

Science

Our vision

As young scientists, we want to promote in our students an inquisitive mindset with a desire to understand how the world around them works.

We aim to accomplish this through the study of a breadth of topics across the three science disciplines enhanced by engaging practical activities designed to develop investigative skills.

In addition to being academically successful, we also want our students to leave us with a love of learning and science; in awe of the amazing things scientific understanding has allowed us to achieve and to always feel the need to ask the question 'Why?'

Science

What is my Learning Journey for Year 7?

We follow the KS3 Activate Scheme of learning.

Marches Academy Trust



Food chains and webs, ecosystems, competition, pollination, fertilisation and germination, seed dispersal.

Big question: What happens to organisms if ecosystems change?

Key Skills:

- Recall and retention of scientific facts
- Using key scientific terminology
- Calculations and equations
- Graph skills
- Analysing and interpreting data
- Evaluating information
- Using models

Assessments:

- End of module tests
- End of year test
- Progress and checkpoint quizzes on Kerboodle
- Extended writing opportunities

#realworldready

- Consider the impacts of humans on ecosystems and organisms around the world
- Appreciate how understating the menstrual cycle has led to contraception and fertility treatments
- Find out how chemical reactions can be used to make useful, everyday products
- Know what all materials are made up of
- Find out where our energy comes from and how we can be more energy efficient

Useful websites and support

- KS3 Bitesize
- Kerboodle (login provided)
- Oak Academy KS3 science
- Educake (login provided)
- CGP KS3 revision guides

Home Learning

- Progress and checkpoint quizzes
- Flipped learning tasks
- Research tasks on scientific ideas
- Revision for end of unit assessments

YEAR 8

Earth

The structure of Earth, Rock cycles, Solar system, Moon and changing ideas.
Big question: How big is the solar system?

Waves

Sound, waves, frequency, light, how light interacts with matter, the eye, colour, and how we hear.
Big question: Why do objects have colours?

Ecosystems

Measuring forces, unbalanced & balanced forces, speed & gravity.
Big questions: How can we measure speed? Where do forces come from?

Forces

Variation, adaptation, puberty, reproductive systems, sexual intercourse, pregnancy and the menstrual cycle.
Big question: How are new humans made?

Matter

The particle model, states of matter, changes of state, diffusion, pressure, pure substances & mixtures, solutions and separating techniques.
Big question: What are materials like inside?

Electromagnets

Potential difference and resistance, series and parallel circuits, current and charge.
Big question: How can one light in your house go out but the rest stay on?

Genes

Acids & alkalis & pH, neutralization, making salts, elements, reactions of non-metals & metals with water, acid & oxygen, displacement reactions.
Big question: What are chemical reactions?

Reactions

Organisms

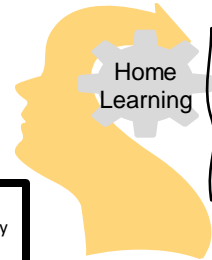
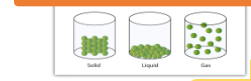
Skeleton, joints & muscles, cells & microscopes, movement of substances & unicellular organisms.
Big question: What are we made of?

Energy

Different energy resources and fuels, power and energy transfers.
Big question: How will we generate electricity in the future?

Enquiry processes

Safety in the laboratory
Equipment in the laboratory
Enquiry skills



Year 7 Curriculum Overview- Subject

Content Topic/unit name, enquiry question	Disciplinary Knowledge (Skills) Actions taken within a topic to gain substantive knowledge	Substantive Knowledge This is the specific, factual content for a topic, which is connected into a careful sequence of learning	Prior Learning (KS2)	Future learning (KS3)
Around the lab and enquiry skills	Using all of the practical skills listed as substantive knowledge through a series of individual experiments each designed to teach a specific skill so all students start year 7 with the same basic tools needed in science	Lab safety Scientific apparatus Creating a hypothesis Writing a method Recording results Drawing a graph Evaluation	Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary (KS2)	Skills used continually under the name “Working Scientifically” at GCSE
Energy	Interpret observations to draw conclusions for multiple experiment Complete practical work safely having due regard from accuracy	Food and energy Energy resources Energy and power calculations Energy adds up Efficiency and calculations	No prior knowledge.	Work Energy Machines Energy and temperature Energy Transfer Radiation and insulation
Organisms	Follow a method to safely complete experiments, - record observations, drawing conclusion from observations made. Practicals completed taking safety into account.	Levels of organization Skeletons, joints and muscles, microscopes, Plant and animal cells Respiration Photosynthesis Specialised cells Movement of substances	Identify that humans and some other animals have skeletons and muscles for support, protection and movement (Year 3) Know that the body is made up different organs (looked specifically at digestive system and circulatory system in Year 4 and 6) Recall definitions of cell, tissue, organ and organ system (from lesson 1 in unit)	Gas exchange Breathing Smoking Nutrients Food tests Unhealthy diet Enzymes in digestion

