <p>Overview of knowledge, understanding and skills (key concepts):</p> <p>Knowledge:</p> <ul style="list-style-type: none">• The difference between physical and chemical changes. What is a chemical reaction. How mass is conserved during a chemical reaction. What is combustion, oxidation and thermal decomposition. What are exothermic and endothermic reactions. What is a catalyst. What are chemical equations. <p>Understanding:</p> <ul style="list-style-type: none">• How atoms rearrange themselves during a chemical reaction. There are different types of chemical reactions. How exothermic and endothermic reactions are useful in real life. Why catalyst are useful in real life. How to balance chemical equations. <p>Skills:</p> <ul style="list-style-type: none">• Word and symbol equations. Numeracy Skills - balancing symbol equations. Practical skills - following methods, identifying new equipment, and making observations. Use experimental data to create an order of reactivity (alkali metals) as well as identifying acids and alkalis and their strengths.	<p>TOPIC 5: ARE 5 PHYSICS UNIT (ELECTRICITY AND MAGNETISM)</p>	<p>TOPIC 6: ARE 6: BIOLOGY UNIT (INTERDEPENDENCE)</p>	<p>TOPIC 7: NON ARE 1: BIOLOGY UNIT (HEALTH)</p>	<p>TOPIC 8 - NON-ARE 2: PHYSICS UNIT (ENERGY IN THE HOME) TOPIC 9 NON - ARE UNIT 3 (RECAP AND CONSOLIDATION OF PRACTICAL SKILLS IN SCIENCE)</p> <p>Big question(s) of the unit: What is the scientific method?</p> <p>Overview of knowledge, understanding and skills (key concepts):</p> <p>Knowledge:</p> <ul style="list-style-type: none">• How to draw a line graph, how to draw a bar graph, identifying practical equipment. <p>Understanding:</p> <ul style="list-style-type: none">• How to plan an experiment correctly, how to identify variables in an experiment, why it is necessary to have only one independent variable in an experiment. <p>Skills:</p> <ul style="list-style-type: none">• Measuring, analysing and interpretation of data, graph drawing, handling of scientific equipment, safety in the lab. <p>MOVE ONTO YEAR 9 CURRICULUM</p>	<p>Autumn 1, ARE: The Periodic table and atomic structure. I can use information from the periodic table to explain how electronic structure, group number and reactivity of an element are linked.</p> <p>Spring 1, ARE: Separation techniques. I can apply my knowledge of particle theory to explain a variety of separation techniques.</p>



AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2	PQEs
<p>TOPIC 1: PQE 1 - PARTICLES</p> <p>Big question(s) of the unit: What are Particles and how do they behave?</p> <p>Overview of knowledge, understanding and skills (key concepts):</p> <p>Knowledge:</p> <ul style="list-style-type: none">What are the 3 states of matter. Draw the arrangement of solids, liquids and gases. What is gas pressure. What is diffusion. The timeline of how the atom was developed. How to draw the structure of an atom. What the atomic number and relative atomic mass mean. What is an ion. What is an isotope. <p>Understanding:</p> <ul style="list-style-type: none">Describe the properties of solids liquids and gases. How gas pressure can change due to different factors. Describe the factors which can affect diffusion. How different models of the atom were superseded as technology and information advanced. How to use the atomic number to identify different elements. How to use the atomic mass to calculate the number of neutrons in an atom. <p>Skills:</p> <ul style="list-style-type: none">Numeracy - Using the Periodic table to calculate subatomic particles.Research skills - development of the atomObservation skills - Recording observations during practical demonstrations.Problem solving skills - applying knowledge to practical problems.	<p>TOPIC 2: PQE 2 - THE PERIODIC TABLE</p> <p>Big question(s) of the unit: What is the Periodic Table?</p> <p>Overview of knowledge, understanding and skills (key concepts):</p> <p>Knowledge:</p> <ul style="list-style-type: none">How was the Periodic Table developed.Using the Periodic Table: where to find metals and nonmetals, what the vertical columns are called and what information they give, what the horizontal rows are called and what information they give, where to find atomic mass and atomic number for each element.The basic structure of an atom. How to use the information to draw an atom and to work out its electron configuration. Trends in reactivity and properties of elements in Groups 1, 7 and 0. <p>Understanding:</p> <ul style="list-style-type: none">How Mendeleev predicted element properties and behaviours. Limitations of the earlier periodic tables. How the determine the number of subatomic particles. The number of electrons on each electron shell. How to use the periodic table to predict properties of some elements. How the properties of elements predict its use. <p>Skills:</p> <ul style="list-style-type: none">How to create chronological timeline. Developing prediction skills. Numeracy skills - calculating number of neutrons. Using scientific diagrams to explain the structure of an atom. Using key scientific language in explanations.	