



# Science Faculty Curriculum Overview

KS4 offers the opportunity for students to expand and apply the knowledge developed over Y7-9, for example applying knowledge of human cell structure and inheritance from KS3 and applying this knowledge in to understanding a wide range of scientific processes and phenomena including genetics, genetic diseases and punnet squares as well as selective breeding, genetic engineering, evolution and biodiversity.

To support retrieval of the key concepts developed prior to year 10, students in KS4 are given the opportunity to recall and retrieve key knowledge through strategic homework, retrieval and set revision periods before whole school assessments. Although, students are exposed to an ever-increasing level of exam questions to support preparation for final examinations, the curriculum is still designed to develop a curiosity for science, by going beyond the mark scheme.

KS4, offers students the opportunity to select triple science as an option, these students follow the same teaching order as trilogy, however, with additional content. Both triple science and trilogy aim to develop students' readiness for next steps including an increased profile for further education/training in the scientific field.

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 10

Term 1	Term 2	Term 3
<p><b>Respiration</b>  <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>                      Changes during exercise</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><b>Recalled Knowledge</b>                      The differences between aerobic and anaerobic respiration.</p> <p><b>Practical Opportunities</b>                      Investigating respiration in living organisms                      Making lactic acid – anaerobic activities                      Testing fitness – Harvard Step Test</p> <p><b>Infection and response</b>  <b>New Skills</b>                      Interpreting correlations                      How to prepare uncontaminated culture of bacteria on sterile agar plates                      Calculating the number of bacteria in a population                      Required practical- Investigating the effect of disinfectants and antibiotics                      Calculating the effect of disinfectants and antibiotics on bacterial growth</p> <p><b>Recalled Skills</b>                      Graph work                      Calculating area using <math>A = \pi r^2</math>                      Order of magnitude (Y9 – Biology B1 – cell structure &amp; transport)</p> <p><b>New knowledge</b></p>	<p><b>Bioenergetics (photosynthesis)</b>  <b>New Skills</b>                      Light intensity and how to measure the rate of photosynthesis                      Testing leaves for starch using ethanol in a safe manner                      Evidence for transpiration through xylem using celery                      Investigating stomata – practical (nail varnish)                      Measuring transpiration rates                      How to use a potometer                      How to use the inverse square law</p> <p><b>Recalled Skills</b>                      Drawing graphs                      Finding means and estimating</p> <p><b>New Knowledge</b>                      Limiting factors of photosynthesis                      Uses of glucose – the product of photosynthesis                      How evaporation and transpiration are controlled in plants.</p> <p><b>Recalled Knowledge</b>                      The basic principles of photosynthesis (Ecosystems Y8 – photosynthesis)                      The role of the leaf stomata in gas exchange in plants. (Ecosystems Y8 – leaves)                      How evaporation and transpiration are controlled in plants. (Ecosystems Y8 – leaves)</p> <p><b>Practical Opportunities</b>                      Required practical – light intensity and the rate of photosynthesis                      Testing leaves for starch</p> <p><b>Chemical changes</b>  <b>Recalled knowledge</b>  <i>Mass is conserved in chemical reactions</i>  <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 differences between atoms, elements and compounds. (y7,8,9 term 1)</i>  <i>Recall how to use chemical symbols and formulae to represent elements and compounds. (y7,8,9 term 1)</i></p>	<p><b>Electricity</b></p> <p><b>Recalled Skills</b>                      Building simple circuits (yr7 Electromagnets)                      Using an Ammeter and Voltmeter (yr7 Electromagnets)</p> <p><b>Recalled Knowledge</b>                      Static electricity (yr7 Electromagnets)                      I, V &amp; R (yr7 Electromagnets)                      series circuits (yr7 Electromagnets)                      parallel circuits (yr7 Electromagnets)                      Skills: Enquiry processes.                      Asking science questions                      Planning investigations                      Recording data                      Analysing patterns                      Evaluating data</p> <p><b>New Skills</b>                      Using variable resistor                      Describing AC and DC on CRO screen                      Wiring a plug</p> <p><b>New Knowledge</b>                      Static electricity                      Electric current and potential difference                      Resistance                      Potential difference - Current characteristics                      Series and parallel circuit.</p> <p>Ac and DC and the national grid.                      Household wiring and 3 pin plug                      Electrical power and potential difference. Choosing a fuse.  <math>E=Pt</math>, <math>P=VI</math> and <math>P=I^2R</math>                      Electrical current and energy transfer. <math>Q=It</math></p> <p><b>Practical Opportunities</b>                      Van de Graaff and perspex/polythene rods charging by friction.                      Circuit tests: Variable resistor and torch bulb. Adjust slider, measure current/note effects.                      Investigating potential differences in series and parallel circuits.</p>