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Matter	Investigate stearic acids melting point through follow a method safely, recording observation into a table and plotting graphs to draw a conclusion Revisit types of variables Use models such as representational, spatial, descriptive to make predictions and to develop scientific explanations and understanding of unfamiliar knowledge Complete range of practicals on separation techniques to make observations	The particle model States of matter Changing state Diffusion Gas pressure Inside particles Purity Solutions and solubility Separation techniques Chromatography	Compare and group materials together, according to whether they are solids, liquids or gases Compare and group together everyday materials on the basis of their properties Compare and group materials together, according to whether they are solids, liquids or gases Decide how mixtures might be separated, including through filtering, sieving and evaporating	Elements, atoms, compounds, chemical formulae, polymers, the periodic table
Electromagnets	Using circuit symbols to draw and then create circuits to predict, observe, record, and evaluate results from series and parallel circuits Use a range of suitable equipment to measure resistance of different wires Correctly choose the variables for the experiment	Potential difference Resistance Series and parallel circuits Current and charge	Construct a simple series electrical circuit, identifying and naming its basic parts. Identifying and naming basic parts. Identify whether or not a lamp will light in a simple series circuit	Magnets and magnetic fields Electromagnets and their uses

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Genes	The need and importance of peer review on scientific theories.	Variation Continuous and discontinuous Adapting to survive Reproduction Fertilisation Development of a fetus Menstrual cycle	Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago	Natural selection Charles Darwin Extinction Biodiversity History of DNA Inheritance Genetic modification
Reactions	Follow a method safely to combine acids and alkalis using various other chemical solutions to observe outcomes, record results and make conclusions.	Chemical reactions Acids and alkalis Neutralisation Making salts Chemical reactions of metals and acids	Hazards and risks	Atoms in chemical reactions Combustion Thermal decomposition Conservation of mass Exo and endothermic reaction
Forces	Follow a method to safely complete experiments, - record observations, and plotting results demonstrating forces using equipment such as newton meters, stop watches and metre rulers,	What a forces is Balanced and unbalanced forces Calculating speed Distance time graphs Gravity & weight calculations	Types of forces Forces make things move How to draw graphs Gravity pulls us down	Friction and Drag Squashing and stretching Turning Pressure in gases Pressure in solids

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Ecosystems	Create a hypothesis, a plan a method, collect data and record correctly.	Food chains and webs Population changes Germination Ecological sampling	Construct and interpret a variety of food chains, identifying producers, predators and prey Recognise that environments can change and that this can sometimes pose dangers to living things	
Waves	Use models such as representational, spatial, descriptive to make predictions and to develop scientific explanations and understanding of unfamiliar knowledge on sound waves Interpret observations to draw conclusions for amplitude and frequency using an oscilloscope Follow a method to accurately record results and make comments on the observations of reflection and refraction	Sound waves and speed Loudness and pitch The ear and hearing Light and eye Reflection Refraction Colour and revision	Recognise that vibrations from sounds travel through a medium to the ear That sound is made through vibration. Recognise that they need light in order to see things and that dark is the absence of light	
Earth	Use models such as representational, spatial, descriptive to make predictions and to develop scientific explanations and understanding of unfamiliar knowledge	Structure of Earth Rock cycles The solar system The moon	Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. Describe the movement of the Earth, and other planets, relative to the Sun in the solar system	Space topic in KS4 (if separate science chosen)

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YEAR 8

Earth

Waves

Ecosystems

Forces

The structure of Earth, Rock cycles, Solar system, Moon and changing ideas.
Big question: How big is the solar system?

