



Science Faculty Curriculum Overview

The study of science should fire pupils' curiosity about phenomena in the world around them and offer opportunities to find explanations. It will instil wonder and drive a desire to ask 'How? Why?' and spark independent learning. Science can engage learners at many levels, developing enquiring minds by linking direct practical experience with scientific ideas. Experimentation and modelling can be encouraged to develop and evaluate explanations to facilitate critical, organised thinking together with creative thought.

Pupils learn how knowledge and understanding in science are rooted in evidence and how the academic resilience of scientists has impacted on society today. They discover how scientific ideas contribute to technological change – affecting industry, business and medicine and improving quality of life. They trace the development of science worldwide and recognise its cultural significance. They learn to question, respect and discuss issues that may affect their own lives, the directions of societies and the future of the world. Their passion to enhance and nurture our planet may provide answers to very real, current environmental problems as well as a route to further learning. There are a number of key concepts that underpin the study of science and how science works. Pupils need to understand these concepts in order to deepen and broaden their knowledge, skills and understanding. Successful mastery of science concepts will facilitate potential entry into a vast number of employment opportunities encompassing many aspects of everyday life such as medicine, energy production, materials and environmental issues.

Term 1	Term 2	Term 3
<p>Autumn 1</p> <p><u>New Skills</u> Calculating magnification, actual and image size Order of magnitude Calculating percentage change and plotting graphs Calculating surface area:volume Required practical - Producing microscope slides Required practical – osmosis – the effect of concentration on potato cells</p> <p><u>Recalled Skills</u> Using a microscope (Organisms Y7 – observing cells) Producing microscope slides – cheek cells, onion cells (Organisms Y7 – observing cells)</p> <p><u>New Knowledge</u> 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><u>Recalled Knowledge</u> What cells look like under a light microscope? (Organisms Y7 – observing cells) The similarities and differences between plant and animal cells. (Organisms Y7 – plant & 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><u>Practical Opportunities</u> Required practical - Producing microscope slides Required practical – osmosis – the effect of concentration on potato cells</p> <p><u>Assessment:</u> Biology B1 & B2 assessments Trilogy B1 & B2 assessments DIRT tasks related to assessment Extended writing tasks – relating to required practical Matter: Atoms and elements</p>	<p>Spring 1</p> <p><u>New Skills</u> 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 Locating pulse</p> <p><u>Recalled Skills</u> Drawing graphs Measuring breathing and heart rate (Organisms Y8 – gas exchange & breathing) Finding means and estimating</p> <p><u>New Knowledge</u> 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><u>Recalled Knowledge</u> The importance of the digestive system. (Organisms Y8 – digestive system; bacteria & enzymes in digestion) The basic structure and function of the human gas exchange system. (Organisms Y8 – gas exchange & breathing) The mechanism of breathing. (Organisms Y8 – gas exchange & breathing)</p> <p><u>Practical Opportunities</u> 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><u>Assessment:</u> Biology B3 assessment Trilogy B3 assessment DIRT tasks related to assessment Extended writing tasks – relating to required practical Matter: The Periodic Table</p>	<p>Summer 1</p> <p><u>New Skills</u> Evaluating the uses of statins, stents, valve replacement, artificial pacemakers and artificial hearts 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><u>Recalled Skills</u> Drawing graphs Finding means and estimating</p> <p><u>New Knowledge</u> Limiting factors of photosynthesis Uses of glucose – the product of photosynthesis How evaporation and transpiration are controlled in plants.</p> <p><u>Recalled Knowledge</u> 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><u>Practical Opportunities</u> Required practical – light intensity and the rate of photosynthesis Testing leaves for starch</p> <p><u>Assessment:</u> Biology B4 & B8 assessments Trilogy B4 & B5 assessments DIRT tasks relating to assessment Extended writing tasks relating to required practical / evaluation of treatments for heart disease Y9 end of year exam</p> <p>Matter: How do atoms combine? Recalled knowledge <i>There are three states of matter (y7 matter)</i></p>

Recalled knowledge.

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)
 Recall simple model of the atom, representing atoms as hard, solid spheres of differing sizes and masses.
 Recall differences between atoms, elements and compounds
 Recall how to use chemical symbols and formulae to represent elements and compounds.
 Recall how to represent chemical reactions using formulae and chemical equations

Recalled skills:

State the different parts of a reaction (products and reactants) (KS2 Science)
 Use reactions to differentiate between reversible and non-reversible reactions (KS2 Science)
 Simple separating techniques, filtration, distillation, crystallisation, and chromatography.