<p>TOPIC 3: PQE 3 - MATERIALS</p> <p>Big question(s) of the unit: Why do we choose different materials to make different things?</p> <p>Overview of knowledge, understanding and skills (key concepts):</p> <p>Knowledge:</p> <ul style="list-style-type: none">The properties of metals and non-metals. metals have different amounts of thermal and electrical conductivity. The definition of ore and 3 types of ore. Define a native metal. What is a polymer. What are ceramics and composites and what properties do they have. <p>Understanding:</p> <ul style="list-style-type: none">Metals have specific uses because of their properties. Properties of metals are related to their position in the Periodic Table. Recognise trends in reactivity. Advantages and disadvantages to quarrying (surface mining) and underground mining and that these must be considered carefully before extraction of the ores. Which refining technique is needed to purify a given metal. Link the properties of polymers, ceramics, and composites to their uses. <p>Skills:</p> <ul style="list-style-type: none">Graph skills including line of best fit. Make observations on reactivity of metals. Make predictions in reactivity using the reactivity series. Construct a table of results. Describe and explain trends in observations and results. Analyse information to make informed decisions. Lab practical skills of naming and handling equipment.	<p>TOPIC 4: PQE 4 - PURITY</p> <p>Big question(s) of the unit: How can we separate mixtures?</p> <p>Overview of knowledge, understanding and skills (key concepts):</p> <p>Knowledge:</p> <p>Define the of purity of a substance. Define mixture, compound and alloy and name common alloys. Mixtures can be separated physically by the processes of filtration, crystallisation, simple distillation, fractional distillation. Be able to describe the thin layer, paper, and Gas chromatography.</p> <p>Understanding:</p> <p>How to use melting point data to distinguish pure from impure substances.</p> <p>Different techniques are used to separate mixtures, depending on their composition. Using chromatography, to calculate the R_f value.</p> <p>Skills:</p> <p>Prediction skills - Be able to suggest suitable purification techniques given information about the substances involved. Numeracy skills - Be able to interpret chromatograms and calculate R_f values for unknown substances. Practical skills - Carry out suitable separation techniques in the lab.</p>	<p>CONTINUATION OF TOPIC 4: PQE 4 - PURITY</p> <p>TOPIC 5: PQE 5 - BONDING</p> <p>Big question(s) of the unit: Why do atoms bond together?</p> <p>Overview of knowledge, understanding and skills (key concepts):</p> <p>Knowledge:</p> <ul style="list-style-type: none">Describe and compare the nature and arrangement of chemical bonds in: ionic compounds including giant ionic lattices, simple molecules, giant covalent structures - Allotropes of carbon and metals. How to calculate relative formula mass. How to calculate relative molecular mass. How to work out empirical formula. <p>Understanding:</p> <ul style="list-style-type: none">describe the properties of ionic compounds, the properties of simple covalent molecules. Explain how properties of allotropes of carbon make them useful in different ways. Explain chemical bonding in terms of electrostatic forces and the transfer or sharing of electrons. Explain the limitations of particular representations and models. Describe what empirical formula it used for. <p>Skills:</p> <ul style="list-style-type: none">Practical skills in testing the properties of ionic compounds and simple covalent molecules. Construct dot and cross diagrams for simple covalent and binary ionic substances. Numeracy Skills - calculating formulas mass. Problem solving skills.Analyse and make conclusions using data obtained from practicals. Using key scientific language in explanations.	<p>CONTINUATION OF TOPIC 5: PQE 5 - BONDING</p> <p>MOVE ONTO Y10 CURRICULUM</p> <ul style="list-style-type: none">I can identify where raw materials come from and how can we use them sustainably. (PQE 1)I understand how we extract raw resources and what are the advantages and disadvantages of doing so. (PQE 2)I understand what metals are and why they always react in a predictable way. (PQE3)I understand how metal compounds react and how we can predict their properties. (PQE 4)	