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Acids & alkalis & pH, neutralization, making salts, elements, reactions of non-metals & metals with water, acid & oxygen, displacement reactions.
Big question: What are chemical reactions?

Organisms

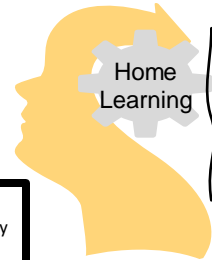
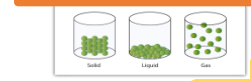
Energy

Enquiry processes

Skeleton, joints & muscles, cells & microscopes, movement of substances & unicellular organisms
Big question: What are we made of?

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Safety in the laboratory
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Year 8 Curriculum Overview- Subject

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Waves from year 7 (2023-2024 only)	Use models such as representational, spatial, descriptive to make predictions and to develop scientific explanations and understanding of unfamiliar knowledge on sound waves Interpret observations to draw conclusions for amplitude and frequency using an oscilloscope Follow a method to accurately record results and make comments on the observations of reflection and refraction	Sound waves and speed Loudness and pitch The ear and hearing Light and eye Reflection Refraction Colour and revision	Recognise that vibrations from sounds travel through a medium to the ear That sound is made through vibration. Recognise that they need light in order to see things and that dark is the absence of light	
Earth from year 7 (2023-2023 only)	Use models such as representational, spatial, descriptive to make predictions and to develop scientific explanations and understanding of unfamiliar knowledge	Structure of Earth Rock cycles The solar system The moon	Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. Describe the movement of the Earth, and other planets, relative to the Sun in the solar system	P8 Space topic in KS4 (if separate science chosen)
Organisms	Follow a method and make accurate observations to explain the results of a food test to see if they contain proteins, starch, sugars, and fats.	Gas exchange Breathing Smoking Nutrients Food tests Unhealthy diet Enzymes in digestion	Organ systems Recognise the impact of diet, exercise, drugs and lifestyle on the way the body functions Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function Describe the simple functions of the basic parts of the digestive system in humans	Respiration in the B4 unit at KS4

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Energy	Use models such as representational, spatial, descriptive to make predictions and to develop scientific explanations and understanding of unfamiliar knowledge Make observations of demonstrations using new equipment such as an oscilloscope. Follow a method accurately to determine a conclusion from reflection and refraction.	Work Energy Machines Energy and temperature Energy Transfer Radiation and insulation	Types of energy (from year 8) Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius ($^{\circ}\text{C}$) (KS2)	Energy stores and systems Conservation and dissipation of energy Efficiency National and global energy resources In P1a unit at KS4
Electromagnets	Create simple circuits following a method and circuit symbols learnt in class. Make observations of simple circuits and make predictions on whether a circuit will light up or not.	Magnets and magnetic fields Electromagnets and their uses	Observe how magnets attract or repel each other and attract some materials and not others and describe magnets as having two poles. Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials	KS4 P7 uses magnets and compasses to find the direction of a magnetic field and making more complex electromagnets and experimenting how to make them stronger.
Matter	Follow a method and make accurate observations to explain the results plotting results in a graph and concluding a relationship.	Elements, atoms, compounds, chemical formulae, polymers, the periodic table	Describe what an atom is Describe the difference between elements, mixtures, and compounds	KS4 learning about the same content in more detail looking at and predicting patterns in a periodic table and balancing equations

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Genes	Use models such as representational, spatial, descriptive to make predictions and to develop scientific explanations and understanding of unfamiliar knowledge	Natural selection Charles Darwin Extinction Biodiversity History of DNA Inheritance Genetic modification	Natural selection covered in prior lesson, Darwin mentioned in Y6/Y7 schemes Food chains/webs and interdependence. How fossils are formed, what fossils are. Inheritance Structure of a cell (nucleus and DNA) as well as inheritance.	B4 at KS4 looking at Inheritance, variation and evolution.
Reactions	Follow a method safely to combine acids and alkalis using various other chemical solutions to observe outcomes, record results and make conclusions.	Atoms in chemical reactions Combustion Thermal decomposition Conservation of mass Exo and endothermic reaction	Describe characteristics of a chemical reaction Word equations	C5 in KS4 learning about exo and endothermic reactions reactions and writing equations, and C3 looking at conservation of mass and chemical equations

