Science

Curriculum lead: Kanika Bhasin (kanika.bhasin@attrust.org.uk)

Subject Intent:

To deliver quality teaching through a cohesive curriculum which spirals from KS3→KS4→KS5 enabling students to create mental schema. The curriculum is designed to inspire curiosity within our students and foster a deep understanding of the natural world and how things work around them. We aim to develop critical thinking, and real-world application of their learning, we strive to cultivate students who are scientifically literate, environmentally conscious, and prepared

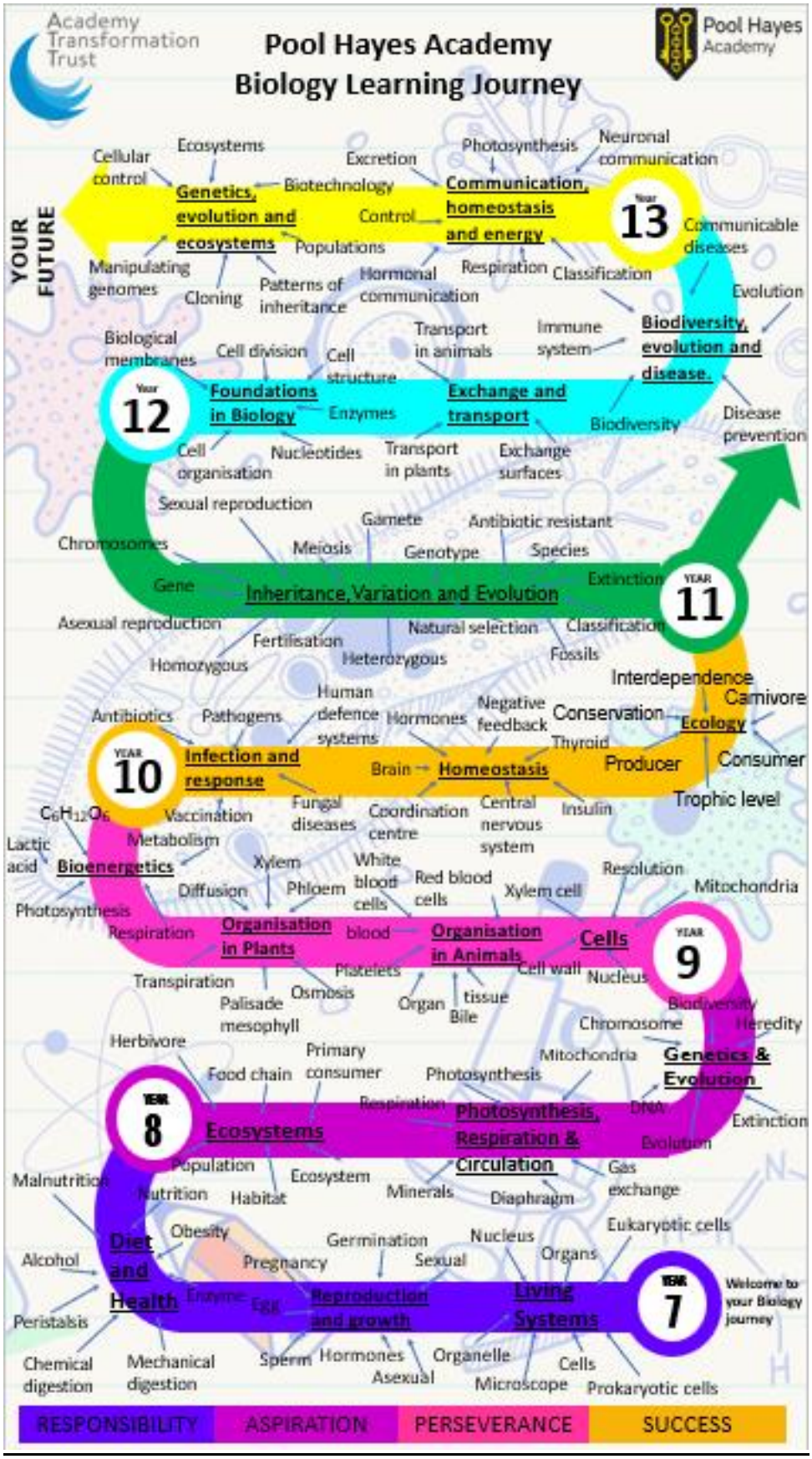
to thrive in a rapidly advancing technological society all to support transforming life chances and preparing all our students to lead successful lives.