<p>The role of bacteria and other pathogens in human and plant diseases, and how to calculate the effect of antibacterial chemicals by measuring the area of zones of inhibition The impact developing new drugs / drug testing Double blind trials The importance of peer review How to produce monoclonal antibodies &amp; their uses How exercise and smoking can affect the health of other systems of the body The effects of recreational drugs on behaviour, health &amp; life processes</p> <p><b>Recalled Knowledge</b> The importance of bacteria in the human digestive system (Organisms Y8 – bacteria &amp; enzymes in digestion) Binary fission (Organisms Y7 – unicellular organisms) Acid production in the stomach (Biology Y9 – B3 – Organisation &amp; the digestive system) Blood and clotting (Biology Y9 – B4 – Organising plants &amp; animals) The structure of the breathing system (Biology Y9 – B4 – Organising plants &amp; animals) The importance of the phloem (Biology Y9 – B4 – Organising plants &amp; animals) The consequences of imbalances in the diet (Organisms Y8 – unhealthy diets) The impact of exercise and smoking on the human gas exchange system (Organisms Y8 – smoking) The types of food people need to keep them healthy and the impact of poor diet on non-communicable (Organisms Y8 – nutrients)</p> <p><b>Practical Opportunities</b> Required practical- Investigating the effect of disinfectants and antibiotics</p> <p><b>Energy</b> Energy <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)</p>	<p><i>Recall how to represent chemical reactions using formulae and chemical equations (y7,8,9 term 1)</i> Breaking down a compound using heat is known as thermal decomposition (y8 matter) Simple acids and alkalis (y7 reactions) Bases will neutralise acids. (y7 reactions) Salts form when acids and bases react (y7 reactions) <i>Energy cannot be created or destroyed</i> <i>Energy changes take place during chemical reactions</i></p> <p><b>Recalled skills:</b> <i>Writing word equations (y7,8 reactions)</i> <i>Recognising symbol equations (y7,8 reactions)</i> <i>Difference between exothermic and endothermic reactions (reactions y8)</i> <i>Energy progress in a reaction can be displayed using a reaction profile diagram. (reactions y8)</i></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>New Knowledge</b> What happens in electrolysis What type of substance can be electrolysed. Products of electrolysis What happens to ions during electrolysis? How water affects the products of electrolysis Know uses for the products of electrolysis of brine. Extraction of aluminium <i>Triple: Chemical cells and fuel cells</i></p> <p><b>New Skills</b> <i>Recognise that electrolytes must be molten or in aqueous solution</i> <i>Explain the movement of ions within the electrolyte.</i> <i>H tier. Half equations to represent the reactions at the electrodes</i> <i>How to predict the products of the electrolysis of aqueous solution.</i> <i>How to investigate the electrolysis of aqueous solution using inert electrodes.</i></p> <p><b>Practical Opportunities</b></p>	<p>RP How does the resistance of a wire depend on its length? Resistors in series and parallel. RP Investigating V – I characteristics of different components. Investigating an alternating potential difference using an oscilloscope Wiring a plug</p> <p><b>Energy changes</b> <b>Recalled knowledge</b> <i>Mass is conserved in chemical reactions</i> <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 differences between atoms, elements and compounds. (y7,8,9 term 1)</i> <i>Recall how to use chemical symbols and formulae to represent elements and compounds. (y7,8,9 term 1)</i> <i>Recall how to represent chemical reactions using formulae and chemical equations (y7,8,9 term 1)</i> Breaking down a compound using heat is known as thermal decomposition (y8 matter) Simple acids and alkalis (y7 reactions) Bases will neutralise acids. (y7 reactions) Salts form when acids and bases react (y7 reactions) <i>Energy cannot be created or destroyed</i> <i>Energy changes take place during chemical reactions</i></p> <p><b>Recalled skills:</b> <i>Writing word equations (y7,8 reactions)</i> <i>Recognising symbol equations (y7,8 reactions)</i> <i>Difference between exothermic and endothermic reactions (reactions y8)</i> <i>Energy progress in a reaction can be displayed using a reaction profile diagram. (reactions y8)</i></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>New Knowledge</b></p>