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Forces	Follow a method to safely complete experiments, - record observations, and plotting results demonstrating forces using equipment such as newton meters, stop watched and rulers.	Friction and Drag Squashing and stretching Turning Pressure in gases Pressure in solids	Types of forces Forces make things move How to draw graphs Gravity pulls us down	Learning what a vector and a scalar and then applying them to different scenarios. The addition of vectors. Calculating moments.
Waves	Use models such as representational, spatial, descriptive to make predictions and to develop scientific explanations and understanding of unfamiliar knowledge Make observations of different devices to draw conclusions of how light travels on the EM spectrum.	Sound waves, water waves and energy Radiation and energy Modelling waves	Use models such as representational, spatial, descriptive to make predictions and to develop scientific explanations and understanding of unfamiliar knowledge on sound waves Interpret observations to draw conclusions for amplitude and frequency using an oscilloscope Follow a method to accurately record results and make comments on the observations of reflection and refraction	P6 KS4 looking at the electromagnetic spectrum of light, sound waves, and how light interacts with matter.

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YEAR 8

Earth

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Big question: What are materials like inside?

Potential difference and resistance, series and parallel circuits, current and charge.

Big question: How can one light in your house go out but the rest stay on?

Baseline assessment

Acids & alkalis & pH, neutralization, making salts, elements, reactions of non-metals & metals with water, acid & oxygen, displacement reactions.

Big question: What are chemical reactions?

Organisms

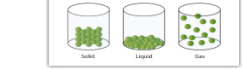
Energy

Enquiry processes

Skeleton, joints & muscles, cells & microscopes, movement of substances & unicellular organisms. **Big question: What are we made of?**

Different energy resources and fuels, power and energy transfers. **Big question: How will we generate electricity in the future?**

Safety in the laboratory
Equipment in the laboratory
Enquiry skills



Physics Key Stage 4 Overview

What is my Learning Journey for Year 9, 10 and 11?

Content – vectors, scalars, resultant forces, moments, centre of mass, parallelogram of forces, resolving forces, motion graphs, momentum, car safety, pressure, upthrust

Bigger Picture Focus – To break down how the objects in the world around us interact, and why they interact the way they do.



Content – solar system, life cycle of stars, big bang, what's next?

Bigger Picture Focus - To appreciate how we and everything else came to exist.



Exams:
-6 x 75 minute papers – 2 for biology, 2 for chemistry, 2 for physics
There is no coursework element.

Assessments:
-End of unit tests
-Weekly educake quizzes to test recall
-6 mark question practice for each unit

