

# Science Faculty Curriculum Overview



The aim of the KS3 science curriculum is to encourage students' natural curiosity about the world around them. Through following the curriculum, we aim to inspire students to want to know more. To build an inquisitive mind set that asks "why" and "how" to explain science phenomena. Through experimental design, analysis and evaluation we strive to develop students who can think scientifically and question the validity of data and evidence.

In year 7 we use low stakes quizzing at the start of each unit to assess students' prior knowledge. This informs our planning, to ensure that each lesson is bespoke to our students to ensure we can support them in progressing in science.

The Y7 and 8 curriculum is split in to the key concepts of science, Forces, Electromagnets, Energy, Waves, Organisms, Ecosystems, Genes, Matter, Reactions and the Earth.

The structure of the curriculum is for year 8 to build upon core concepts and threshold knowledge developed in year 7. For example, in year 7 students will develop knowledge and understanding of the particle model and how this relates to changing state, diffusion and mixtures. In year 8, this is expanded by exploring atoms, elements and compounds.

Students are assessed throughout the curriculum to determine that appropriate intervention is put in place to address misconceptions. To support students in developing their scientific understanding, certain lessons have assessments linked to them. These assessments are part of the learning journey, and staff mark these to provide students with feedback to act upon. The curriculum also utilises peer and self-assessment to ensure students are aware of their successes and how to progress further.

## Year 7

Term 1	Term 2	Term 3
<p><b><u>Matter 1: Recalled Knowledge</u></b>  <i>Recall that different materials have different properties (KS2 Science)</i>  <i>State that materials can exist in the solid, liquid or gaseous state (KS2 Science)</i>  <i>Give examples of reversible and non-reversible reactions (KS2 Science, Y7, Reactions: Chemical Reaction)</i>  <i>Recall the various changes of state (KS2 Science)</i>  <i>Define the term solubility (KS2 Science)</i>  <i>Define the term diffusion (Y7, Organisms, Movement of Substances)</i></p> <p><b><u>Matter: Recalled Skills</u></b></p>	<p><b><u>Matter 2: Recalled Knowledge</u></b>  <i>Recall that different materials have different properties (KS2 Science)</i>  <i>State that materials can exist in the solid, liquid or gaseous state (KS2 Science)</i>  <i>Give examples of reversible and non-reversible reactions (KS2 Science, Y7, Reactions: Chemical Reaction)</i>  <i>Recall the various changes of state (KS2 Science)</i>  <i>Define the term solubility (KS2 Science)</i>  <i>Define the term diffusion (Y7, Organisms, Movement of Substances)</i></p> <p><b><u>Matter: Recalled Skills</u></b></p>	<p><b><u>Energy: Recalled Knowledge</u></b>  <i>Recall that animals get their food from plants and other animals (KS2 Science)</i>  <i>Recall that animals cannot make their own food (KS2 Science)</i>  <i>State that common appliances run on electricity (KS2 Science)</i>  <i>Recall that unsupported objects fall to earth because of gravity (KS2 Science, Y7 Forces, Gravity)</i>  <i>Give examples of common forces (air resistance etc) (KS2 Science, Y7, Forces, Introduction to forces)</i></p> <p><b><u>Energy: Recalled Skills</u></b></p> <p><b><u>General Scientific Enquiry Skills.</u></b></p>