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<p>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)                  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: Enquiry processes.                  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</p> <p><b>Practical Opportunities</b></p>	<p>Investigating the electrolysis of aqueous solutions</p> <p><b>Radioactivity</b>  <b>Recalled Skills</b>                  Drawing electron configuration (Y9 structure of the atom)</p> <p><b>Recalled Knowledge</b>                  Pressure in liquids &amp; gases). (yr8 Forces)                  Stress (Pressure on solid surface). (yr8 Forces)                  Structure of the atom (Y9 structure of atom)</p> <p><b>Skills: Enquiry processes.</b>                  Asking science questions                  Planning investigations                  Recording data                  Analysing patterns                  Evaluating data</p> <p><b>New Skills</b>                  Measuring radiation using Geiger Muller tube</p> <p><b>New Knowledge</b>                  Models of the atom                  Discovery of the nucleus                  Using the periodic table and definition of an isotope. alpha, beta &amp; gamma radiation and decay                  Half-life</p> <p><b>Practical Opportunities</b>                  Demo alpha, beta &amp; gamma</p>	<p>Endothermic and exothermic reactions and their transfer of energy                  Uses of exothermic and endothermic energy changes.                  The activation energy of a reaction.                  Know the difference between bond making and bond breaking.                  Know that there is a certain amount of energy associated with each bond.</p> <p><b>New Skills</b>  <i>To distinguish endothermic and exothermic reactions by observing the temperature change</i>  <i>Recognising activation energy when drawing reaction profiles for a reaction.</i>  <i>Identifying exothermic and endothermic reactions from energy</i>                  H tier – the impact of bonding breaking and bond making on overall energy change.                  Calculate overall energy change in reactions.</p> <p><b>Practical Opportunities</b>                  Investigating temperature changes in a variety of reactions</p> <p><b>Rates of reaction</b>  <b>Recalled knowledge</b>  <i>Mass is conserved in chemical reactions</i>  <i>Recall that everything is made of particles (KS2 Science, Y7 Matter, The particle model)</i>  <i>Chemical reactions produce new substances as products y,8 reactions)</i>  <i>Chemical reactions may release gases. (y8 reactions)</i>  <i>Chemical reactions may produce products which are solids. (y8 reactions.</i>  <i>Some reactions are reversible (y7,8 matter, reactions)</i></p> <p><b>Recalled skills:</b>  <i>Writing word equations (y7,8 reactions)</i>  <i>Recognising symbol equations (y7,8 reactions)</i>  <i>Recognising when a chemical reaction takes place</i></p> <p>General Scientific Enquiry Skills.                  Ask scientific questions                  Plan investigations                  Record data                  Analyse patterns in data                  Evaluate data                  Give conclusions related to the data</p>
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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  
 Energy Circus experiment  
 Calculating work e.g. climbing stairs