#realworldready

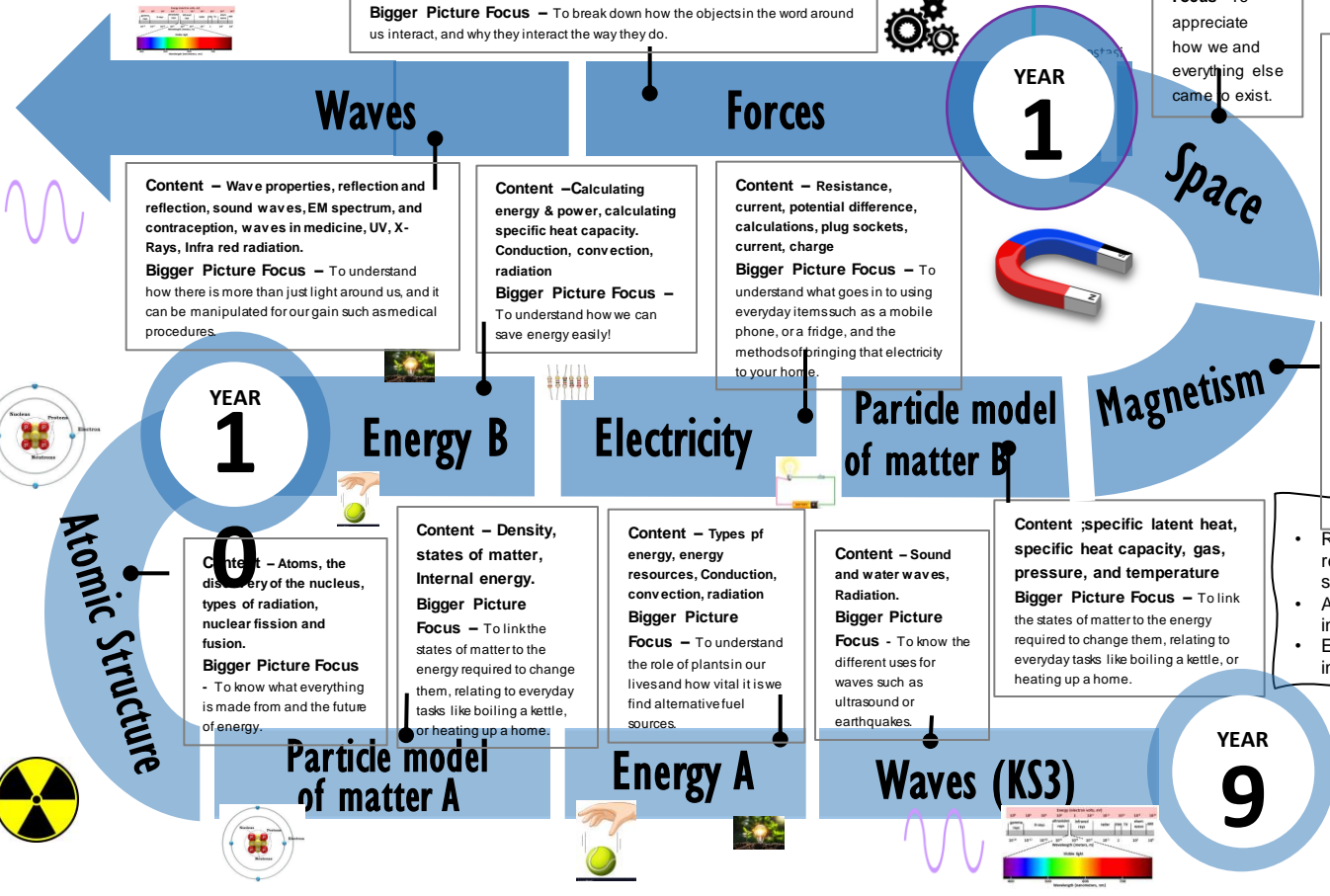
- Appreciate how scientific understanding of Physics can explain everyday occurrences, and those that are out of this world.
- Understand how to minimise our impact on the Earth through our energy choices.
- Learn that we don't know everything yet and there are lots of unanswered questions.
- Understand the importance of science to a wide variety of careers.

Useful websites and support

- GCSE bitesize
- GCSEPod
- Oak Academy
- Seneca
- Educake
- Savemyexams
- Physics and maths tutor

Home Learning

- Weekly educake quizzes to test recall
- Other tasks may include:
 - 6 mark question practice for each unit
 - Past paper practice
 - Flipped learning tasks



Waves

Content – Wave properties, reflection and refraction, sound waves, EM spectrum, and contraception, waves in medicine, UV, X-Rays, Infra red radiation.

Bigger Picture Focus – To understand how there is more than just light around us, and it can be manipulated for our gain such as medical procedures.



Forces

Content – Calculating energy & power, calculating specific heat capacity. Conduction, convection, radiation

Bigger Picture Focus – To understand how we can save energy easily!

Content – Resistance, current, potential difference, calculations, plug sockets, current, charge

Bigger Picture Focus – To understand what goes in to using everyday items such as a mobile phone, or a fridge, and the methods of bringing that electricity to your home.



Space

Content – Magnetic fields, electromagnets, electric motors, generators, transformers, microphones and speakers.

Bigger Picture Focus – To understand how we can generate electricity and then harness it for different devices such as electromagnets, linking to everyday uses such as electric cars and speakers. This includes how we are able to transfer electricity across the globe.

YEAR 1

Energy B

Content – Atoms, the discovery of the nucleus, types of radiation, nuclear fission and fusion.

Bigger Picture Focus – To know what everything is made from and the future of energy.



Electricity

Content – Types of energy, energy resources, Conduction, convection, radiation

Bigger Picture Focus – To understand the role of plants in our lives and how vital it is we find alternative fuel sources.



Particle model of matter B

Content – Sound and water waves, Radiation.