<p><i>Use evaporation to separate a dissolved solid from its solution (KS2 Science)</i>  <i>Use filtration to separate a solid from a liquid (KS2 Science)</i></p> <p><u>General Scientific Enquiry Skills.</u>          Ask scientific questions          Plan investigations          Record data          Analyse patterns in data          Evaluate data          Give conclusions related to the data</p> <p><b><u>Matter: New Knowledge</u></b>          Describe the particle model of matter          Explain the properties of different materials (including solids, liquids and gases) based on their arrangement of particles          Use particle theory and information about transfer of energy to describe how changes of state occur          Compare boiling and evaporation          Review the term diffusion in terms of particle theory          Explain how gas pressure occurs</p> <p><b><u>Matter: New Skills</u></b>          Draw before and after diagrams to explain observations about changes of state          Draw before and after diagrams to explain observations about diffusion          Draw before and after diagrams to explain observations about gas pressure          Recognise the state of a substance in relation to its mp and bp</p> <p><b><u>Practical Opportunities</u></b>          Density calculations          Cooling curve          Measuring the boiling point of solutions          Demo sublimation          Demo diffusion</p> <p><b><u>Organisms: Recalled Knowledge</u></b>  <i>Recall the life cycles of plants and animals (KS2 Science)</i>  <i>State the different parts of a plant (KS2 Science)</i>  <i>Give the functions of a skeleton (KS2 Science)</i>  <i>Explain why muscles work together (KS2 Science)</i></p>	<p><i>Use evaporation to separate a dissolved solid from its solution (KS2 Science)</i>  <i>Use filtration to separate a solid from a liquid (KS2 Science)</i></p> <p><u>General Scientific Enquiry Skills.</u>          Ask scientific questions          Plan investigations          Record data          Analyse patterns in data          Evaluate data          Give conclusions related to the data</p> <p><b><u>Matter: New Knowledge</u></b>          Explain how gas pressure occurs          Define the term atom          Compare elements and compounds          State the properties of a pure substance and a mixture          Define the terms solution, solute, solvent and solubility          Explain how substances dissolve using the particle model          State why filtration, evaporation and distillation work as separation techniques          Describe how chromatography works to separate substances          Introduce Tier 3 vocabulary</p> <p><b><u>Matter: New Skills</u></b>          Use diagrams to represent atoms, elements and compounds          Use mp information to categorise a substance as pure or a mixture          Use solubility curves to explain observations about solutions          Choose when to use filtration, evaporation and distillation as an appropriate separation technique          Use evidence from chromatography to identify unknown substances</p> <p><b><u>Practical Opportunities</u></b>          Solubility experiments          Filtration          Evaporation          Distillation          Chromatography</p> <p><b><u>Genes: Recalled Knowledge</u></b>  <i>Define the term adaptation (KS2 Science)</i>  <i>Recall that environments can change, posing dangers to organisms (KS2 Science)</i></p>	<p>Ask scientific questions          Plan investigations          Record data          Analyse patterns in data          Evaluate data          Give conclusions related to the data</p> <p><b><u>Energy: New Knowledge</u></b>          State the unit of energy          Give examples of renewable and non-renewable resources          Compare renewable and non-renewable resources          Describe how energy is transferred from an energy resource to an electrical device          List various types of energy store          Define the term dissipation          Explain how energy is dissipated in a range of situations          Introduce Tier 3 vocabulary</p> <p><b><u>Energy: New Skills</u></b>          Compare the energy content of food and fuels          Compare the energy content of food and fuels with energy requirements          Evaluate the advantages and disadvantages of renewable and non-renewable resources          Calculate the cost for home energy usage          Compare the energy usage and cost of running different home devices          Use a model of energy transfer between stores to describe how to get jobs done          Show how energy is transferred in real-life examples          Calculate the use energy and the amount dissipated, given values of input and output energy</p> <p><u>Practical opportunities</u>          Burning fuel in foods          Energy transfers and stores circus          Investigate the efficiency of light bulbs</p> <p><b><u>Ecosystems: Recalled Knowledge</u></b>  <i>State what a food chain and food web are (KS2 Science)</i>  <i>Recall that environments can change, posing dangers to organisms (KS2 Science)</i>  <i>Recall the resources that plants need to grow (KS2 Science)</i></p>
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<p><b><u>Organisms: Recalled Skills</u></b></p> <p><b><u>General Scientific Enquiry Skills.</u></b>          Ask scientific questions          Plan investigations          Record data          Analyse patterns in data          Evaluate data          Give conclusions related to the data</p> <p><b><u>Organisms: New Knowledge</u></b>          State examples of tissues          Name the main parts of a skeleton          Relate the properties of bone to the functions of the skeleton          State where the joints are found          Describe the structure and function of the joints          Define and use the term antagonistic          Describe the function of major muscle groups          Define the term cell          Compare plant and animal cells          Give the functions of the various parts of plant and animal cells          Name and describe examples of specialised plant and animal cells          Define and describe the term diffusion          Identify structures in an amoeba and a euglena.          Explain how uni-cellular organisms are adapted to carry out different functions.          Introduce Tier 3 vocabulary</p> <p><b><u>Organisms: New Skills</u></b>          Give the order of hierarchy in an multi-cellular organism          Measure the force exerted by different muscles          Use a diagram to predict the result of a muscle contraction or relaxation          Explain how to use a microscope to observe a cell          Match cell components to their functions          Suggest the organism a cell comes from, given its features</p> <p><b><u>Practical Opportunities</u></b>          Using a microscope to observe cheek/onion cell          Diffusion demonstration          Observing amoeba</p> <p>Forces</p>	<p><i>State that offspring are not always identical to their parents (KS2 Science)</i>  <i>Describe the changes humans go through from birth to old age(KS2 Science)</i></p> <p><b><u>Genes: Recalled Skills</u></b>  <i>Relate the adaptations of animals and plants to their environment (KS2 Science)</i>  <i>Use life cycles to show the different stages in an organism's life (KS2 Science)</i></p> <p><b><u>General Scientific Enquiry Skills.</u></b>          Ask scientific questions          Plan investigations          Record data          Analyse patterns in data          Evaluate data          Give conclusions related to the data</p> <p><b><u>Genes: New Knowledge</u></b>          State the causes of variation in a species          Compare continuous and discontinuous variation          Describe how variation helps species to survive          Explain how species are adapted to their environment          List the changes that occur during puberty          Differentiate between adolescence and puberty          Name and describe the functions of the main structures in the male and female reproductive systems          Describe the function and structure of the gametes          State what is meant by fertilisation          Describe the process of fertilisation          Give causes of low fertility in males and females          State what is meant by gestation          Describe what happens during gestation and birth          Explain what substances are passed between mother and fetus          State what the menstrual cycle is.          Introduce Tier 3 vocabulary</p> <p><b><u>Genes: New Skills</u></b>          Represent intraspecies variation using graphs          Label diagrams of the male and female reproductive systems          Recognise the male and female gametes          Represent the menstrual cycle diagrammatically</p> <p><b><u>Practical Opportunities</u></b></p>	<p><i>Explain the function of a flower (KS2 Science)</i>  <i>Describe the function of pollen (KS2 Science)</i></p> <p><b><u>Ecosystems: Recalled Knowledge</u></b>  <i>Use food chains and webs to show feeding relationships (KS2 Science)</i></p> <p><b><u>General Scientific Enquiry Skills.</u></b>          Ask scientific questions          Plan investigations          Record data          Analyse patterns in data          Evaluate data          Give conclusions related to the data</p> <p><b><u>Ecosystems: New Knowledge</u></b>          State what food webs and food chains are in terms of the different tropic stages          State the factors that affect the population of a species          Define the term bioaccumulation and explain how it occurs          Explain the importance of insect pollinators to food supplies          Define and use the terms ecosystem, community, habitat, niche and environment.          List resources that animals and plants compete for          Compare wind and insect pollinated plants          State what is meant by fertilisation (plant)          Describe the process of fertilisation and germination in plants          State the ways seeds can be dispersed and relate these ways to the adaptations of seeds.          Introduce Tier 3 vocabulary</p> <p><b><u>Ecosystems: New Skills</u></b>          Combine food chains to make food webs          Use graphs to describe interactions between predators and prey          Identify the structures of a flower and link these to their function</p> <p><b><u>Practical Opportunities</u></b>          Investigating the distribution of a plant (using a quadrat)          Flower dissection          Seed dispersal modelling</p> <p><b><u>Waves : Recalled Knowledge</u></b>  <i>Recall that light travels in straight lines and is reflected from surfaces (KS2 Science)</i></p>