**Quantitative chemistry**

**Recalled knowledge**

*Mass is conserved in chemical reactions*  
*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 differences between atoms, elements and compounds. (y7,8,9 term 1)*  
*Recall how to use chemical symbols and formulae to represent elements and compounds. (y7,8,9 term 1)*  
*Recall how to represent chemical reactions using formulae and chemical equations (y7,8,9 term 1)*  
 Breaking down a compound using heat is known as thermal decomposition (y8 matter)  
 Simple acids and alkalis (y7 reactions)

**Recalled skills:**

*Writing word equations (y7,8 reactions)*  
*Recognising symbol equations (y7,8 reactions)*  
*Use of indicators to distinguish between acids and alkalis (y7,8 reactions)*  
*Use of universal indicator to establish pH number (y7,8 reactions)*  
*Reactions of acid and bases (y7 reactions)*  
*Reactions of acid and metal*  
*Using the periodic table to identify the relative atomic mass of an element*

**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**

**New Knowledge**

What is meant by the rate of a reaction?  
 The factors that affect rate of reaction.  
 Collision theory  
 What a reversible reaction is.  
 How to represent reversible reactions  
 What happens to the energy transfers in reversible reactions?  
 How a reversible reaction in a closed system can be at equilibrium.  
 H tier- The composition of an equilibrium mixture can be altered by changing conditions.

**New Skills**

How to collect data on the rate of a chemical reaction.  
 How to calculate the mean rate of a chemical reaction  
 How to calculate the rate of a chemical reaction at a specific time.  
 How to use collision theory to explain the effect of surface area, temperature, concentration (pressure in gases) and a catalyst on reaction rate.  
 Determine how changing the pressure affects reversible reactions involving gases.  
 Determine how changing the temperature affects the reversible reaction.

**Practical Opportunities**

The different methods can be used to investigate the rate of different reactions.

**Forces**

**Recalled Skills**

Using newton meter. (yr7 Forces)  
 Calculating speed. (yr7 Forces)

**Recalled Knowledge**

Measuring Forces (yr7 Forces)  
 Balanced and unbalanced forces (yr7 Forces)  
 Speed (yr7 Forces)  
 Distance-time graphs (yr7 Forces)  
 Turning forces (yr8 Forces)

**Skills: Enquiry processes.**

Asking science questions  
 Planning investigations  
 Recording data  
 Analysing patterns