Bigger Picture Focus – To know the different uses for waves such as ultrasound or earthquakes.

Content – specific latent heat, specific heat capacity, gas, pressure, and temperature

Bigger Picture Focus – To link the states of matter to the energy required to change them, relating to everyday tasks like boiling a kettle, or heating up a home.

Key Skills:

- Recall and retention of scientific facts
- Analysing and interpreting data
- Evaluating information

YEAR 10

Particle model of matter A



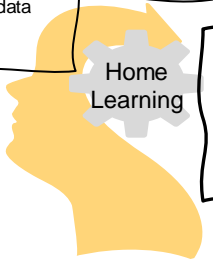
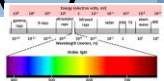
Energy A



Waves (KS3)



YEAR 9



Chemistry Key Stage 4 Overview

What is my Learning Journey for Year 9, 10 and 11?



Marches Academy Trust

Content – Purity, formulations, chromatography, identification of common gases.

Bigger Picture Focus – To link the importance of identification of chemicals to areas such as forensics and drug control science.

Content – crude oil and alkanes, fractional distillation, properties of hydrocarbons, cracking, alkenes.

Bigger Picture Focus – To understand how knowledge of carbon compounds can be used to develop useful products such as pharmaceuticals, perfumes and flavourings.

Content – reversible reactions, effect of changing conditions on equilibrium.

Bigger Picture Focus – To use knowledge of reaction rates to understand how ideal conditions for industrial reactions are decided upon.

Exams:

-6 x 75 minute papers – 2 for biology, 2 for chemistry, 2 for physics
There is no coursework element.

Assessments:

-End of unit tests
-Weekly educake quizzes to test recall
-6 mark question practice for each unit

#realworldready

- Appreciate how scientific understanding can result in developments in industries such as agriculture, manufacturing (e.g. of perfumes and detergents) and forensic and analytical science.
- Use scientific knowledge to understand steps we can take to reduce negative impact on our environment.
- Understand the importance of science to a wide variety of careers.

Useful websites and support

- GCSE bitesize
- GCSEPod
- Oak Academy
- Seneca
- Educake
- Savemyexams
- Physics and maths tutor

Home Learning

- Weekly educake quizzes to test recall
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Scan this QR code to take you to the specification we study.

Content – ionic, covalent and metallic bonding, states of matter, properties of ionic compounds, simple molecules, giant covalent structures, metals and alloys, allotropes of carbon.
Bigger Picture Focus – To use information about structure and bonding to explain physical and chemical properties and understand how this can be used to develop new materials with desirable properties.

YEAR 1

C1 Atomic structure & Periodic Table

Content – Atoms, ions and isotopes, models of the atom, development of the periodic table, trends in the modern periodic table, separating mixtures.

Bigger Picture Focus – To understand how knowledge of the structure of atoms and the arrangement of elements in the periodic table allows us to predict their properties and reactions.

C2 Structure & bonding

Content – Reactivity of metals, reactions of acids, making salts, electrolysis of molten compounds and aqueous solutions.

Bigger Picture Focus – To consider how knowledge of chemical changes aids in the development of new materials and processes and helps us to understand the complex reactions that occur in living organisms.

C4 Chemical changes

Content – calculating rates, factors affecting rates of reaction, collision theory

Bigger Picture Focus – To use knowledge of reaction rates to understand the impact of different conditions on rates of reactions in industry

C6 Rates of reaction part 1

C3 Quantitative chemistry

Content – conservation of mass, chemical equations, amount of substance, limiting reactants, concentration of solutions.

Bigger Picture Focus – To understand that use of equations is a key way for chemists to communicate ideas and how quantitative methods can be used to determine purity and yield of substances.

C5 Energy changes

Content – endothermic and exothermic reactions, reaction profiles, energy change of reactions.

Bigger Picture Focus – To consider how interactions between particles in chemical reactions can result in heating or cooling effects that are useful in everyday life.

YEAR 1

C6 part 2

C10 Using resources

Content – sustainability, potable water, waste-water treatment, alternative methods of metal extraction, life cycle assessment and recycling.

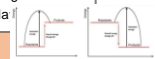
Bigger Picture Focus – To appreciate the sustainable use of resources in order to reduce environmental impact.