At Pool Hayes Academy our curriculum:

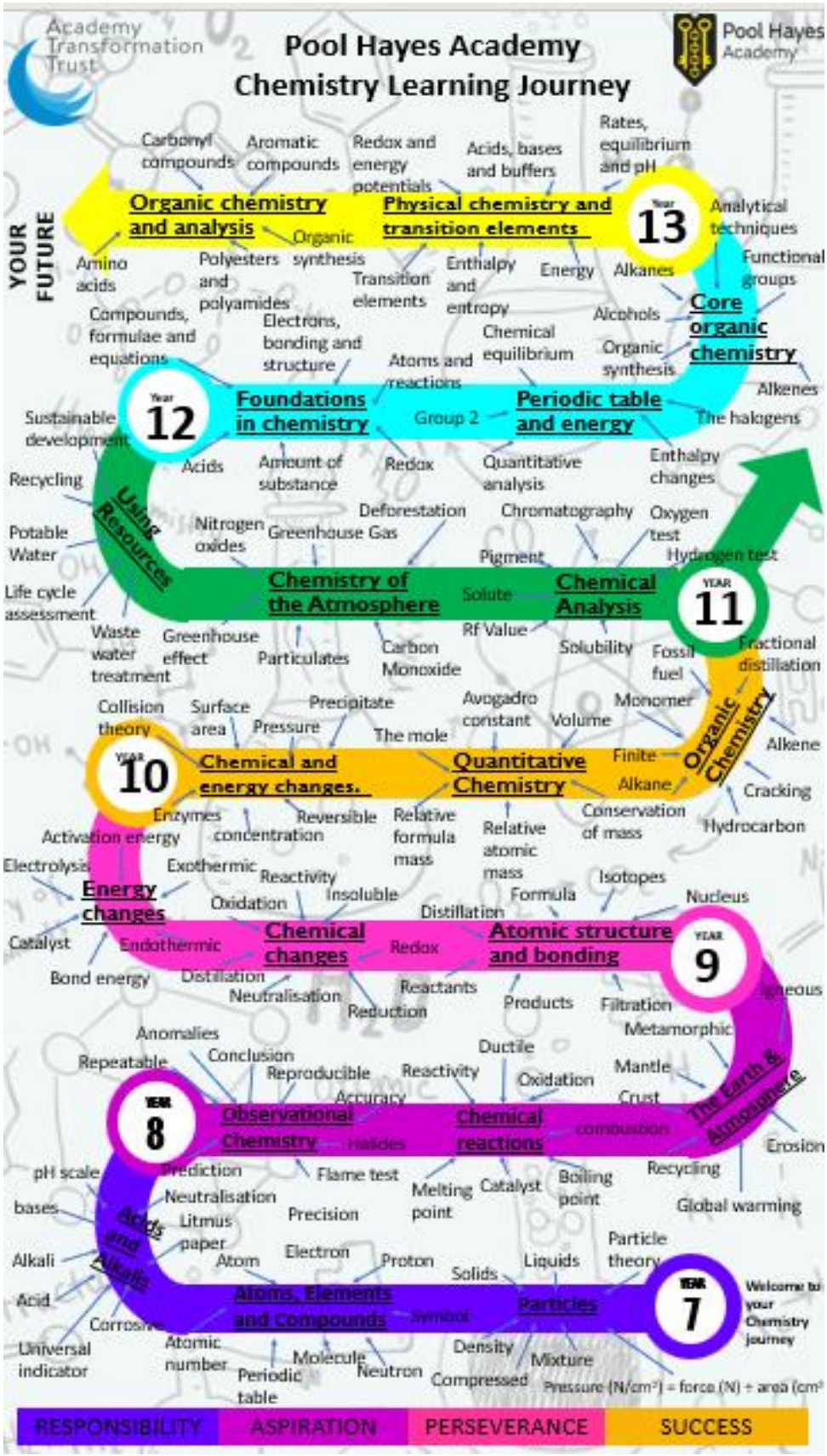
- Allows our pupils to feel empowered by what they study to become **critical thinkers** and more **empathetic human beings**. It promotes environmental and social responsibility by exploring the impact of human activities on the planet and the role of science in addressing global challenges. It instils a sense of responsibility and empowerment to contribute positively to society.
- Teaches pupils to become **global citizens** helps them to think beyond the classroom by fostering curiosity, enthusiasm and a sense of wonder about the world around us by encouraging students to ask questions, explore, and engage in hands-on experiments and develop a lifelong passion for science and learning.
- **Develops Scientific Knowledge and Understanding; educates and inspires** the next generation of independent, critical thinking, scientifically literate young adults.
- **Covers** 2016 National Curriculum for Science.
- **Is spiral** providing regular retrieval, spaced learning and build on previous knowledge making mental schemas**.** It d**elivers a well-sequenced, knowledge-rich curriculum** that builds on prior learning and progressively develops key scientific concepts and skills.
- **Incorporates both substantive and disciplinary knowledge**—teaching students not only what scientists know, but how they know it, fostering curiosity and deeper understanding.
- **Embeds opportunities for critical thinking and problem-solving** throughout the curriculum, encouraging students to think like scientists.
- **Ensures high expectations and academic rigour** in every lesson, for every student, with clear explanations, modelling, and structured practice.
- **Provides regular formative assessment and feedback** to identify misconceptions and close knowledge gaps effectively.
- **Creates a positive, inclusive classroom culture** where students feel safe to ask questions, explore ideas, and take intellectual risks.
- **Offers enrichment opportunities beyond the classroom**, including STEM clubs, competitions, trips, and links with external partners to extend learning.
- Cultivate Collaboration and Communication Skills: Encourage teamwork and collaboration through group projects and experiments.