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<p><b>Forces: Recalled Knowledge</b>  <i>State some common forces (friction, air resistance) (KS2 Science)</i>  <i>Compare contact and non-contact forces(KS2 Science)</i>  <i>Recall how magnetic forces act(KS2 Science)</i>  <i>Explain how gravity acts (KS2 Science)</i>  <i>Describe why unsupported objects fall towards earth (KS2 Science)</i></p> <p><b>Forces: Recalled Skills</b></p> <p><u>General Scientific Enquiry Skills.</u>          Ask scientific questions          Plan investigations          Record data          Analyse patterns in data          Evaluate data          Give conclusions related to the data</p> <p><b>Forces: New Knowledge</b>          State the unit of force          Describe what is meant by an interaction pair          Describe what happens when the resultant force is not zero          State the formula for speed          Describe the link between speed, journey time and movement of the observer          State the value of g on earth and on the moon          Differentiate between mass and weight          Describe how gravitational force varies with mass and distance          Explain why objects stay in orbit          Introduce Tier 3 vocabulary</p> <p><b>Forces: New Skills</b>          Use a force diagram to represent resultant forces          Use force diagrams to describe situations involving gravity          Use the formula for speed          Interpret distance-time graphs to calculate speed and describe journeys          Use the formula to calculate weight on different planets</p> <p><u>Practical opportunities</u>          Measuring forces practical          Are the forces balanced or unbalanced?          Speed of a car down a ramp</p>	<p>Investigating arm span</p> <p><b>Reactions: Recalled Knowledge</b>  <i>Recall that everything is made up of particles (KS2 Science)</i>  <i>State that materials can exist in the solid, liquid or gaseous state (KS2 Science)</i>  <i>Use simple particle theory to explain changes of state (KS2 Science)</i>  <i>Define the terms element and compounds (KS2 Science)</i>  <i>Give examples of elements and compounds (KS2 Science)</i>  <i>Compare elements and compounds (KS2 Science)</i>  <i>Compare reversible and non-reversible reactions (KS2 Science)</i>  <i>Recall simple reversible and non-reversible reactions (KS2 Science)</i></p> <p><b>Reactions: Recalled Skills</b>  <i>State the different parts of a reaction (products and reactants) (KS2 Science)</i>  <i>Use reactions to differentiate between reversible and non-reversible reactions (KS2 Science)</i></p> <p><u>General Scientific Enquiry Skills.</u>          Ask scientific questions          Plan investigations          Record data          Analyse patterns in data          Evaluate data          Give conclusions related to the data</p> <p>Introduction to Science</p> <p><b>Reactions: New Knowledge</b>          Compare chemical reactions and physical changes          Differentiate between acids and alkalis          Define and give examples of common indicators          List the factors that affect the pH of a solution          Name strong and weak acids          State the products formed in a neutralisation reaction          Give uses for neutralisation reactions          Name 3 magnetic elements          Compare the properties of metals and non-metals          State the products formed from various reactions (metal + oxygen, metal + acid, metal + water)          Define and give examples of displacement reactions          Introduce Tier 3 vocabulary</p>	<p>State that dark is the absence of light (KS2 Science)          Recall that light from the sun can be dangerous (KS2 Science)          Explain how shadows are formed (KS2 Science)          Recall that sounds are made by vibrating objects (KS2 Science)</p> <p><b>Waves: Recalled Skills</b>  <i>Change the way an object vibrates by altering the pitch and loudness of a sound (KS2 Science)</i></p> <p><b>Waves: New Knowledge</b>          State the speed of sound          Describe how sound travels          Relate loudness to amplitude          Describe the amplitude of a wave from an oscilloscope trace          Relate frequency to wavelength          Describe the frequency of a wave from an oscilloscope trace          Name parts of the ear          Describe how the ear works          Explain how the ear can be damaged          State the speed of light          Describe how images are formed in a plane mirror in reflection          Describe how light refracts when it enters a medium          Compare what happens when light passes through lenses and transparent materials          Name parts of the eye          Explain how lenses are used to correct vision          Compare colours in terms of their frequency          Introduce Tier 3 vocabulary</p> <p><b>Waves: New Skills</b>          Explain observations were sound is and isn't transmitted          Use drawings of waves to describe how sound waves change with volume          Use drawings of waves to describe how sound waves change with pitch          Label a diagram of the ear          Use ray diagrams of eclipses to explain what observers may see          Use ray diagrams to show how light reflects and forms images          Construct a ray diagram to show how light refracts          Label a diagram of the eye          Use ray diagrams to show how light passes through the lens in the eye          Use the ray model to describe how objects appear different colours</p>
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<p>Gravity cups</p>	<p><b>Reactions: New Skills</b>                  Describe the chemical characteristics of a reaction                  Use indicators to categorise substances as acidic or alkaline                  Describe a method for making a neutral solution from an acid and an alkali                  Predict the salt formed in different neutralisation reactions                  Identify an unknown element from its chemical and physical properties                  Use word equations to represent the reactions of (metal + oxygen, metal + acid, metal + water)                  Predict the outcome of various displacement reactions</p> <p><b>Practical Opportunities</b>                  Circus of chemical and physical reactions                  Testing acids and alkalis with indicators                  Making red cabbage indicator                  Strong and weak acid practical                  Neutralisation experiments with indigestion remedies                  Making salts                  Testing conductivity of metals and non-metals                  Metals and acid practical                  Burning metals in oxygen                  Demo Group 1 metals with water                  Displacement reactions</p> <p><b>Electricity: Recalled Knowledge</b>                  State that appliances run on electricity (KS2 Science)                  Recall that a bulb will light if there is a battery and a complete loop (KS2 Science)                  Identify and compare conductors and insulators (KS2 Science)                  State that bulbs will get brighter if there are more cells in a circuit (KS2 Science)</p> <p><b>Electricity : Recalled Skills</b>                  Construct working circuits safely (KS2 Science)                  Use symbols when drawing electrical circuits (KS2 Science)</p> <p><b>General Scientific Enquiry Skills.</b>                  Ask scientific questions                  Plan investigations                  Record data                  Analyse patterns in data                  Evaluate data                  Give conclusions related to the data</p>	<p><b>Practical opportunities</b>                  Measure the speed of sound                  signal generator to identify changes in frequency and amplitude                  create a model ear                  measure the brightness of light with increasing distance                  specular and diffuse reflection                  light colour mixing                  Cows eye dissection</p> <p><b>Earth: Recalled Knowledge</b>                  Recall how sedimentary, igneous and metamorphic rocks were formed (KS2 Science)                  State that the earth and other planets orbit the Sun (KS2 Science)                  Define the term moon and explain how the moon orbits the earth (KS2 Science)                  Explain why we have day and night (KS2 Science)</p> <p><b>Earth: Recalled Skills</b>                  Classify rocks according to their properties (KS2 Science)</p> <p><b>General Scientific Enquiry Skills.</b>                  Ask scientific questions                  Plan investigations                  Record data                  Analyse patterns in data                  Evaluate data                  Give conclusions related to the data</p> <p><b>Earth: New Knowledge</b>                  Name and compare the 3 rock layers in the earth                  Describe how sedimentary, igneous and metamorphic rocks are formed                  Give examples of sedimentary, igneous and metamorphic rocks                  List the processes that lead to igneous, sedimentary and metamorphic rocks being interconverted                  Describe the properties of ceramics                  List and categorise the objects you can see in the night sky                  Describe the solar system                  Name some of the phases of the moon                  Explain why we see some of the phases of the moon                  Introduce Tier 3 vocabulary</p>
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	<p><b><u>Electricity: New Knowledge</u></b>                  Define potential difference and explain how it affects the way circuits work                  Define resistance and explain how it affects how components work                  Describe the pd across series and parallel circuits                  Compare series and parallel circuits                  Describe what is meant by current                  Describe what happens to current in series and parallel circuits                  Describe the properties of an electric field                  State how charged objects interact                  Introduce Tier 3 vocabulary</p> <p><b><u>Electricity: New Skills</u></b>                  Use an analogy to explain potential difference                  Draw circuit diagrams that measure potential difference                  Use a formula to calculate resistance                  Make circuits and describe what components with resistance do                  Use an analogy to explain resistance                  Make series and parallel circuits from circuit diagrams                  Use a diagrams to explain how objects become charged up</p> <p><u>Practical opportunities</u>                  Van de graaff generator and acetate rod practical                  Measure and investigate current                  Measure and investigate potential difference                  Investigating the resistance of a wire                  Series and parallel comparison</p>	<p><b><u>Earth: New Skills</u></b>                  Classify rocks according to their properties</p> <p><b><u>Practical Opportunities</u></b>                  Investigation of sedimentary, igneous and metamorphic rocks                  Make a volcano</p>
Christmas Holiday	Easter Holiday	Summer Holiday