C9 Chemistry of the atmosphere

Content – Composition and evolution of the atmosphere, greenhouse gases, climate change, atmospheric pollutants and their sources.

Bigger Picture Focus – To understand how knowledge of changes in the atmosphere over time are enabling us to take action to reduce human impact on climate change.

YEAR 9



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B1a Cells	Using light microscopes to observe draw and label a selection of plant and animal cells	Eukaryotes and Prokaryotes Animal and plant cells Cell specialization Cell differentiation Microscopy Culturing microorganisms Transport in cells	KS3 Organisms microscopes, Plant and animal cells Respiration Photosynthesis Specialised cells Movement of substances	KS5 A level Biology, Module 2: Foundations in biology – cell structure
P1a Energy	Make and record observation in a series of experiments using different types of energies as they transfer from one to another Explain everyday and technological applications of science; evaluate associated personal, social, economic and environmental implications	Energy stores and systems Conservation and dissipation of energy Efficiency National and global energy resources	KS3 Energy Work Energy Machines Energy and temperature Energy Transfer Radiation and insulation	.KS5 A level Physics, module 3: Forces and motion
C5 Energy changes	Investigate the variables that affect temperature changes in reacting solutions.	Exo and endothermic reactions including reaction profiles and the energy change of reactions.	KS3 Reactions Atoms in chemical reactions Combustion Thermal decomposition Conservation of mass Exo and endothermic reaction	KS5 A level Chemistry, module 3: Periodic table and Energy
P3a Particle model of matter	Use appropriate equipment to make and record measurements needed to determine the dimensions of regular and irregular shapes Use SI units and prefixes	Density of material Changes of state Internal energy	KS3 Matter The particle model States of matter Changing state Diffusion Gas pressure Inside particles	KS5 A level Physics, module 5 Newtonian world and astrophysics

Year 9 Curriculum Overview- Subject

Content Topic/unit name, enquiry question	Disciplinary Knowledge (Skills) Actions taken within a topic to gain substantive knowledge	Substantive Knowledge This is the specific, factual content for a topic, which is connected into a careful sequence of learning	Prior Learning (KS2)	Future learning (KS3)
B2a Organisation	Use qualitative reagents to test for a range of carbohydrates, lipids, and proteins including Benedicts solution, iodine and Biuret	Principles of organisation Human digestion system	KS3 Organisms Enzymes in digestion Unhealthy diet KS2 Describe the simple functions of the basic parts of the digestive system in humans	KS5 A level Module 4 Biodiversity, Evolution, and Disease
C6a Rates of reaction	Develop a hypothesis then investigate how change in concentration affect the rates of reactions by a method involving turbidity and a volume of gas produced Interpret observations Presenting observations and data appropriately	Rate of reaction Factors which affect the rate of reactions Collision theory and activation energy Catalysts	KS3 Reactions Atoms in chemical reactions Conservation of mass Exo and endothermic reactions Chemical reactions Chemical reactions of metals and acids	KS5 A level Chemistry, module 3: Periodic table and energy
P7a Electromagnets	Using magnets and a compass observe and draw the magnet fields lines around a magnet Using a bar magnet and iron fillings to explain how magnets and magnetic fields interact between 2 magnets Follow a method and record results for how many paper clips can be picked up using a solenoid and then an electromagnet. Evaluate methods and suggest possible improvements	Poles of a magnet Magnetic fields The motor effect	KS3 Electromagnets Creating basic circuits with circuit symbols. Creating basic electromagnets.	KS5 A level Physics module 6: Particles and medical physics

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B4 Bioenergetics	The effect of light intensity on the rate of photosynthesis.	Photosynthesis Respiration	KS3 Organisms Levels of organization Skeletons, joints and muscles, microscopes, Plant and animal cells Respiration Photosynthesis Specialised cells Movement of substances	KS5 A level biology Module 5: Communication, homeostasis, and energy
C1 Atomic Structure	The need and importance of peer review on scientific theories.	Simple model of the atom, symbols, relative atomic mass, electronic charge and isotopes. The periodic table.	KS3 Matter Elements, atoms, compounds, chemical formulae, polymers, the periodictable	KS5 A level Chemistry, module 2: Foundations in Chemistry