<p>What is meant by the relative atomic mass of an element.          How to calculate the relative atomic mass of an element and a compound.          H tier, how to calculate the number of moles when given the mass of a substance          How to use balanced symbol equations to calculate masses of reactants and products          What the limiting factor is, in a reaction.          To calculate the concentration of solutions.          How some common metals react with water and dilute acids.          Reactivity series of metals          The position of carbon and hydrogen in the reactivity series.          Tendency of metal to form a positive ion depends on reactivity of the metal.          Reaction between metal and acid.          Reaction between acid and bases.          Reaction between acids and alkalis.          Reaction between acids with carbonates</p> <p><b>New Skills</b>          Deduce an order of reactivity of metals based on experimental results          Predict reactions of unfamiliar metals given information about their relative reactivities.          H tier – writing ionic equations.          H tier – identify the species that have been oxidised or reduced.          How to interpret and evaluate processes used to extract metals.          H tier - How to identify redox reactions          How to predict products from given reactants.          How to use the formulae of common ions to deduce the formulae of salts.  <i>Triple: To calculate yield of a reaction</i>  <i>Titration calculations</i></p> <p><b>Practical Opportunities</b>          Observe the reactions of some metals with water and dilute acid.          Use of displacement reactions to identify an order of reactivity          How to prepare pure dry crystals of the salts formed in neutralisation reactions between acids and insoluble bases          How to prepare pure dry crystals of named soluble salts from information provided          Investigate neutralisation</p> <p><b>Particle model</b></p>		<p><b>Evaluating data</b></p> <p><b>New Skills</b>          Calculating acceleration          Using light gates          Using air track          Finding the CoM</p> <p><b>New Knowledge</b>          Vectors and scalars.          Newton's 3rd law.          Resultant forces 7 Newton's 1<sup>st</sup> Law          Turning forces (moments)          Finding COM          Parallelogram of forces          Resolution of forces</p> <p><b>Practical Opportunities</b>          Dropping cupcake cases          See saws experiment. (moments)          Finding COM</p> <p><b>Ecology</b></p> <p><b>New Skills</b>          Finding the range, the mean, the median and the mode          Measuring the population size of a common species using sampling techniques          Investigating competition in plants</p> <p><b>Recalled Skills</b>          Produce a food chain/web (Ecosystems Y7 – Food chains, webs &amp; disruption)          Interpreting food webs (Ecosystems Y7 – Food chains, webs &amp; disruption)</p> <p><b>New Knowledge</b>          How to investigate and measure the distribution and abundance of species in a system          About the competition between organisms for scarce resources, and about the adaptations of organisms that result from natural selection and enable them to compete successfully in specific environments          About the material cycles in nature that return chemicals from the bodies of organisms in the soil, water and air</p>
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<p><b>Recalled Skills</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><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>About the levels of organisation within an ecosystem, including the cyclical relationships between predators and their prey.                  The importance of decomposition and the factors that affect the rate of decay and of compost formation                  The reasons for the human population explosion and its impact in terms of pollution of the land, water, and air. Some of the ways people interact with their environment, and how these ways can have negative or positive effects on biodiversity.                  What is meant by food security and the measures that can be taken to make food production both more efficient and sustainable</p> <p><b>Recalled Knowledge</b>                  Adaptations in plants &amp; animals (Genes Y7 - Adapting to change)                  Competition for resources between individuals and species (Genes Y8 – extinction)                  That plants and animals have different requirements from their environments (Ecosystems Y7 – competition)                  Darwin's theory and about natural selection (Genes Y8 – natural selection)                  That plants need mineral ions and water from the soil, carbon dioxide from the air, and light to make the chemicals they need ( Ecosystems Y8 – photosynthesis)                  Factors that affect the growth of bacterial populations. (Organisms Y7 – unicellular organisms)</p> <p><b>Practical Opportunities</b>                  Required practical - measuring the population size of a common species using sampling techniques                  Investigating competition in plants</p>
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Year 11

Term 1	Term 2	Term 3
<p><b>Paper 1 Revision</b>  <b>Biology/Physics</b></p>	<p><b>Evolution/adaptations</b>  <b>New Skills</b>                  Genetic diagrams – punnet squares</p>	