Year 8

Term 1	Term 2	Term 3
<p><b><u>Forces: Recalled Knowledge</u></b>                  State some forces require contact between two objects (KS2 Science (Y7 Forces: Introduction to forces)                  Give examples of some common forces (air resistance, gravity, friction) (KS2 Science, Y7 Forces: Introduction to Forces)</p> <p><b><u>Forces: Recalled Skills</u></b></p>	<p><b><u>Reactions: Recalled Knowledge</u></b>                  Recall that chemical reactions are not easily reversible (Y7 Reactions: Chemical reactions)                  List the signs that indicate a chemical reaction may have taken place (Y7 Reactions: Chemical Reactions)                  Explain what happens in burning reactions (KS2 Science, Y7 Reactions: Chemical reactions of metals and non-metals)</p>	<p><b><u>Genes: Recalled Knowledge</u></b>                  Define the term adaptation and give examples of adaptations (KS2 Science, Y7 Genes, Adapting to change)                  Recall that living things change over time and fossils provide evidence of that change (KS2 Science)</p>

<p><i>Explain that the shapes of solid objects can be changed by squashing, bending and twisting (KS2 Science)</i></p> <p><u>General Scientific Enquiry Skills.</u>                  Ask scientific questions                  Plan investigations                  Record data                  Analyse patterns in data                  Evaluate data                  Give conclusions related to the data</p> <p><b><u>Forces: New Knowledge</u></b>                  Describe what happens to a moving object when the resultant force is zero                  Define the terms drag and equilibrium                  Describe the factors that affect the size of the drag force                  Describe how forces deform objects                  Define the term linear relationship                  Describe what is meant by a moment                  Describe how fluids exert pressure                  Explain the relationship between atmospheric pressure and height                  State the relationship between liquid pressure and depth                  Explain how hydraulic machines work                  Define the term upthrust                  Explain why some objects float and some objects sink and link this to upthrust                  Define the term stress                  Explain the effect of solid surfaces on each other using the term stress                  Introduce Tier 3 vocabulary</p> <p><b><u>Forces: New Skills</u></b>                  Draw the forces acting on an object in contact situations                  Use Hooke's law to show how the extension of a spring is altered in different situations                  Calculate the moment of a turning force                  Calculate pressure in fluids in a variety of situations                  Use particle diagrams to demonstrate how pressure is exerted</p> <p><b><u>Practical Opportunities</u></b>                  Friction experiment                  Dropping cup cake cases experiment                  Extension of a spring experiment                  Seesaw experiment</p>	<p><b><u>Reactions: Recalled Skills</u></b>  <i>Name the different parts of a written word equation (Y7 Reactions, Chemical reactions of metals and non-metals )</i>  <i>Represent reactions as word equations (Y7 Reactions, Chemical reactions of metals and non-metals)</i></p> <p><u>General Scientific Enquiry Skills.</u>                  Ask scientific questions                  Plan investigations                  Record data                  Analyse patterns in data                  Evaluate data                  Give conclusions related to the data</p> <p><b><u>Reactions: New Knowledge</u></b>                  Describe the model of chemical change and conservation of mass                  State what happens during combustion                  State the energy transfer involved in combustion                  State what happens during thermal decomposition                  State what is meant by conservation of mass                  Compare exothermic and endothermic reactions                  Identify whether an energy level diagram is showing an exothermic or endothermic reaction                  State what happens to bonds in chemical reactions                  Introduce Tier 3 vocabulary</p> <p><b><u>Reactions: New Skills</u></b>                  Write word equations for chemical reactions (combustion, thermal decomposition)                  Use particle diagrams to represent chemical reactions (combustion, thermal decomposition)                  Predict the products formed from combustion, thermal decomposition reactions                  Calculate masses of reactants and products                  Balance symbol equations                  Use experimental observations to differentiate between exothermic and endothermic reactions                  Use energy level diagrams to explain energy changes in exothermic and endothermic reactions                  Use bond energies to predict energy changes in reactions</p> <p><b><u>Practical Opportunities</u></b>                  Combustion                  Thermal decomposition of carbonates                  Examples of exothermic and endothermic reactions</p>	<p><i>Living things are not identical to their parents (KS2 Science)</i></p> <p><b><u>Genes: Recalled Skills</u></b></p> <p><u>General Scientific Enquiry Skills.</u>                  Ask scientific questions                  Plan investigations                  Record data                  Analyse patterns in data                  Evaluate data                  Give conclusions related to the data</p> <p><b><u>Genes: New Knowledge</u></b>                  Describe the theory of natural selection and explain why evolution occurs                  State factors that lead to extinction                  Explain the importance of biodiversity in maintaining plant and animal populations                  Define the term "endangered species"                  Describe how characteristics are inherited                  Give the link between DNA, chromosomes and genes                  Explain how a DNA mutation may affect an organism and its future offspring                  Describe the structure of DNA and how scientists worked together to discover its structure                  Compare dominant and recessive alleles                  Explain why offspring are not identical to their parents                  Explain how genetic modification works                  Evaluate the advantages and disadvantages of genetic modification                  Introduce Tier 3 vocabulary</p> <p><b><u>Genes: New Skills</u></b>                  Describe why peer review is necessary                  Evaluate the evidence that led Darwin to develop his theory of natural selection                  List techniques that can be used to prevent extinction                  Use Punnett squares to show how genes are inherited</p> <p><b><u>Practical Opportunities</u></b></p> <p><b><u>Earth: Recalled Knowledge</u></b>  <i>State that the sun heats the surface of the Earth ( KS2 Science, Y7 Earth : The Earth)</i>  <i>Recall that carbon dioxide in the atmosphere causes global warming (KS2 Science)</i></p>
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<p>Demonstrations Pressure in liquids &amp; gases Float or sink activity Stress (Pressure) experiment pressing bungs into plasticine.</p> <p><b><u>Matter: Recalled Knowledge</u></b> Recall that everything is made of particles (KS2 Science, Y7 Matter, The particle model) State that all materials are made up of one or more elements (Y7 Matter, Inside particles) Recall that elements are listed in the periodic table (Y7 Reactions: More about elements) Recall that the metals are listed on the left of the periodic table and the non-metals are listed on the right (Y7 Reactions, More about elements) Differentiate between chemical and physical properties (Y7 Reactions, Chemical reactions)</p> <p><b><u>Matter: Recalled Skills</u></b></p> <p><u>General Scientific Enquiry Skills.</u> Ask scientific questions Plan investigations Record data Analyse patterns in data Evaluate data Give conclusions related to the data</p> <p><b><u>Matter: New Knowledge</u></b> Define the term element, atom, compound and mixture Recall the symbols of 16 elements Compare compounds and mixtures Compare atoms and molecules Describe the structure of a polymer Relate the properties of a polymer to the arrangement of its molecules Relate the group and the period of an element to its properties State the properties and reactivity of the group 1 elements Describe the reactions of the group 1 metals State the properties and reactivity of the group 7 elements Describe the reactions of the group 7 elements State the properties and reactivity of the group 0 elements Describe the reactions of the group 0 elements Introduce Tier 3 vocabulary</p>	<p><b><u>Energy: Recalled Knowledge</u></b> Recall that vibrations from sounds pass through a medium to the ear (KS2 Science, Y7 Waves: Sound waves and speed, Y7 Waves: The ear and hearing) State how we see things (via light travelling from a source to the eye) (KS2 Science, Y7 Waves: Light, Y7 Waves: The eye and Vision) Recall that unsupported objects fall towards earth due to gravity (KS2 Science, Y7 Forces, Introduction to Forces, Gravity, Y8 Forces: Friction and drag) Give examples of forces that act between moving surfaces (air resistance, water resistance and friction) ( Y7 Forces, Y7 Forces: Balanced and Unbalanced forces, Y8 Forces: Friction and drag)</p> <p><b><u>Energy: Recalled Skills</u></b></p> <p><u>General Scientific Enquiry Skills.</u> Ask scientific questions Plan investigations Record data Analyse patterns in data Evaluate data Give conclusions related to the data</p> <p><b><u>Energy: New Knowledge</u></b> Define the term work and use the term to explain what simple machines do Compare the work needed to move objects different distances Differentiate between energy and temperature Explain why objects change temperature (using the model of energy loss and gain) Use the particle model to describe how energy is transferred Describe how a thermal insulator can reduce energy transfer State sources of infrared radiation Compare conduction convection and radiation Describe how energy is transferred to the sun Introduce Tier 3 vocabulary</p> <p><b><u>Energy: New Skills</u></b> Show how a lever works diagrammatically Show convention currents diagrammatically Compare insulation methods</p>	<p>State that metals can join with other elements in compounds (Y7 Reactions, Reactions of metals and non-metals Y8 Matte: Compounds) Recall that rocks are mixtures of minerals ( KS2 Science, Y7 Earth: the structure of the earth) Explain how metals are arranged in terms of their reactivity (KS2 Science, Y7 Reactions, More about elements, Y8 Matter: Elements of Group 1)</p> <p><b><u>Earth: Recalled Skills</u></b> Evaluate the impact of global warming on the weather (KS2 Science)</p> <p><u>General Scientific Enquiry Skills.</u> Ask scientific questions Plan investigations Record data Analyse patterns in data Evaluate data Give conclusions related to the data</p> <p><b><u>Earth: New Knowledge</u></b> State the link between increase in greenhouse gases and increase in global temperature Name 2 greenhouse gases Recall the composition of the earth's atmosphere Explain what is meant by global warming List the processes that recycle carbon naturally State one cause of global warming that scientists have evidence for Evaluate the impact of humans on the carbon cycle and global warming Define the term ore Recall the methods of extracting metals State why certain natural resources will run out Explain why recycling is important Describe how the earth's resources are recycled Introduce Tier 3 vocabulary</p> <p><b><u>Earth: New Skills</u></b> Represent the carbon cycle diagrammatically Justify the method of extracting an ore, given a set of data Suggest factors to consider when extracting metals</p> <p><b><u>Practical Opportunities</u></b> Displacement reactions</p>