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<p>Big question(s) of the unit: Unit C2.2 How do the position of elements on the periodic table determine how they bond?</p> <p>Overview of knowledge, understanding and skills (key concepts):</p> <p>Knowledge:</p> <ul style="list-style-type: none">The difference between metals & non-metals. <p>Understanding:</p> <ul style="list-style-type: none">How the electron arrangement of an atom is connected to the way it reacts and how it bonds. Explain ionic and covalent bonding and the limitations of the models we use. <p>Skills:</p> <ul style="list-style-type: none">Dot and cross diagrams of covalent/ionic bonding.	<p>Big question(s) of the unit: Unit C2.3: What are the allotropes of carbon and why do they have different properties?</p> <p>Overview of knowledge, understanding and skills (key concepts):</p> <p>Knowledge:</p> <ul style="list-style-type: none">Definition of allotropes. Carbon can form a vast array of structures. <p>Understanding:</p> <ul style="list-style-type: none">Explain the properties of the allotropes of carbon using ideas about structure and bonding. <p>Skills:</p> <ul style="list-style-type: none">Use data to predict the state of substances under certain conditions.	<p>Big question(s) of the unit: C3: How can we use the particle model to explain the changes during a chemical reaction and conservation of mass? How can we use Avogadro's constant to calculate moles?</p> <p>Overview of knowledge, understanding and skills (key concepts):</p> <p>Knowledge:</p> <ul style="list-style-type: none">Use chemical symbols to write formulae of ionic and covalent compounds, Use the principle of conservation of mass to write balanced symbol equations (& half eqns). Use ions to deduce formulae. Construct ionic eqns. Use state symbols to describe physical states of substances. Describe gas tests for H₂, O₂, Cl₂ and CO₂. Recall the definition of Avogadro's constant and a mole. <p>Understanding:</p> <ul style="list-style-type: none">Explain observations changes in a non-enclosed system. Explain How the mass of a substance is related to moles. Explain how the mass of a solute and the volume of a solution is related to concentration. <p>Skills:</p> <ul style="list-style-type: none">Deduce the stoichiometry of an equation from the masses of reactants and products and explain the effect of a limiting quantity of a reactant. use a balanced equation to calculate masses of reactants or products.	<p>Big question(s) of the unit: C3.2 How do we know if a reaction is exothermic or endothermic?</p> <p>Overview of knowledge, understanding and skills (key concepts):</p> <p>Knowledge:</p> <ul style="list-style-type: none">Define exothermic and endothermic reactions. Draw and label reaction profiles. <p>Understanding:</p> <ul style="list-style-type: none">Explain activation energy. <p>Skills:</p> <ul style="list-style-type: none">Determining reactions measuring temperature change. Calculate energy changes in bond making and breaking.	<p>Big question(s) of the unit: C3.3 Different types of chemical reaction.</p> <p>Overview of knowledge, understanding and skills (key concepts):</p> <p>Knowledge:</p> <ul style="list-style-type: none">Explain reduction and oxidation reactions as loss/gain of electrons. H⁺ ions are present in acids. OH⁻ ions in alkalis. Describe a neutralisation reaction, including the general ionic equation. Recall acids and alkalis are measured by the pH (logarithmic) and how it relates to concentration of H⁺ ions. Describe techniques used to measure pH. <p>Understanding:</p> <ul style="list-style-type: none">Explain which species is reduced/ oxidised. Recall carbonate and some metals react and write equations to show this. Explain dilute/ concentrated and strong/ weak to describe acids. <p>Skills:</p> <ul style="list-style-type: none">Production of pure dry salts. Neutralisation reactions. pH of titration curves.	<p>Big question(s) of the unit: C3.4 How is electrolysis used to separate ionic compounds? How can we predict the products of electrolysis?</p> <p>Overview of knowledge, understanding and skills (key concepts):</p> <p>Knowledge:</p> <ul style="list-style-type: none">Recall that positive ions are formed at the cathode and negative ions are formed at the anode. Describe electrolysis using inert and non-inert electrodes. <p>Understanding:</p> <ul style="list-style-type: none">Predict the products of binary and aqueous electrolysis. <p>Skills:</p> <ul style="list-style-type: none">Electrolysis of copper sulphate solution and brine.	<p>Big question(s) of the unit: C4.1 How can we use the properties of elements to predict reactions?</p> <p>Overview of knowledge, understanding and skills (key concepts):</p> <p>Knowledge:</p> <ul style="list-style-type: none">Recall simple properties of groups 1,7 and 0. <p>Understanding:</p> <ul style="list-style-type: none">Explain how the properties relate to the number of electrons in the outer shells. Predict reactions using position on the periodic table. Explain how the reactivity of metals is connected to it's tendency to form positive ions. <p>Skills:</p> <ul style="list-style-type: none">Use experimental data to create an order of reactivity. Displacement reactions with Halogens. And with metals and metal salts.