<p><b>Paper 2 Revision Chemistry</b></p> <p><b>Nervous system/hormones</b></p> <p><b>New Skills</b> How to carry out an investigation into reaction times How to find the blind spot</p> <p><b>Recalled Skills</b> Organs of the reproductive system (Genes Y7 – the menstrual cycle) Fertilisation (Genes Y7 – fertilisation &amp; implantation) The menstrual cycle in simplistic terms (Genes Y7 – the menstrual cycle)</p> <p><b>New Knowledge</b> The differences between sensory and motor neurones and their roles in coordination and control. About the arrangement of tissues in the endocrine organs and how they are adapted to their functions. How the structure of enzymes are related to their functions and how different factor affect the rate of enzyme controlled reactions. How reproduction is controlled by hormones and how hormones can be used in the artificial control of fertility How hormones work together to control the menstrual cycle, and how they can be used in the artificial control of fertility Main areas of the brain Main parts of the human eye and how light is focussed Short –sightedness/long sightedness Kidney function, dialysis and transplants Control of temperature Control of water balance - ADH</p> <p><b>Recalled Knowledge</b> The basic structure of neurones. (Y9 – Biology B1 – cell structure &amp; transport) That tissues can be organised into organs with particular functions in the body (Y9 – Biology B3 – organisation &amp; the digestive system) That enzymes act as biological catalysts. (Y9 – Biology B3 – organisation &amp; the digestive system) The basic processes of human reproduction. (Genes Y7 – human reproduction) The male and female reproductive organs. (Genes Y7 – human reproduction)</p> <p><b>Practical Opportunities</b></p>	<p>How inheritance works Meiosis diagrams How to use genetic family trees Using timescales – standard form</p> <p><b>Recalled Skills</b> Simple reproduction (Genes Y7 – human reproduction) What is DNA (Genes Y8 – DNA) Methods of inheritance (Genes Y7 – inheritance) Selective breeding (Genes Y8 – genetic modification) Using timescales – standard form (Biology B1- The world of the microscope)</p> <p><b>New Knowledge</b> How Charles Darwin built up the evidence for his theory of evolution by natural selection and some of the barriers to the acceptance of his ideas, as well as some of the modern evidence we have for evolution. About new DNA-based systems for classifying organisms.</p> <p><b>Recalled Knowledge</b> The nucleus of the cell and the chromosomes it contains. (Biology B1 – Cell structure &amp; transport; B2 – Cell division) About mitosis and the cell cycle (Biology B2 – Cell division) The process of reproduction (Genes Y7 - reproduction) How inheritance works (Genes Y8 – human reproduction) How biological ideas develop. (all units) About the characteristics of eukaryotic and prokaryotic cells, and the differences between animal, bacterial and plant cells. (Biology B1 – cell structure &amp; transport) Genetics, punnet squares, selective breeding</p> <p><b>Practical Opportunities</b> N/A</p> <p><b>Energy changes</b></p> <p><b>Recalled knowledge</b> <i>Mass is conserved in chemical reactions</i> <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 differences between atoms, elements and compounds. (y7,8,9 term 1)</i> <i>Recall how to use chemical symbols and formulae to represent elements and compounds. (y7,8,9 term 1)</i></p>	
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<p><b>Required practical - How to carry out an investigation into reaction times</b> How to find the blind spot</p> <p><b>Reproduction/Genetics</b> <b>New Skills</b> Genetic diagrams – punnet squares How inheritance works Meiosis diagrams How to use genetic family trees Using timescales – standard form</p> <p><b>Recalled Skills</b> Simple reproduction (Genes Y7 – human reproduction) What is DNA (Genes Y8 – DNA) Methods of inheritance (Genes Y7 – inheritance) Selective breeding (Genes Y8 – genetic modification) Using timescales – standard form (Biology B1- The world of the microscope)</p> <p><b>New Knowledge</b> About the DNA that makes up the chromosomes, about the variants of the genes known as alleles, and how all the DNA of an organism can be analysed. About meiosis in cell division and the formation of gametes. How information is passed from one generation to another and how to use genetic diagrams, direct proportion, simple ratios, and probability to predict the outcome of a genetic cross. About the importance of selective breeding in the development of plants and animals and the increasing use of genetic engineering to introduce desirable characteristics.