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<p><b><u>Matter: New Skills</u></b>          Use observations from experiments to explain why a substance must be an element          Represent atoms and molecules using particle diagrams          Use particle diagrams to classify a substance as an element, compound or mixture          Name compounds using their chemical formulae          Use chemical formulae to name the elements present and determine their relative proportions          Represent polymers using particle diagrams          Use data to describe a trend in the physical properties of a set of elements in the periodic table          Use observations to describe trends and predict properties of the group 1 metals          Use observations to describe trends and predict properties of the group 7 elements          Use observations to describe trends and predict properties of the group 0 elements</p> <p><b><u>Practical Opportunities</u></b>          Making compounds          Demo Group 1 elements with water          Displacement reactions of Group 7</p> <p><b><u>Organisms: Recalled Knowledge</u></b>  <i>Evaluate the impact diet, exercise, drugs and lifestyle have on the body (KS2 Science)</i>  <i>State that animals cannot make their own food (KS2 Science, Y7 Ecosystems: Food chains and webs and Energy: Food and fuels )</i>  <i>Recall the different functions of teeth (KS2 Science)</i>  <i>Recall the different parts and function of the digestive system (KS2 Science)</i></p> <p><b><u>Organisms: Recalled Skills</u></b>          Evaluate the amount of nutrition humans need to be healthy (KS2 Science)</p> <p><b><u>General Scientific Enquiry Skills.</u></b>          Ask scientific questions          Plan investigations          Record data          Analyse patterns in data          Evaluate data          Give conclusions related to the data</p>	<p><b><u>Practical Opportunities</u></b>          Definition of work, work done climbing stairs          Measuring Forces using ramps, gears, pulleys and levers          Heating 100ml and 200ml water. Kinetic Theory          Infra-red radiation experiment          Insulation experiment</p> <p><b><u>Ecosystems: Recalled Knowledge</u></b>  <i>State the functions of the parts of a flower and plant (KS2 Science, Y7 Ecosystems, Flowers and pollination)</i>  <i>Recall the requirements for life (KS2 Science, Y7 Ecosystems Competition)</i>  <i>Recall how water is transported in plants (KS2 Science)</i></p> <p><b><u>Ecosystems: Recalled Skills</u></b></p> <p><b><u>General Scientific Enquiry Skills.</u></b>          Ask scientific questions          Plan investigations          Record data          Analyse patterns in data          Evaluate data          Give conclusions related to the data</p> <p><b><u>Ecosystems: New Knowledge</u></b>          State what happens during aerobic respiration          Compare aerobic and anaerobic respiration          Relate specific activities to aerobic and anaerobic respiration          Describe how bread, beer and wine are made          Recall how plants make glucose using photosynthesis          List the resources needed for photosynthesis and describe how they are obtained          Describe the structure and function of the main components of a leaf          Explain how a leaf is adapted for photosynthesis          State the factors that affect the rate of photosynthesis          Explain how fertilisers are used          Give the role of nitrates, phosphates, potassium and magnesium in plant growth          Introduce Tier 3 vocabulary</p> <p><b><u>Ecosystems: New Skills</u></b>          Use a word equation to represent aerobic respiration          Use a word equation to represent anaerobic respiration          Use a word equation to represent fermentation</p>	<p>Demonstration of electrolysis</p>
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<p><b><u>Organisms: New Knowledge</u></b>  Describe the function of the gas exchange system and relate it to its function  Explain why your breathing rate and volume can change  Compare the processes of inhaling and exhaling  Evaluate the impact of smoking, exercise and asthma on the gas exchange system  Differentiate between medicinal and recreational drugs  Evaluate the effects of drugs (in particular alcohol and tobacco) on health and behaviour, pregnancy and conception)  Recall the colloquial name for ethanol  List the components of a healthy diet  Compare the nutritional components of different foods and diets  Describe the effects of deficiencies and excesses of nutrients on an individual's health  Recall how you obtain and use energy  State the health impact cause by unbalanced diets  State what happens during digestions  Define the term enzyme and give their role in the digestive system  Describe the role of bacteria in the digestive system  Relate the structure of the parts digestive system to their function  Introduce Tier 3 vocabulary</p> <p><b><u>Organisms: New Skills</u></b>  Use the bell-jar model to explain what happens during breathing  Describe how to test for starch, lipids, sugar and protein and state the positive test for these nutrients  Calculate the energy requirements of individuals of differing lifestyles  Label a diagram of the digestive system  Explain what happens to the nutrients in a meal as they pass through the digestive system</p> <p><b><u>Practical Opportunities</u></b>  Comparing inhaled and exhaled air  Measuring volume of exhaled air Vs height  Reaction time practical  Food tests  Energy in food practical  Demo H<sub>2</sub>O<sub>2</sub> prac  Enzyme practical</p>	<p>Use a word equation to represent photosynthesis  Represent the limiting factors of photosynthesis graphically  Describe how to test a leaf for starch</p> <p><b><u>Practical Opportunities</u></b>  Effect of exercise on breathing rates  Rate of fermentation  Pondweed demo (using computer simulation)  Observing the stomata of a leaf  Testing a leaf for starch</p> <p><b><u>Waves: Recalled Knowledge</u></b>  <i>Recall that light from the sun can be dangerous (KS2 Science)</i>  <i>Explain how light is reflected from surfaces (KS2 Science Y7)</i>  <i>Waves: Light)</i>  <i>State that sounds are made by vibrating objects (KS2 Science, Y7)</i>  <i>Waves: Sound waves and speed)</i>  <i>Describe how sounds are made by waves travelling through a medium (KS2 Science, Y7)</i>  <i>Waves: Sound waves and speed, Y7)</i>  <i>Waves: The ear and hearing)</i></p> <p><b><u>Waves: Recalled Skills</u></b>  <u>General Scientific Enquiry Skills.</u>  Ask scientific questions  Plan investigations  Record data  Analyse patterns in data  Evaluate data  Give conclusions related to the data</p> <p><b><u>Waves: New Knowledge</u></b>  Describe how sound transfers energy  Explain how a microphone and loudspeaker work  List the various parts of the electromagnetic spectrum  Explain the effect of radiation on living cells  Explain, in terms of frequency, the relative impact of electromagnetic waves on living cells  Compare transverse and longitudinal waves  Describe what happens when waves superimpose  Introduce Tier 3 vocabulary</p> <p><b><u>Waves: New Skills</u></b>  Relate amplitude and frequency to energy</p>	
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<p><b><u>Electromagnets: Recalled Knowledge</u></b>  <i>Recall that magnetic forces act at a distance (KS2 Science, Y7 Forces: Gravity)</i>  <i>State some magnetic materials (KS2 Science, Y7 Reactions: More about elements)</i>  <i>Explain that magnets attract and repel each other, and attract and repel some materials but not others (KS2 Science)</i></p> <p><b><u>Electromagnets: Recalled Skills</u></b></p> <p><b><u>Electromagnets: New Knowledge</u></b>          Describe how magnets interact          Describe how to make an electromagnet          Relate the distance of an electromagnet to its strength          Explain how electric bells, circuit breakers, and loudspeakers work          Evaluate the use of an electromagnet over a permanent magnet          Introduce Tier 3 vocabulary</p> <p><b><u>Electromagnets: New Skills</u></b>          Explain observations about navigation using the Earth's magnetic field          Interpret magnetic field diagrams          Use a magnetic field diagram to explain how to make an electromagnet and to change its strength</p> <p><b><u>Practical Opportunities</u></b>          Permanent magnet experiments          Magnetic fields around magnet</p>	<p>Use wave models to compare longitudinal and transverse waves          Use models to explain wave behaviour</p> <p><b><u>Practical Opportunities</u></b>          Demonstrate slinky for longitudinal wave, CRO, vibrating plate and ultrasound          Introducing electromagnetic spectrum          Demo Transverse wave (and longitudinal), examples of each with slinky basic and go through wave form          Use ripple tank to demonstrate reflection</p> <p><b><u>Reactions: Recalled Knowledge</u></b>  <i>Recall that chemical reactions are not easily reversible (Y7 Reactions: Chemical reactions)</i>  <i>List the signs that indicate a chemical reaction may have taken place (Y7 Reactions: Chemical Reactions)</i>  <i>Explain what happens in burning reactions (KS2 Science, Y7 Reactions: Chemical reactions of metals and non-metals)</i></p> <p><b><u>Reactions: Recalled Skills</u></b>  <i>Name the different parts of a written word equation (Y7 Reactions, Chemical reactions of metals and non-metals )</i>  <i>Represent reactions as word equations (Y7 Reactions, Chemical reactions of metals and non-metals)</i></p> <p><b><u>General Scientific Enquiry Skills.</u></b>          Ask scientific questions          Plan investigations          Record data          Analyse patterns in data          Evaluate data          Give conclusions related to the data</p> <p><b><u>Reactions: New Knowledge</u></b>          Describe the model of chemical change and conservation of mass          State what happens during combustion          State the energy transfer involved in combustion          State what happens during thermal decomposition          State what is meant by conservation of mass          Compare exothermic and endothermic reactions          Identify whether an energy level diagram is showing an exothermic or endothermic reaction          State what happens to bonds in chemical reactions          Introduce Tier 3 vocabulary</p>	
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**Reactions: New Skills**

