



Curriculum Overview: Science

Exam Board:

AUTUMN 1

AUTUMN 2

SPRING 1

SPRING 2

SUMMER 1

SUMMER 2

7

Cell Biology

- Animal cells
- Plant cells
- Cell structures and functions
- Microscopes

The Particle Model

- States of matter
- Changing states of matter
- Density
- Diffusion

Forces

- Types of forces
- Balanced and unbalanced forces
- Investigating friction

Human Organ Systems

- Nutrition
- Digestive system
- Food tests
- Respiratory system
- Skeletal system
- Muscular system

Atoms, Elements, Compounds & Mixtures

- Atoms, elements, compounds and mixtures
- Solutions
- Separating substances
- Energy stores
- Energy transfers
- Non-renewable and renewable energy resources

Reproduction

- Plant reproduction
- Puberty
- Human reproduction
- Pregnancy

Chemical Reactions

- Physical and chemical changes
- Acids and alkalis
- pH scale
- Neutralisation
- Metal reactions
- Endothermic and exothermic reaction

Space

- Mass, weight and gravity
- Night and day
- Seasons
- The moon
- Solar system

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Plants and Ecosystems

- Photosynthesis and the structure of a leaf
- Dependence
- Food chains and webs
- Pyramids of number
- Sampling

Periodic Table & Reactivity

- Periodic table
- Properties of metals; and non metals
- Groups 1, 7 and 0
- Reactivity series
- Chemical reactions

Forces & Motion

- Speed and distance-time graphs
- Motion
- Friction
- Drag forces
- Pressure
- Moments

Health & Disease

- Respiration
- Exercise
- Circulatory system
- Heart disease
- Asthma
- Smoking, drugs and alcohol
- Pathogens

Materials and the Earth

- Structure of the Earth
- Types of rock
- Fossils
- Crude oil
- Ceramics, polymers, and composites
- Recycling
- Atmosphere
- Greenhouse effect

Waves

- Nature of waves
- Volume and pitch
- Hearing and the ear
- Reflection
- Light
- Lenses
- Colour

Genetics & Evolution

- DNA
- Inheritance
- Variation
- Evolution
- Natural selection
- Extinction
- Classification

Electricity and Magnetism

- Series & parallel circuits
- Current & potential difference
- Resistance
- Magnetic fields
- Electromagnets

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Cell Biology

- Animal & Plant cells
- Eukaryotes and Prokaryotes
- Microscopy
- Specialised cells and differentiation
- Cell Division
- Transport in cells

Atomic Structure and Periodic Table

- Atoms, elements and compounds
- Equations
- Mixtures
- Atom and models of the atom
- Relative atomic mass
- Electronic structure
- Periodic table
- Group 1, 7 and 0

Energy

- Energy stores in a system
- Kinetic, elastic potential energy and gravitational potential energy
- Energy changes in a system
- Specific Heat Capacity
- Power
- Efficiency
- Renewable and non-renewable energy resources

Organisation

- Principles of organisation
- Digestion and enzymes
- Food tests
- Lungs
- Heart and heart disease
- Blood vessels and blood
- Health and lifestyle
- Cancer
- Plant tissues and transport systems

Bonding, Structure and Properties

- Chemical bonds, ionic, covalent and metallic.
- How bonding and structure relate to the properties of substances.
- Polymers
- States of matter

Particle Model

- States of matter
- Density
- Changes of state
- Specific Heat Capacity
- Gas Pressure

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Bioenergetics

- Photosynthesis
- Limiting factors
- Rate of photosynthesis
- Uses of glucose
- Respiration
- Response to exercise
- Metabolism

Electricity

- Current, potential difference & resistance
- Series & parallel circuits.
- Resistors
- Mains electricity and the National Grid
- Power and energy transfer

Quantitative Chemistry

- Conservation of mass
- Relative formula mass
- Higher: Using moles
- Concentration of solutions

Infection and Response

- Communicable diseases
- Body defence systems
- Vaccination
- Antibiotics and painkillers
- Development of drugs

Atomic Structure

- Structure of the atom
- Development of the atom
- Nuclear equations
- Half life
- Irradiation and contamination

Chemical Changes

- Reactivity of metals.
- Reactions of acids
- Making salts
- Electrolysis

Energy Changes

- Exothermic and endothermic reactions.
- Reaction profile diagrams

Forces

- Forces and their interactions
- Work done
- Energy Transfer
- Forces and elasticity
- Forces and motion
- Newton's Laws
- Stopping distance
- Momentum

Rate and Extent of Chemical Change

- Rate of reaction.
- Factors affecting rates of reaction
- Reversible reactions and dynamic equilibrium.

Chemical Analysis

- Purity and formulations
- Chromatography
- Gas tests

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Ecology

- Communities
- Biotic and abiotic factors
- Competition
- Adaptations
- Estimating populations
- Water and carbon cycles
- Biodiversity and human impact

Homeostasis and Response

- Homeostasis
- Human nervous system
- Hormonal co-ordination in humans

Organic Chemistry

- Carbon compounds as fuels & feedstock.
- Cracking & alkanes.

Waves

- Waves in air, fluids & solids.
- Refraction
- Electro-magnetic waves
- Infrared radiation

Chemistry of the Atmosphere

- Composition of Earth's atmosphere.
- Greenhouse gasses.
- Carbon footprint
- Pollutants

Inheritance, Variation and Evolution

- Reproduction
- Understanding genetics
- Variation and evolution
- Classification

Using Resources

- Using Earth's resources
- Sustainable development
- Potable water
- Wastewater treatment
- Life cycle assessments

Magnetism and Electromagnetism

- Permanent and induced magnets
- Magnetic forces
- The motor effect.
- Electro-magnetism

Revision

GCSE exams

Curriculum Intent

The vision of this faculty is that, together with families and the local community, we are dedicated to helping young people, regardless of their ability or socio-economic background, to develop a **lifelong love of learning for Science** and the confidence to not just navigate the scientific world, but to shape it. **We aim to instil a sense of awe and wonder** in the scientific world so **fostering an appreciation of the uses and application of Science**, both today and in the future.