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.

New Skills

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

Recalled knowledge

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 elements are made up of only one type of atom (matter y7 and 8)
 Group 1 and 7 elements (matter y8)
 How patterns in reactions can be predicted with reference to the periodic table

Recalled skills:

Write the definition of atoms, elements, molecules (y8 matter)
 Label the position of metals and non-metals on a periodic table.
 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

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

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.

The arrangement of particles within solids, liquids and gases. (y7 matter)
 The movement of particles within solids, liquids and gases. (y7 matter)
 The processes of melting and freezing. (y7 matter)
 The processes of evaporation and condensation (y7 matter)
 The differences between compounds and elements (y9 term 1)
 The properties (and examples) of metals and non-metals
 To use atomic structure to explain patterns in reactivity in the periodic table. (y9 term 2)
 To explain the difference between metals and non-metals in terms of their atomic structures and bonding (y9 term 2)

Recalled skills:

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)

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.

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.

New Skills

Draw diagrams to show the formation of positive or negative ions by loss or gain of electrons.

<p>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. Introduce Tier 3 vocabulary</p> <p>Practical Opportunities Filtration Chromatography Distillation Crystallisation</p> <p>Assessment Opportunities Specific assessment opportunities within certain lessons, to include extended writing tasks, numeracy task, how science works tasks were applicable. End of term assessment opportunity</p> <p>P2 Energy transfer by heating P3 Energy resources</p> <p>Recalled Skills Use of thermometer/Use of stop clock. (yr7 Energy) Conduction, Convection & Radiation (yr8 Energy) Testing Insulation experiment (yr8 Energy)</p> <p>Recalled Knowledge 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 & non-renewable sources. (yr7 Energy)</p> <p>Skills: <u>Enquiry processes.</u> Asking science questions Planning investigations Recording data Analysing patterns Evaluating data</p>	<p>Predict outcomes of reactions within group 1 and 7. Explain the lack of reactivity within group 0</p> <p>Practical Opportunities Reactions of group 1 (demo) Reactions of group 7 (displacement reactions)</p> <p>Assessment Opportunities Specific assessment opportunities within certain lessons, to include extended writing tasks, numeracy task, how science works tasks were applicable. End of term assessment opportunity</p> <p>P4 Electric circuits P5 Electricity in the home</p> <p>Recalled Skills Building simple circuits (yr7 Electromagnets) Using an Ammeter and Voltmeter (yr7 Electromagnets)</p> <p>Recalled Knowledge Static electricity (yr7 Electromagnets) I, V & R (yr7 Electromagnets) series circuits (yr7 Electromagnets) parallel circuits (yr7 Electromagnets) Skills: <u>Enquiry processes.</u> Asking science questions Planning investigations Recording data Analysing patterns Evaluating data</p> <p>New Skills Using variable resistor Describing AC and DC on CRO screen Wiring a plug</p>	<p>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. 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>Practical Opportunities Conductivity of ionic / covalent structures. Use of model kits</p> <p>Assessment Opportunities Specific assessment opportunities within certain lessons, to include extended writing tasks, numeracy task, how science works tasks were applicable. End of term assessment opportunity</p> <p>P1 Conservation and dissipation of energy</p> <p>Recalled Skills Finding energy in fuel & food (yr7 Energy)</p> <p>Recalled Knowledge Work done = Energy transferred & 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>New Skills Calculating work, gravitational potential energy, kinetic energy and elastic potential energy.</p>
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<p><u>New Skills</u> Finding specific heat capacity Calculating power of heater and energy transferred.</p> <p><u>New Knowledge</u> Kinetic theory of matter Energy transfer by conduction Energy transfer by convection Energy transfer by radiation Insulation Specific heat capacity</p> <p>Energy demands. Renewable & Non Renewable Sources Non Renewable sources. Thermal power stations Renewable sources Environmental considerations Supply and demand. Pump storage.</p> <p><u>Practical Opportunities</u> 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 Specific heat capacity RP Demo model power station. Structure of coal power station</p> <p><u>Assessment Opportunities:</u> Trilogy P2 and P3 assessments DIRT tasks related to assessment Extended writing task Required practical; Specific heat capacity Required practical; Insulation</p>	<p><u>New Knowledge</u> 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. $E=Pt$, $P=VI$ and $P=I^2R$ Electrical current and energy transfer. $Q=It$</p> <p><u>Practical Opportunities</u> 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. 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><u>Assessment Opportunities:</u> Trilogy P4 and P5 assessments DIRT tasks related to assessment Extended writing task Required practical; Resistance Required practical; $V - I$ characteristics</p>	<p><u>New Knowledge</u> Changes in energy stores Conservation of energy Definition of work Calculating work done by a Force Calculating gravitational potential energy Calculating kinetic energy & elastic potential energy. Energy Dissipation Energy and efficiency and using Sankey diagrams Electrical devices and efficiency Energy and Power Paying for electricity</p> <p><u>Practical Opportunities</u> Energy Circus experiment Calculating work e.g. climbing stairs</p> <p><u>Assessment Opportunities:</u> Trilogy P1 assessment DIRT tasks related to assessment Extended writing task End of year exam. GCSE questions testing P1 – P5.</p>
Christmas Holiday	Easter Holiday	Summer Holiday