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<p>Big question(s) of the unit: C4.1 How can we use the properties of elements to predict reactions?</p> <p>Overview of knowledge, understanding and skills (key concepts):</p> <p>Knowledge:</p> <ul style="list-style-type: none">Recall simple properties of groups 1,7 and 0. <p>Understanding:</p> <ul style="list-style-type: none">Explain how the properties relate to the number of electrons in the outer shells. Predict reactions using position on the periodic table. Explain how the reactivity of metals is connected to its tendency to form positive ions. <p>Skills:</p> <ul style="list-style-type: none">Use experimental data to create an order of reactivity. Displacement reactions with Halogens. And with metals and metal salts.	<p>Big question(s) of the unit: C5.1: How do monitor and control chemical reactions?</p> <p>Overview of knowledge, understanding and skills (key concepts):</p> <p>Knowledge:</p> <ul style="list-style-type: none">Describe how to change the rate of reaction. Describe catalysts and how they speed up reactions and identify them in a reaction. <p>Understanding:</p> <ul style="list-style-type: none">Suggest practical methods for determining rate of reaction. Interpret rate of reaction graphs. Explain how to change the rate of reaction in terms of frequency and energy of collisions. <p>Skills:</p> <ul style="list-style-type: none">Practical investigations into rates of reaction inc. Catalysts.	<p>Big question(s) of the unit: C5.2: What is dynamic equilibrium? How can changing the conditions of a reaction change the equilibrium?</p> <p>Overview of knowledge, understanding and skills (key concepts):</p> <p>Knowledge:</p> <ul style="list-style-type: none">Recall that some reactions can be reversed by altering their equilibrium. Recall dynamic equilibrium occurs in a closed system when the forward and backward reactions are equal. <p>Understanding:</p> <ul style="list-style-type: none">Predict the effects of changing the conditions of a reaction, using LeChatliers principle. <p>Skills:</p> <ul style="list-style-type: none">Analysis of models used to explain Dynamic equilibrium.Analysis of graphs to predict the best use Le Chatelier's principle to maximise yield.	<p>Big question(s) of the unit: C6.1 How can we extract and process substances into useful materials?</p> <p>Overview of knowledge, understanding and skills (key concepts):</p> <p>Knowledge:</p> <ul style="list-style-type: none">Describe and interpret life-cycle processes. Describe the pros and cons of materials to be recycled. Describe the fractionation of crude oil. Describe fraction as hydrocarbons. Recall crude oil is vital for the petrol chemical industry. Describe cracking and its products. <p>Understanding:</p> <ul style="list-style-type: none">Explain why some metals can be extracted using carbon but others cannot, using their relative position in the reactivity series. Explain when electrolysis is needed. Evaluate biological extraction processes. Explain the fraction of crude oil. Explain that modern life is dependent on finite crude oil. <p>Skills:</p> <ul style="list-style-type: none">Electrolysis of copper sulphate solution and brine.	<p>Big question(s) of the unit: C6.2 How do humans affect the climate?</p> <p>Overview of knowledge, understanding and skills (key concepts):</p> <p>Knowledge:</p> <ul style="list-style-type: none">Describe how an oxygen rich atmosphere evolved over time. Describe the greenhouse effect. Describe the effects of CO2 levels in the atmosphere. Describe the main sources and consequences of types of pollution. Describe the methods of creating potable water. <p>Understanding:</p> <ul style="list-style-type: none">Interpret evidence for the evolution of the atmosphere. Evaluate evidence of anthropogenic contributions to climate change. <p>Skills:</p> <ul style="list-style-type: none">Analysis of data to show links between anthropogenic/ natural influences on CO2 levels and global warming.	REVISION	EXAMS