Science plays a very important part of the curriculum because it links to learners' lives in terms of **their own health, medicine, and the environment**, supporting them to develop their own **ethical standpoint on technological advances**. Understanding Science is crucial in helping learners to understand where **Physics, Biology and Chemistry** is in their homes, in their school and their community. The subject of Science prepares learners for the "next stage" because everything in Science has an impact on what learners say and do. The local community has strong links with Science and technology both historically and in the present. By using these links in Science lessons, we can give the curriculum more **relevance for our learners**.

The Science curriculum is **broad and balanced**; it is taught through **10 big ideas linking Biology, Chemistry and Physics** which support learners' progression through years 7 to 11, taking into account **prior learning**. The big ideas help to provide a framework to help learners organise knowledge and directly supports what we know about how students learn in Science for example, grouping related ideas together, moving from concrete to abstract ideas and revisiting and building upon the same idea multiple times. **The big ideas are sequenced through a spiral curriculum to enable depth before breadth**, this is to prepare learners to develop **critical thinking, problem solving and decision making**. Concepts learned are applied in **practical science** to deepen understanding. **Practical science** allows students to **cultivate curiosity, construct hypotheses, observe, record, and analyse data**. It allows us to evaluate the scientific method and appreciate how **scientific ideas have changed over time**. Practical Science is crucial to the curriculum across all age groups, skill being developed with **increased rigour and complexity as learners' progress through KS3 and 4**.

It is our intention that, when learners leave Beacon Hill Academy, they appreciate the importance of Science in everyday life and have a healthy curiosity in the scientific world, its applications and potential.

Curriculum Implementation

- **Learners will have a firm grasp of the powerful, substantive knowledge across the scientific disciplines.**
This will be achieved by:
 - **Challenging subject content** delivered by subject specialists.
 - The use of **'I do, We do, You do' strategy** to build learning and to challenge and scaffold as appropriate
 - The use of **recall and retrieval activities in DNA** and home learning to help learners to know more and remember more
 - The use of **appropriate assessment, both summative and formative**, which allows teachers to **accurately assess gaps** in knowledge and **identify misconceptions** and allows learners to **deepen their learning by completing 'Green for Growth' tasks**.
 - **Regular feedback** will be given after **Demonstrate activities followed by bespoke Connect tasks and 'Green for Growth'**
- **Learners will be good communicators of science. They will be able to research, inform, argue and debate relevant scientific ideas; interrogate their validity and be immune to the spread of misinformation. They will be able to discuss issues relating to SMSC thus fostering social understanding.**
This will be achieved by:
 - **Explicit teaching of the disciplinary literacy** required for science to **include Frayer models and reciprocal reading strategies**
 - Teachers provide opportunity for students to **collaborate on their work**.
 - Teachers will develop learners thinking around the wider social, environmental and economic impacts of scientific applications.
- **Learners will know that theories must be testable and how to apply the scientific method to their everyday lives.**
This will be achieved by:
 - Sequencing of **disciplinary knowledge** within the substantive context.
 - Using **purposeful practical work** to support students to consolidate their understanding.
 - Explicit teaching and careful **sequencing of substantive & disciplinary knowledge**. This will allow learners to **develop schema** and links between the Science disciplines and other curriculum areas such as Geography and Maths.
- **Learners will have flexible, transferrable knowledge of science and the science of learning so that they are confident life-long learners and equipped for further study.**
This will be achieved by:
 - **Explicit teaching of revision skills** and effective study skills.
 - Helping learners to develop their revision toolkit and provide opportunities to **participate in intervention**.
- **Learners will have a confident grasp of the key mathematical concepts that underpin Science.**
This will be achieved by:
 - Explicit teaching of fundamental maths, embedded within the science programme of study and sequenced to account for prior learning. This will also be informed by links with the Maths department
 - The use of "EVERY" scaffold when solving equations. This gives learners a framework on which to build calculations.

Exam results (2024 cohort); overall progress = -0.08, 46.5 % of learners achieved 44+, 27.8% of learners achieved 55+ and 10.1% of learners achieved 77+.

Interventions provided include Golden Days, half term revision sessions and morning breakfast revision sessions are focussed on helping learner revise prior knowledge and develop exam skills and technique.

To further support with recall and retrieval revision strategies, the introduction of Cornell Notes and revision flashcards have been introduced as part of the Revision Revolution to support early revision strategies.

There are clear links to learning and addressing misconceptions through clear exposition phases as well as in the Reteach and Reassess process following assessments. The increased focus on literacy through reciprocal reading, glossaries and Frayer Models support learners with understanding difficult scientific terminology.

Currently we have 14 learners who have opted to study Separate Sciences at KS4 in Year 11 and an increased uptake of 20 learners in Year 10.

There have been several enrichment activities planned this year including a speaker from Severn Trent Water who delivered a workshop on water treatment linking to the GCSE Chemistry curriculum, a GCSE live visit which involved Triple Science learners attending seminars from high profile scientists, the Year 8 Big Bang visit to the NEC aimed at aimed at increasing curiosity and interest in the STEM subjects and Teams meetings with Scientists in STEM careers for all year groups.