Write word equations for chemical reactions (combustion, thermal decomposition)  
Use particle diagrams to represent chemical reactions (combustion, thermal decomposition)  
Predict the products formed from combustion, thermal decomposition reactions  
Calculate masses of reactants and products  
Balance symbol equations  
Use experimental observations to differentiate between exothermic and endothermic reactions  
Use energy level diagrams to explain energy changes in exothermic and endothermic reactions  
Use bond energies to predict energy changes in reactions

**Practical Opportunities**

Combustion  
Thermal decomposition of carbonates  
Examples of exothermic and endothermic reactions

**Reactions: Recalled Knowledge**

*Recall that chemical reactions are not easily reversible (Y7 Reactions: Chemical reactions)*  
*List the signs that indicate a chemical reaction may have taken place (Y7 Reactions: Chemical Reactions)*  
*Explain what happens in burning reactions (KS2 Science, Y7 Reactions: Chemical reactions of metals and non-metals)*

**Reactions: Recalled Skills**

*Name the different parts of a written word equation (Y7 Reactions, Chemical reactions of metals and non-metals )*  
*Represent reactions as word equations (Y7 Reactions, Chemical reactions of metals and non-metals)*

**General Scientific Enquiry Skills.**

Ask scientific questions  
Plan investigations  
Record data  
Analyse patterns in data  
Evaluate data  
Give conclusions related to the data

**Reactions: New Knowledge**

Describe the model of chemical change and conservation of mass  
State what happens during combustion  
State the energy transfer involved in combustion

State what happens during thermal decomposition  
State what is meant by conservation of mass  
Compare exothermic and endothermic reactions  
Identify whether an energy level diagram is showing an exothermic or endothermic reaction  
State what happens to bonds in chemical reactions  
Introduce Tier 3 vocabulary

**Reactions: New Skills**

Write word equations for chemical reactions (combustion, thermal decomposition)  
Use particle diagrams to represent chemical reactions (combustion, thermal decomposition)  
Predict the products formed from combustion, thermal decomposition reactions  
Calculate masses of reactants and products  
Balance symbol equations  
Use experimental observations to differentiate between exothermic and endothermic reactions  
Use energy level diagrams to explain energy changes in exothermic and endothermic reactions  
Use bond energies to predict energy changes in reactions

**Practical Opportunities**

Combustion

Thermal decomposition of carbonates

Examples of exothermic and endothermic reactions

**Reactions: Recalled Knowledge**

*Recall that chemical reactions are not easily reversible (Y7*

*Reactions: Chemical reactions)*

*List the signs that indicate a chemical reaction may have taken place (Y7 Reactions: Chemical Reactions)*

*Explain what happens in burning reactions (KS2 Science, Y7*

*Reactions: Chemical reactions of metals and non-metals)*

**Reactions: Recalled Skills**

*Name the different parts of a written word equation (Y7 Reactions, Chemical reactions of metals and non-metals )*

*Represent reactions as word equations (Y7 Reactions, Chemical reactions of metals and non-metals)*

**General Scientific Enquiry Skills.**

Ask scientific questions

Plan investigations

Record data

Analyse patterns in data

	<p>Evaluate data Give conclusions related to the data</p> <p><b>Reactions: New Knowledge</b> Describe the model of chemical change and conservation of mass State what happens during combustion State the energy transfer involved in combustion State what happens during thermal decomposition State what is meant by conservation of mass Compare exothermic and endothermic reactions Identify whether an energy level diagram is showing an exothermic or endothermic reaction State what happens to bonds in chemical reactions Introduce Tier 3 vocabulary</p> <p><b>Reactions: New Skills</b> Write word equations for chemical reactions (combustion, thermal decomposition) Use particle diagrams to represent chemical reactions (combustion, thermal decomposition) Predict the products formed from combustion, thermal decomposition reactions Calculate masses of reactants and products Balance symbol equations Use experimental observations to differentiate between exothermic and endothermic reactions Use energy level diagrams to explain energy changes in exothermic and endothermic reactions Use bond energies to predict energy changes in reactions</p> <p><b>Practical Opportunities</b> Combustion Thermal decomposition of carbonates Examples of exothermic and endothermic reactions and refraction</p>	
Christmas Holiday	Easter Holiday	Summer Holiday

Year 9 is the bridging year between KS3 and KS4, for this reason, the year is used to build a strong and secure understanding of the core concepts required to understand the GCSE curriculum. Y9 aims to review and recap all key learning from key stage 3 but to build on this so that knowledge can be applied and therefore made secure. For example, students cover energy in Y7 and Y8, looking at transfers and the uses of energy. In Y9, we support students in applying this knowledge to generating electricity and evaluating different sources of energy generation in different unfamiliar contexts. Students in Y9 will then apply this knowledge further in all three disciplines when in KS4, for example, exothermic and endothermic reactions, forces and acceleration, waves and radiation.