</p> <p><b>Recalled Knowledge</b> The nucleus of the cell and the chromosomes it contains. (Biology B1 – Cell structure &amp; transport; B2 – Cell division) About mitosis and the cell cycle (Biology B2 – Cell division) The process of reproduction (Genes Y7 - reproduction) How inheritance works (Genes Y8 – human reproduction) How biological ideas develop. (all units) About the characteristics of eukaryotic and prokaryotic cells, and the differences between animal, bacterial and plant cells. (Biology B1 – cell structure &amp; transport)</p> <p><b>Practical Opportunities</b> N/A</p>	<p><i>Recall how to represent chemical reactions using formulae and chemical equations (y7,8,9 term 1)</i> Breaking down a compound using heat is known as thermal decomposition (y8 matter) Simple acids and alkalis (y7 reactions) Bases will neutralise acids. (y7 reactions) Salts form when acids and bases react (y7 reactions) <i>Energy cannot be created or destroyed</i> <i>Energy changes take place during chemical reactions</i></p> <p><b>Recalled skills:</b> <i>Writing word equations (y7,8 reactions)</i> <i>Recognising symbol equations (y7,8 reactions)</i> <i>Difference between exothermic and endothermic reactions (reactions y8)</i> <i>Energy progress in a reaction can be displayed using a reaction profile diagram. (reactions y8)</i></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>New Knowledge</b> Endothermic and exothermic reactions and their transfer of energy Uses of exothermic and endothermic energy changes. The activation energy of a reaction. Know the difference between bond making and bond breaking. Know that there is a certain amount of energy associated with each bond.</p> <p><b>New Skills</b> <i>To distinguish endothermic and exothermic reactions by observing the temperature change</i> <i>Recognising activation energy when drawing reaction profiles for a reaction.</i> <i>Identifying exothermic and endothermic reactions from energy</i> H tier – the impact of bonding breaking and bond making on overall energy change. Calculate overall energy change in reactions.</p> <p><b>Practical Opportunities</b></p>	
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<p><b>Chemical changes</b>  <b>Chemical changes</b>  <b>Recalled knowledge</b>  <i>Mass is conserved in chemical reactions</i>  <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 differences between atoms, elements and compounds. (y7,8,9 term 1)</i>  <i>Recall how to use chemical symbols and formulae to represent elements and compounds. (y7,8,9 term 1)</i>  <i>Recall how to represent chemical reactions using formulae and chemical equations (y7,8,9 term 1)</i>  <i>Breaking down a compound using heat is known as thermal decomposition (y8 matter)</i>  <i>Simple acids and alkalis (y7 reactions)</i>  <i>Bases will neutralise acids. (y7 reactions)</i>  <i>Salts form when acids and bases react (y7 reactions)</i>  <i>Energy cannot be created or destroyed</i>  <i>Energy changes take place during chemical reactions</i></p> <p><b>Recalled skills:</b>  <i>Writing word equations (y7,8 reactions)</i>  <i>Recognising symbol equations (y7,8 reactions)</i>  <i>Difference between exothermic and endothermic reactions (reactions y8)</i>  <i>Energy progress in a reaction can be displayed using a reaction profile diagram. (reactions y8)</i></p> <p>General Scientific Enquiry Skills.  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>  What happens in electrolysis  What type of substance can be electrolysed.  Products of electrolysis  What happens to ions during electrolysis?  How water effects the products of electrolysis  Know uses for the products of electrolysis of brine.  Extraction of aluminium  <i>Triple: Chemical cells and fuel cells</i></p>	<p>Investigating temperature changes in a variety of reactions</p> <p><b>Waves and Electromagnetic spectrum</b>  <b>Recalled Skills</b>  Describe motion of waves using a slinky. (yr8 waves)</p> <p><i>Light Reflection/Refraction (yr7 waves)</i>  <i>The eye and vision (yr7 waves)</i>  <i>Colour (yr7 waves)</i></p> <p><b>Recalled Knowledge</b>  Longitudinal wave; sound waves (yr7&amp;8 waves)  Transverse waves; water waves and electromagnetic spectrum (yr8 waves)  Radiation and energy (yr8 waves)  Ripple tank to demonstrate Reflection and Refraction (yr7 waves)  Sound waves and speed (yr7 waves)  Loudness &amp; amplitude/Frequency and pitch(yr8waves)  The ear and hearing (yr7 waves)  Light Reflection/Refraction (yr7 waves)  The eye and vision (yr7 waves)  Colour (yr7 waves)</p> <p>Skills: Enquiry processes.  Asking science questions  Planning investigations  Recording data  Analysing patterns  Evaluating data</p> <p><b>New Skills</b>  Describe waves in a ripple tank  Observe standing waves in a string</p> <p><i>Drawing ray diagrams for reflection</i>  <i>Drawing ray diagrams for lenses</i></p> <p><b>New Knowledge</b>  Transverse and longitudinal waves.  Basic wave form and wave equation <math>v=f \times \lambda</math>  Reflection and refraction.  Waves in ripple tank and standing wave.  Sound waves</p> <p>Electromagnetic spectrum; uses and dangers</p>	