Year 10 Chemistry

Term 1	Term 2	Term 3
<p>Autumn 1</p> <p><u>New Skills</u> 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</p>	<p>Spring 1</p> <p><u>New Skills</u> Light intensity and how to measure the rate of photosynthesis Testing leaves for starch using ethanol in a safe manner How to use the inverse square law Calculating change in breathing/heart rate Investigating aerobic respiration in living organisms Interpreting graphs of the body's response to exercise</p>	<p>Summer 1</p> <p><u>New Skills</u> 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><u>Recalled Skills</u></p>

Calculating the effect of disinfectants and antibiotics on bacterial growth

Recalled Skills

Graph work

Calculating area using $A = \pi r^2$

Order of magnitude (Y9 – Biology B1 – cell structure & transport)

New knowledge

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 & their uses

How exercise and smoking can affect the health of other systems of the body

The effects of recreational drugs on behaviour, health & life processes

Recalled Knowledge

The importance of bacteria in the human digestive system (Organisms Y8 – bacteria & enzymes in digestion)

Binary fission (Organisms Y7 – unicellular organisms)

Acid production in the stomach (Biology Y9 – B3 – Organisation & the digestive system)

Blood and clotting (Biology Y9 – B4 – Organising plants & animals)

The structure of the breathing system (Biology Y9 – B4 – Organising plants & animals)

The importance of the phloem (Biology Y9 – B4 – Organising plants & 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)

Practical Opportunities

Required practical- Investigating the effect of disinfectants and antibiotics

Assessment:

Biology B5, B6 & B7 assessments

Trilogy B5, B6 & B7 assessments

DIRT tasks related to assessment

Biology extended writing tasks – relating to required practical

Recalled Skills

Testing a leaf for starch (Ecosystems Y8 – investigating photosynthesis)

Drawing graphs of limiting factors (Ecosystems Y8 – investigating photosynthesis)

New Knowledge

Limiting factors of photosynthesis

Uses of glucose – the product of photosynthesis

Word & symbol equations for aerobic & anaerobic respiration

How an oxygen debt builds up during anaerobic respiration in your muscles.

Metabolic reactions and the role of the liver

Recalled Knowledge

Structure of the leaf

Movement of substances into a plant

The basic principles of photosynthesis

The differences between aerobic and anaerobic respiration.

Practical Opportunities

Required practical – light intensity and the rate of photosynthesis

Testing leaves for starch

Investigating respiration in living organisms

Making lactic acid – anaerobic activities

Testing fitness – Harvard Step Test

Assessment:

Biology B8 & B9 assessments

Trilogy B8 & B9 assessments

DIRT tasks related to assessment

Extended writing tasks – AQA 6 mark question

Produce a food chain/web (Ecosystems Y7 – Food chains, webs & disruption)

Interpreting food webs (Ecosystems Y7 – Food chains, webs & disruption)

New Knowledge

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

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

Recalled Knowledge

Adaptations in plants & 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)

Practical Opportunities

Required practical - measuring the population size of a common species using sampling techniques

Investigating competition in plants

Assessment:

Biology B16, B17 & B18 assessments

Trilogy B15, B16 & B17 assessments

DIRT tasks related to assessment

Trilogy extended writing tasks – AQA 6 mark question

Reactions: Calculations and chemical changes

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

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.