Students are assessed at the start of Y9, on the core concepts developed over the past 2 years. This allows staff to plan intervention, through lessons, retrieval and review activities to ensure this core threshold knowledge is secure, allowing students to develop their understanding further.

Year 9 allows students to explore these core concepts in more detail, with the difficulty slowly increasing. As the year progresses students are exposed to increasing exam questions, to start developing their exam language, to allow them to display and apply their knowledge. This incremental development allows students to transition from Y8 to y10 in a supportive manner to maximise their progress.

Students are assessed throughout the curriculum to determine that appropriate intervention is put in place to address misconceptions. To support students in developing their scientific understanding, certain lessons have assessments linked to them. These assessments are part of the learning journey, and staff mark these to provide students with feedback to act upon. The curriculum also utilises peer and self-assessment to ensure students are aware of their successes and how to progress further.

Year 9

Term 1	Term 2	Term 3
<p><b>Cell Biology</b>  <b><u>New :Skills</u></b>                      Calculating magnification, actual and image size                      Order of magnitude                      Calculating percentage change and plotting graphs                      Calculating surface area:volume                      Required practical - Producing microscope slides</p>	<p><b>Organisation 1 Digestion</b>  <b><u>New :Skills</u></b>                      Using equipment safely to carry out food tests for starch, glucose, protein and lipids                      Investigating the impact of an inorganic catalyst and an enzyme – collecting oxygen over water                      Required practical – the effect of pH on enzyme action                      Interpreting graphs</p>	<p><b>Particle model</b>  <b><u>Recalled Skills</u></b>                      Use of thermometer                      Use of stop clock                      Calculating stress (Pressure on surface). (yr8 Forces)                      Calculating density (yr7 matter)                      Use of displacement can (yr7 matter)</p>

<p>Required practical – osmosis – the effect of concentration on potato cells</p> <p><b>Recalled Skills</b> Using a microscope (Organisms Y7 – observing cells) Producing microscope slides – cheek cells, onion cells (Organisms Y7 – observing cells)</p> <p><b>New Knowledge</b> What we can see under the electron microscope - and how to calculate magnification. The similarities and differences between prokaryotic and eukaryotic cells and orders of magnitude. The roles of osmosis and active transport in the movement of materials in and between cells. The type of cell division that forms the gametes and the way normal body cells grow and divide</p> <p><b>Recalled Knowledge</b> What cells look like under a light microscope? (Organisms Y7 – observing cells) The similarities and differences between plant and animal cells. (Organisms Y7 – plant &amp; animal cells) The role of diffusion in the movement of materials in and between cells. (Organisms Y7 – movement of substances) Similarities/differences between animal and plant cells Cell specialisation (Organisms Y7 – specialised cells)</p> <p><b>Practical Opportunities</b> Required practical - Producing microscope slides Required practical – osmosis – the effect of concentration on potato cells</p>	<p>Locating pulse</p> <p><b>Recalled Skills</b> Drawing graphs Measuring breathing and heart rate (Organisms Y8 – gas exchange &amp; breathing) Finding means and estimating</p> <p><b>New Knowledge</b> The way the structure of enzymes is related to their function. Surface area: volume ratios and the adaptations of the alveoli of the lungs for effective gas exchange. The importance of ventilating the lungs and the gills of fish to maintain steep concentration gradients.</p> <p><b>Recalled Knowledge</b> The importance of the digestive system. (Organisms Y8 – digestive system; bacteria &amp; enzymes in digestion) The basic structure and function of the human gas exchange system. (Organisms Y8 – gas exchange &amp; breathing) The mechanism of breathing. (Organisms Y8 – gas exchange &amp; breathing)</p> <p><b>Practical Opportunities</b> Required practical – food tests for starch, glucose, protein and lipids Investigating the impact of an inorganic catalyst and an enzyme Required practical – the effect of pH on enzyme action Interpreting graphs Breaking down protein using pepsin</p>	<p><b>Recalled Knowledge</b> Pressure in liquids &amp; gases). (yr8 Forces) Stress (Pressure on solid surface). (yr8 Forces)</p> <p><b>Skills: Enquiry processes.</b> Asking science questions Planning investigations Recording data Analysing patterns Evaluating data</p> <p><b>New Skills</b> Cooling curve for Salol Measuring specific Latent heat</p> <p><b>New Knowledge</b> Density Required Solids, Liquids and gases Changes of state Internal energy Latent heat Gas pressure &amp; temperature</p> <p><b>Practical Opportunities</b> Heating Ice Water /Water vapour Cooling curve for salol Demo Latent heat of Fusion &amp; Vaporisation. Latent heat of fusion and vaporisation demos. Demo Press in liquids &amp; gases. Density Required Practical</p>
<p>Energy</p> <p><b>Recalled Skills</b> Use of thermometer/Use of stop clock. (yr7 Energy) Conduction, Convection &amp; Radiation (yr8 Energy) Testing Insulation experiment (yr8 Energy) Finding energy in fuel &amp; food (yr7 Energy)</p> <p><b>Recalled Knowledge</b> Kinetic Theory of matter (yr8 Energy) Energy and temperature (yr8 Energy) Conduction/Convection/Infra-red radiation (yr8 Energy) Insulation (yr8 Energy) Energy resources. (yr7 Energy) Generating electricity. (yr7 Energy) Renewable &amp; non-renewable sources. (yr7 Energy)</p>	<p>Bonding</p> <p><b>Recalled knowledge</b> <i>There are three states of matter (y7 matter)</i> <i>The arrangement of particles within solids, liquids and gases. (y7 matter)</i> <i>The movement of particles within solids, liquids and gases. (y7 matter)</i> <i>The processes of melting and freezing. (y7 matter)</i> <i>The processes of evaporation and condensation (y7 matter)</i> <i>The differences between compounds and elements (y9 term 1)</i> <i>The properties (and examples) of metals and non-metals</i> <i>To use atomic structure to explain patterns in reactivity in the periodic table. (y9 term 2)</i></p>	<p><b>Organisation 2 Respiratory/Circulatory</b></p> <p><b>New Skills</b> Calculating change in breathing/heart rate Investigating aerobic respiration in living organisms Interpreting graphs of the body's response to exercise</p> <p><b>Recalled Skills</b> Measuring heart rate</p> <p><b>New Knowledge</b> Word &amp; symbol equations for aerobic &amp; anaerobic respiration How an oxygen debt builds up during anaerobic respiration in your muscles. Metabolic reactions and the role of the liver</p>