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<p><b>New Skills</b>  <i>Recognise that electrolytes must be molten or in aqueous solution</i>  <i>Explain the movement of ions within the electrolyte.</i>  <i>H tier. Half equations to represent the reactions at the electrodes</i>  <i>How to predict the products of the electrolysis of aqueous solution.</i>  <i>How to investigate the electrolysis of aqueous solution using inert electrodes.</i></p> <p><b>Practical Opportunities</b>          Investigating the electrolysis of aqueous solutions</p> <p><b>Motion and forces</b>          Forces  <b>Recalled Skills</b>          Using newton meter. (yr7 Forces)          Calculating speed. (yr7 Forces)</p> <p><b>Recalled Knowledge</b>          Measuring Forces (yr7 Forces)          Balanced and unbalanced forces (yr7 Forces)          Speed (yr7 Forces)          Distance-time graphs (yr7 Forces)          Turning forces (yr8 Forces)          Vectors and scalars.          Newton's 3rd law.          Resultant forces 7 Newton's 1<sup>st</sup> Law          Turning forces (moments)          Finding COM          Parallelogram of forces          Resolution of 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>          Calculating acceleration          Using light gates</p>	<p>Communication using electromagnetic waves          Medical uses of electromagnetic waves          Use of X Rays in medicine</p> <p><i>Reflection</i>  <i>Refraction</i>  <i>Light and colour</i>  <i>Lenses</i>  <i>Use of lenses</i></p> <p><b>Practical Opportunities</b>          Demo transvers and longitudinal waves with slinky. Videos          Theory on basic wave form. Label wave. CRO and signal gen          RP waves in a ripple tank          RP reflection and refraction through block          Demo sound waves with sig gen and loudspeaker          Sound in a vacuum Finding speed of sound by echo</p> <p>Model spectrum with devices</p> <p><b>Electromagnetism</b>  <b>Recalled Skills</b>          Plotting magnetic fields around permanent magnet. (yr8 electromagnets)          Electromagnets (yr8 electromagnets)</p> <p><b>Recalled Knowledge</b>          Permanent magnets (yr8 electromagnets)          Magnetic fields around a permanent magnet (yr8 electromagnets)          Magnetic effect of a current (yr8 electromagnets)          Electromagnets (yr8 electromagnets)</p> <p><i>Stars, planets and satellites (yr7 earth)</i>  <i>Solar system (yr7 earth)</i></p> <p>Skills: Enquiry processes.          Asking science questions          Planning investigations          Recording data          Analysing patterns          Evaluating data</p> <p><b>New Skills</b>          Plotting magnetic fields around an electromagnet.          Motor effect          Generator effect</p>	
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<p>Using air track</p> <p><b>New Knowledge</b></p> <p>Speed investigation &amp; equations          Acceleration investigation &amp; equations          distance vs velocity time graphs.          velocity vs time graphs          Using motion graphs to find vel, acc and distance travelled</p> <p><b>Practical Opportunities</b></p> <p>Finding speed of trolley down ramp          Finding acceleration of trolley using ticker tape</p>	<p><b>New Knowledge</b></p> <p>Permanent magnets &amp; magnetic fields          Magnetic effect of a current          Electromagnets          The motor effect</p> <p><i>Generator effect. AC generator          Transformers &amp; national grid.          Big bang theory          Expanding universe and red shift          Life history of a star &amp; formation of elements by fusion          Planetary nebula, formation of planets and satellites.</i></p> <p><b>Practical Opportunities</b></p> <p>Permanent magnets, magnetic mtl's &amp; fields          Plotting field around bar magnets.          what effect strength of an electromagnet          Demo the motor effect</p> <p><i>Demo electromagnetic induction (generator effect)          Demo Transformers.</i></p>	
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