Reactions: Electrolysis and energy changes

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)

Bases will neutralise acids. (y7 reactions)

Salts form when acids and bases react (y7 reactions)

Energy cannot be created or destroyed

Energy changes take place during chemical reactions

Recalled skills:

Writing word equations (y7,8 reactions)

Recognising symbol equations (y7,8 reactions)

Difference between exothermic and endothermic reactions (reactions y8)

Energy progress in a reaction can be displayed using a reaction profile diagram. (reactions y8)

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

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

Endothermic and endothermic reactions and their transfer of energy

Extended writing tasks – AQA 6 mark question
Y10 mock exams

Reactions: Rates of reaction

Recalled knowledge

Mass is conserved in chemical reactions

Recall that everything is made of particles (KS2 Science, Y7 Matter, The particle model)

Chemical reactions produce new substances as products (y,8 reactions)

Chemical reactions may release gases. (y8 reactions)

Chemical reactions may produce products which are solids. (y8 reactions)

Some reactions are reversible (y7,8 matter, reactions)

Recalled skills:

Writing word equations (y7,8 reactions)

Recognising symbol equations (y7,8 reactions)

Recognising when a chemical reaction takes place

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

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.

<p>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>New Skills 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>Practical Opportunities 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>Assessment Opportunities Specific assessment opportunities within certain lessons, to include extended writing tasks, numeracy task, how science works tasks were applicable. End of term assessment opportunity</p> <p>P6 Molecules and matter P7 Radioactivity</p> <p>Recalled Skills 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>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. <i>Triple: Chemical cells and fuel cells</i></p> <p>New Skills <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> <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>Practical Opportunities Investigating the electrolysis of aqueous solutions Investigating temperature changes in a variety of reactions</p> <p>Assessment Opportunities Specific assessment opportunities within certain lessons, to include extended writing tasks, numeracy task, how science works tasks were applicable. End of term assessment opportunity</p> <p>P8 Forces in balance P9 Motion</p> <p>Recalled Skills Using newton meter. (yr7 Forces) Calculating speed. (yr7 Forces)</p> <p>Recalled Knowledge Measuring Forces (yr7 Forces)</p>	<p>Determine hoe changing the temperature affects the reversible reaction.</p> <p>Practical Opportunities The different methods can be used to investigate the rate of different reactions.</p> <p>Assessment Opportunities Specific assessment opportunities within certain lessons, to include extended writing tasks, numeracy task, how science works tasks were applicable. End of term assessment opportunity</p> <p>P10 Forces and motion P11 Force and pressure P12 Wave properties</p> <p>Recalled Skills Extension of a spring experiment. (yr8 Forces)</p> <p>Recalled Knowledge Gravity (yr7 Forces)</p>
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<p>Recalled Knowledge Pressure in liquids & gases). (yr8 Forces) Stress (Pressure on solid surface). (yr8 Forces)</p> <p>Skills: Enquiry processes. Asking science questions Planning investigations Recording data Analysing patterns Evaluating data</p> <p>New Skills Cooling curve for Salol Measuring specific Latent heat Measuring radiation using Geiger Muller tube</p> <p>New Knowledge Density Required Solids, Liquids and gases Changes of state Internal energy Latent heat Gas pressure & temperature</p> <p>Models of the atom Discovery of the nucleus Using the periodic table and definition of an isotope. alpha, beta & gamma radiation and decay Half-life</p> <p>Practical Opportunities Heating Ice Water /Water vapour Cooling curve for salol Demo Latent heat of Fusion & Vaporisation. Latent heat of fusion and vaporisation demos. Demo Press in liquids & gases. Density Required Practical</p> <p>Demo alpha, beta & gamma</p> <p>Assessment Opportunities: Trilogy P6 and P7 