<p>Work done = Energy transferred &amp; work done by a force. (yr8 Energy)  Machines Measuring; ramps, gears, pulleys and levers (yr8 Energy)  Chemical energy in food and fuels (yr7 Energy)  Energy and power (yr8 Energy)  Energy adds up (yr7 Energy)  Energy dissipation (yr7 Energy)</p> <p>Skills: <u>Enquiry processes.</u>  Asking science questions  Planning investigations  Recording data  Analysing patterns  Evaluating data</p> <p><b>New Skills</b>  Finding specific heat capacity  Calculating power of heater and energy transferred.  Calculating work, gravitational potential energy, kinetic energy and elastic potential energy.</p> <p><b>New Knowledge</b>  Kinetic theory of matter  Energy transfer by conduction  Energy transfer by convection  Energy transfer by radiation  Insulation  Changes in energy stores  Conservation of energy  Definition of work  Calculating work done by a Force  Calculating gravitational potential energy  Calculating kinetic energy &amp; elastic potential energy.  Energy Dissipation  Energy and efficiency  Electrical devices and efficiency  Energy and Power  Paying for electricity  Energy demands. Renewable &amp; Non Renewable Sources  Non Renewable sources. Thermal power stations  Renewable sources  Environmental considerations  Supply and demand. Pump storage.</p> <p><b>Practical Opportunities</b></p>	<p><i>To explain the difference between metals and non-metals in terms of their atomic structures and bonding (y9 term 2)</i></p> <p><b>Recalled skills:</b>  <i>Describe the arrangement of particles within solids, liquids and gases and link this to energy of particles (y8 matter.)  Draw diagrams to represent the particles within solids, liquids and gases. (y8 matter)  Draw and interpret cooling curves and heating curves when given exemplar data (y8 matter)  Determine the atomic structure of an atom when presented with the appropriate information. (y9 term 2)</i></p> <p><u>General Scientific Enquiry Skills.</u>  Ask scientific questions  Plan investigations  Record data  Analyse patterns in data  Evaluate data  Give conclusions related to the data</p> <p><b>New Knowledge.</b>  Ions are formed when atoms gain or lose electrons.  Group 1 atoms form positive ions (+1)  Group 7 atoms form negative ions (-1)  Positive ions are attracted to negative ions. This is ionic bonding.  Ionic compounds have high melting points.  Ionic compounds form giant lattices  Ionic compounds conduct electricity when molten or dissolved in water.  When non-metals join, covalent bonds form.  Covalent bonds are a shared electron pair.  Small covalent molecules have low melting points.  Giant covalent structures have high melting points  Examples of substances which contain covalent bonding.  Metals contain metallic bonding.</p> <p><b>New Skills</b>  Draw diagrams to show the formation of positive or negative ions by loss or gain of electrons.  Recognise the charge on an ion dependant on the group in the periodic table.  Recognise ionic compounds  Draw diagrams and describe how ionic bonds are formed.  Explain why ionic compounds have high melting point  Recognise covalent compounds  Draw diagrams and describe how covalent bonds are formed.</p>	<p>Structure of the heart  Structure of the lungs  How the heart and lungs are adapted to their roles  Structure of blood vessels and function  Composite of the blood  CHD and factors effecting risk  Treating heart problems, evaluating the use of stents and statins</p> <p><b>Recalled Knowledge</b>  The differences between aerobic and anaerobic respiration.  The role of the heart and the lungs in respiration  How lifestyle can impact upon health</p> <p><b>Practical Opportunities</b>  Investigating respiration in living organisms  Making lactic acid – anaerobic activities  Testing fitness – Harvard Step Test</p>
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<p>Heating different volumes of water.                  Conduction through metal rods. Drawing pins, vaseline.                  Demo convection experiments. Snake spinners.                  Heating and cooling by IR. Leslies cube IR thermometer                  Insulation RP                  Demo model power station. Structure of coal power station                  Energy Circus experiment                  Calculating work e.g. climbing stairs</p> <p>Atomic structure and Periodic table  <b>Recalled knowledge.</b>  <i>Recall that everything is made of particles (KS2 Science, Y7 Matter, The particle model)</i>  <i>State that all materials are made up of one or more elements (Y7 Matter, Inside particles)</i>  <i>Recall that elements are listed in the periodic table (Y7 Reactions: More about elements)</i>  <i>Recall that the metals are listed on the left of the periodic table and the non-metals are listed on the right (Y7 Reactions, More about elements)</i>  <i>Differentiate between chemical and physical properties (Y7 Reactions, Chemical reactions)</i>  <i>Recall simple model of the atom, representing atoms as hard, solid spheres of differing sizes and masses.</i>  <i>Recall differences between atoms, elements and compounds</i>  <i>Recall how to use chemical symbols and formulae to represent elements and compounds.</i>  <i>Recall how to represent chemical reactions using formulae and chemical equations</i>  <i>Recall that elements are made up of only one type of atom (matter y7 and 8)</i>  <i>Group 1 and 7 elements (matter y8)</i>  <i>How patterns in reactions can be predicted with reference to the periodic table</i></p> <p><b>Recalled skills:</b>  <i>State the different parts of a reaction (products and reactants) (KS2 Science)</i>  <i>Use reactions to differentiate between reversible and non-reversible reactions (KS2 Science)</i>  <i>Simple separating techniques, filtration, distillation, crystallisation, and chromatography.</i>  <i>Write the definition of atoms, elements, molecules (y8 matter)</i>  <i>Label the position of metals and non-metals on a periodic table.</i></p>	<p>Explain why small covalent molecules have low melting point.                  Explain why giant ionic structures have high melting points.                  Describe the bonding in NaCl, graphite, diamond, graphene, fullerenes.                  Describe the bonding found in metals and explain why metals can conduct electricity                  Explain why metals can conduct electricity.</p> <p><b>Practical Opportunities</b>                  Conductivity of ionic / covalent structures.                  Use of model kits</p>	
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Identify the elements (and the number of their atoms) present from given formulae.

Identify the elements from given symbols.

Explain what groups and periods are.

Explain that there are trends in the periodic table.

#### General Scientific Enquiry Skills.

Ask scientific questions

Plan investigations

Record data

Analyse patterns in data

Evaluate data

Give conclusions related to the data

#### **New Knowledge**

Atoms are made up of differing numbers of three different subatomic particles.

To relate the numbers of subatomic particles to the position within the periodic table.

To learn about the history of the atom and how we arrived at our current nuclear model.

To explain the formulae of elements and compounds, knowing the structure of the atoms and the type of bonding involved.

To define the terms mixture and compounds and explain the differences between them.

The development of the periodic table over time

How atomic structure is linked to the periodic table.

To use atomic structure to explain patterns in reactivity in the periodic table.

To explain the difference between metals and non-metals in terms of their atomic structures and bonding

How metals and non-metals differ (structure of the atoms and position in periodic table)

Why noble gases are so unreactive.

Trends in reactivity within groups 1 and 7, and why they occur (link to atomic structure)

#### **New Skills**

Identify the numbers of sub-atomic particles in a given atom.

Draw diagrams to represent the numbers of sub-atomic particles in a given atom.

Identify the scientists and their impact on our understanding of the structure of an atom.

To understand which separation methods are suitable for which mixtures, why and how to perform these techniques.

<p>Introduce Tier 3 vocabulary List the names and contribution of the scientists involved in composing the periodic table. Compare their models. Calculate and draw the structure of atoms Name the groups 1, 7 and 0. Identify the elements within group 1, 7 and 0. Explain the trends in group 1 and 7. Predict outcomes of reactions within group 1 and 7. Explain the lack of reactivity within group 0</p> <p><b>Practical Opportunities</b> Filtration Chromatography Distillation Crystallisation Reactions of group 1 (demo) Reactions of group 7 (displacement reactions)</p>		
<b>Christmas Holiday</b>	<b>Easter Holiday</b>	<b>Summer Holiday</b>