assessments DIRT tasks related to assessment Extended writing task Required practical; Density</p>	<p>Balanced and unbalanced forces (yr7 Forces) Speed (yr7 Forces) Distance-time graphs (yr7 Forces) Turning forces (yr8 Forces)</p> <p>Skills: Enquiry processes. Asking science questions Planning investigations Recording data Analysing patterns Evaluating data</p> <p>New Skills Calculating acceleration Using light gates Using air track Finding the CoM</p> <p>New Knowledge Vectors and scalars. Newton's 3rd law. Resultant forces & Newton's 1st Law Turning forces (moments) Finding COM Parallelogram of forces Resolution of forces</p> <p>Speed investigation & equations Acceleration investigation & equations distance vs velocity time graphs. velocity vs time graphs Using motion graphs to find vel, acc and distance travelled</p> <p>Practical Opportunities Dropping cupcake cases See saws experiment. (moments) Finding COM</p> <p>Finding speed of trolley down ramp Finding acceleration of trolley using ticker tape</p> <p>Assessment Opportunities: Trilogy P8 and P9 assessments DIRT tasks related to assessment Extended writing task</p>	<p>Friction and drag (yr8 Forces) Extension of a spring experiment (yr8 Forces)</p> <p><i>Describe motion of waves using a slinky (yr8 waves)</i> <i>Transverse waves; water waves and electromagnetic spectrum (yr8 waves)</i> <i>Radiation and energy (yr8 waves)</i> <i>Ripple tank to demonstrate Reflection and Refraction (yr7 waves)</i> <i>Sound waves and speed (yr7 waves)</i> <i>Loudness & amplitude/Frequency and pitch (yr8waves)</i> <i>The ear and hearing (yr7 waves)</i> <i>Light Reflection/Refraction (yr7 waves)</i> <i>The eye and vision (yr7 waves) and Colour (yr7 waves)</i></p> <p>Skills: Enquiry processes. Asking science questions Planning investigations Recording data Analysing patterns Evaluating data</p> <p>New Skills Calculating momentum</p> <p><i>Describe waves in a ripple tank</i> <i>Observe standing waves in a string</i></p> <p>New Knowledge Force = mass x acceleration. Newton's 2nd law Weight and mass. $W=mg$ Dropping objects and terminal velocity. Force and breaking. Momentum. Momentum= mass x velocity Conservation of momentum (collisions and explosions) Force and elasticity, Hooke's Law</p> <p><i>Using a Force to change momentum.</i> <i>Stress (pressure on a surface)</i> <i>Pressure in a liquid column</i> <i>Atmospheric pressure</i> <i>Upthrust and floating</i> <i>Transverse and longitudinal waves.</i> <i>Basic wave form and wave equation $v=f \times \lambda$</i> <i>Reflection and refraction.</i> <i>Waves in ripple tank and standing wave.</i> <i>Sound waves</i> <i>Sound & ultrasound.</i> <i>P & S waves. Structure of the Earth. Video.</i></p> <p>Practical Opportunities</p>
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		RP Acceleration of trolley on air track Dropping objects through different liquids RP Force and extension <u>Assessment Opportunities:</u> Trilogy P10 assessment DIRT tasks related to assessment Extended writing task Required practical; Acceleration of trolley on air track. Required practical; Hooke's law; Extension of a spring. End of year exam. Paper 1 (P1 – P7).
Christmas Holiday	Easter Holiday	Summer Holiday

Year 11 Chemistry

Term 1	Term 2	Term 3
<p>Autumn 1</p> <p><u>New Skills</u> How to carry out an investigation into reaction times How to find the blind spot</p> <p><u>Recalled Skills</u> Organs of the reproductive system (Genes Y7 – the menstrual cycle) Fertilisation (Genes Y7 – fertilisation & implantation) The menstrual cycle in simplistic terms (Genes Y7 – the menstrual cycle)</p> <p><u>New Knowledge</u> 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</p>	<p>Spring 1</p> <p><u>New Skills</u> Genetic diagrams – punnet squares How inheritance works Meiosis diagrams How to use genetic family trees Using timescales – standard form</p> <p><u>Recalled Skills</u> 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><u>New Knowledge</u> 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. How Charles Darwin built up the evidence for his theory of evolution by natural selection and some of the barriers to the</p>	<p>Summer 1</p> <p>Biology</p> <p><u>Recalled Skills</u> Required practicals Graphical skills</p> <p><u>Recalled Knowledge</u> Practice papers Revisit key words Revisit command words</p> <p><u>Practical Opportunities</u> Revisit required practicals</p> <p><u>Assessment:</u> GCSE exam</p>

<p>Control of water balance - ADH</p> <p>Recalled Knowledge The basic structure of neurones. (Y9 – Biology B1 – cell structure & transport) That tissues can be organised into organs with particular functions in the body (Y9 – Biology B3 – organisation & the digestive system) That enzymes act as biological catalysts. (Y9 – Biology B3 – organisation & 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>Practical Opportunities Required practical - How to carry out an investigation into reaction times How to find the blind spot</p> <p>Assessment: Biology B10, B11 & B12 assessments Trilogy B10 & B11 assessments DIRT tasks related to assessment Extended writing tasks – AQA 6 mark question</p> <p>Reactions: Crude oil, chemical analysis, the earth's atmosphere Recalled knowledge <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)</p> <p>Recalled skills: <i>Writing word equations (y7,8 reactions)</i> <i>Recognising symbol equations (y7,8 reactions)</i> <i>Use of indicators to distinguish between acids and alkalis (y7,8 reactions)</i></p> <p>General Scientific Enquiry Skills. Ask scientific questions Plan investigations</p>	<p>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>Recalled Knowledge The nucleus of the cell and the chromosomes it contains. (Biology B1 – Cell structure & 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 & transport)</p> <p>Practical Opportunities N/A</p> <p>Assessment: Biology B13, B14 & B15 assessments Trilogy B12, B13 & B14 assessments DIRT tasks related to assessment Extended writing tasks – AQA 6 mark question</p> <p>Reactions: The earth's resources, revision Recalled knowledge <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>What happens in electrolysis (y10 term 2)</i> <i>What type of substance can be electrolysed. (y10 term 2)</i> <i>Products of electrolysis (y10 term 2)</i></p> <p>Recalled skills: <i>Writing word equations (y7,8 reactions)</i> <i>Recognising symbol equations (y7,8 reactions)</i> <i>How to predict the products of the electrolysis of aqueous solution. (y10 term 2)</i> <i>How to investigate the electrolysis of aqueous solution using inert electrodes (y10 term 2)</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>New Knowledge</p>	<p>Reactions: Revision</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>Assessment Opportunities Specific assessment opportunities within certain lessons, to include extended writing tasks, numeracy task, how science works tasks were applicable. End of term assessment opportunity</p>
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<p>Record data Analyse patterns in data Evaluate data Give conclusions related to the data</p> <p>New Knowledge What is crude oil made up from? What are alkanes? The names and formulae of the first four alkanes. How to separate the hydrocarbons in crude oil. Conditions needed for complete and incomplete combustion and the products of each reaction. Cracking of hydrocarbons Definition of pure substances and formulations. How paper chromatography separates mixtures. How to test for gases Theory about how our atmosphere developed. The main changes in the atmosphere over time and some of the likely causes of these changes The Greenhouse Effect The products of combustion of a fuel and the problems caused by increased amounts of pollutants in the air. <i>Triple: Reactions of alkenes</i> <i>Structures of alcohols, carboxylic acids and esters.</i> <i>Reactions and uses of alcohols</i> <i>Addition, condensation, natural polymers.</i> <i>Testing for ions</i></p> <p>New Skills Representing alkanes by using their chemical formula or displayed formula How the volatility, viscosity and flammability of hydrocarbons are affected by the size of the molecules. Describe how to fractionally distil crude oil and explain the process. Explaining the differences in conditions and products of complete and incomplete combustion. Determine the products of cracking. Use melting point data to distinguish pure and impure substances. Identify formulations given suitable data. How chromatography can be used to distinguish pure substances from impure substances. How to interpret chromatograms and calculate R_f values Identify gases from results of tests How to interpret evidence and evaluate different theories about the earth's early atmosphere. Evaluating the product of combustion with impact on the environment. <i>Triple; Recognising and drawing the functional groups of alkenes, alcohols, carboxylic acid, ester.</i></p>	<p>Finite and renewable resources Difference between potable and pure water Differences between treatment of ground water and salt water How waste-water is made safe to release into the environment Life cycle assessments Reduce, reuse and recycle to reduce environmental impact <i>Triple: Rusting</i> <i>Useful alloys and the properties of polymers</i> <i>Glass ceramics and composites</i> <i>The Haber process to make ammonia</i></p> <p>New Skills How to distinguish resources given appropriate data, between finite and renewable How to extract and interpret information about resources, given appropriate information. How to use orders of magnitude to evaluate the significance of data To explain the relative ease of obtaining potable water from waste, ground and salt water To evaluate alternative biological methods of metal extraction, given appropriate information. How to carry out and interpret LCA given appropriate information How to evaluate ways of reducing the use of limited supplies of metal ores, given appropriate information <i>Triple: How to investigate the conditions of rusting.</i> <i>The conditions needed to produce ammonia</i> <i>How to prepare samples of fertiliser</i></p> <p>Practical Opportunities Simple distillation of salt water. Test the distillate to determine purity</p> <p>Assessment Opportunities Specific assessment opportunities within certain lessons, to include extended writing tasks, numeracy task, how science works tasks were applicable. End of term assessment opportunity</p>	
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Recognise the reactions of alkenes and alcohols
Work out the formula of products of organic reactions.
Given appropriate data, establish the composition of an unknown

Practical Opportunities

Simple and fractional distillation
Paper chromatography
Test for gases

Assessment Opportunities

Specific assessment opportunities within certain lessons, to include extended writing tasks, numeracy task, how science works tasks were applicable.
End of term assessment opportunity

P11 Wave properties

P12 Electromagnetic waves

P13 Electromagnetic waves

P14 Light

Recalled Skills

Describe motion of waves using a slinky. (yr8 waves)

Light Reflection/Refraction (yr7 waves)

The eye and vision (yr7 waves)

Colour (yr7 waves)

Recalled Knowledge

Longitudinal wave; sound waves (yr7&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 & amplitude/Frequency and pitch (yr8 waves)

The ear and hearing (yr7 waves)

Light Reflection/Refraction (yr7 waves)

The eye and vision (yr7 waves)

Colour (yr7 waves)

Skills: Enquiry processes.

Asking science questions

Planning investigations

Recording data

Analysing patterns

Evaluating data

New Skills

Describe waves in a ripple tank

P13 Electromagnetism

P15 Electromagnetism

P16 Space

Recalled Skills

Plotting magnetic fields around permanent magnet. (yr8 electromagnets)

Electromagnets (yr8 electromagnets)

Recalled Knowledge

Permanent magnets (yr8 electromagnets)

Magnetic fields around a permanent magnet (yr8 electromagnets)

Magnetic effect of a current (yr8 electromagnets)

Electromagnets (yr8 electromagnets)

Stars, planets and satellites (yr7 earth)

Solar system (yr7 earth)

Skills: Enquiry processes.

Asking science questions

Planning investigations

Recording data

Analysing patterns

Evaluating data

New Skills

Plotting magnetic fields around an electromagnet.

Motor effect

Generator effect

New Knowledge

Permanent magnets & magnetic fields

Magnetic effect of a current

Electromagnets

The motor effect

Physics

Revision for GCSE exams

<p>Observe standing waves in a string</p> <p><i>Drawing ray diagrams for reflection</i> <i>Drawing ray diagrams for lenses</i></p> <p><u>New Knowledge</u> Transverse and longitudinal waves. Basic wave form and wave equation $v=f \times \lambda$ Reflection and refraction. Waves in ripple tank and standing wave. Sound waves</p> <p>Electromagnetic spectrum; uses and dangers 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><u>Practical Opportunities</u> 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><u>Assessment Opportunities:</u> Trilogy P2 and P3 assessments DIRT tasks related to assessment Extended writing task Required practical; Reflection and refraction of light Required practical; Ripple tank and vibrating string. Required practical; Radiation (IR) and absorption – (Leslie's cube) December mocks. Paper 1 (P1 – P7).</p>	<p><i>Generator effect. AC generator</i> <i>Transformers & national grid.</i> <i>Big bang theory</i> <i>Expanding universe and red shift</i> <i>Life history of a star & formation of elements by fusion</i> <i>Planetary nebula, formation of planets and satellites.</i></p> <p><u>Practical Opportunities</u> Permanent magnets, magnetic mtl & fields Plotting field around bar magnets. what effect strength of an electromagnet Demo the motor effect</p> <p><i>Demo electromagnetic induction (generator effect)</i> <i>Demo Transformers.</i></p> <p><u>Assessment Opportunities:</u> Trilogy P2 and P3 assessments DIRT tasks related to assessment Extended writing task</p> <p>March mocks. Paper 2 (P8 – P13).</p>	
Christmas Holiday	Easter Holiday	Summer Holiday