Science

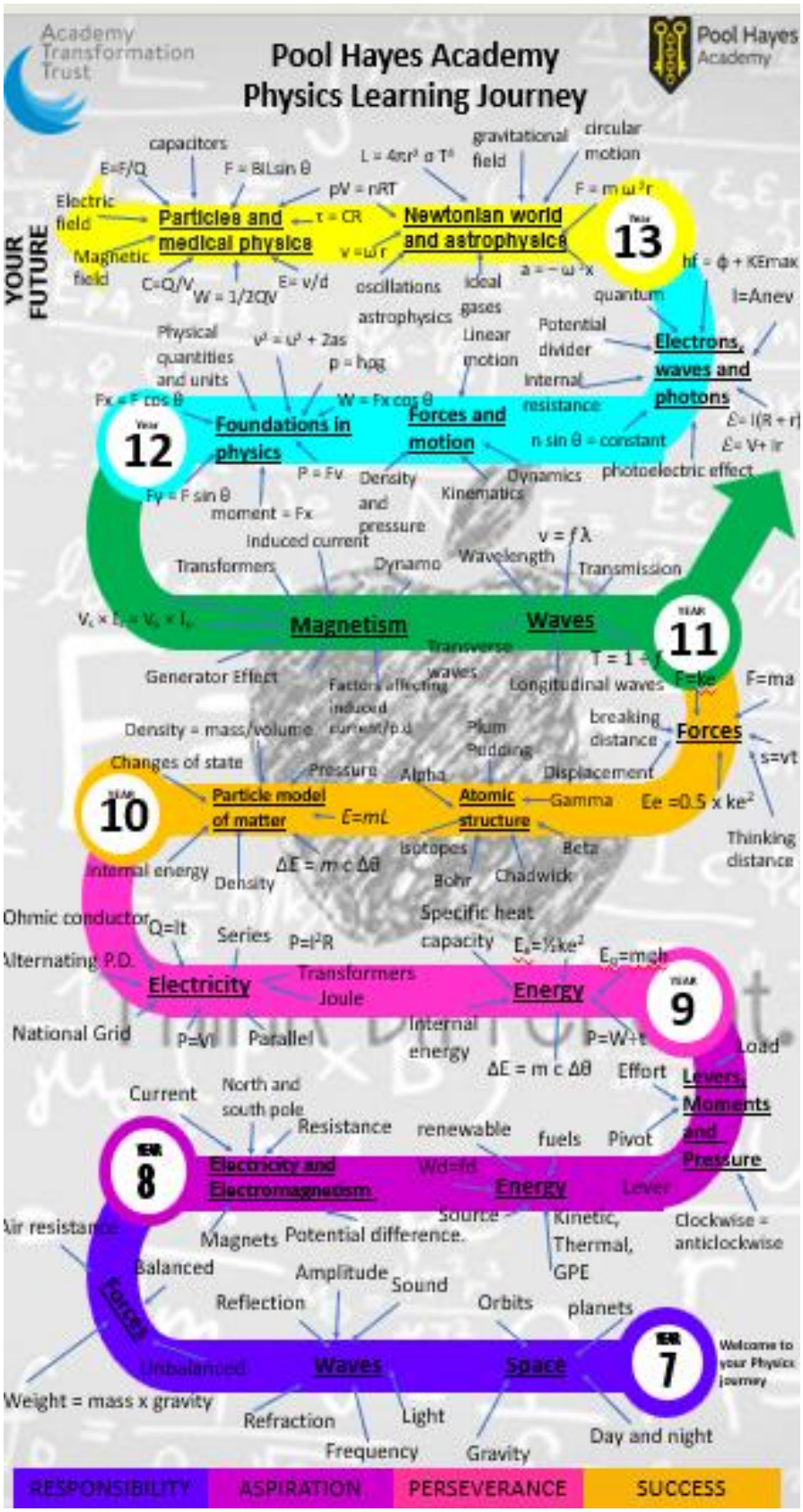
Learning journey:



Science


Academy Transformation Trust
Pool Hayes Academy
Chemistry Learning Journey
Pool Hayes Academy
YOUR FUTURE
Carbonyl compounds
Aromatic compounds
Redox and energy potentials
Acids, bases and buffers
Rates, equilibrium and pH
Organic chemistry and analysis
Physical chemistry and transition elements
Year 13
Analytical techniques
Amino acids
Polyesters and polyamides
Organic synthesis
Transition elements
Enthalpy and entropy
Energy
Alkanes
Functional groups
Compounds, formulae and equations
Electrons, bonding and structure
Chemical equilibrium
Alcohols
Core organic chemistry
Atoms and reactions
Organic synthesis
Alkenes
Year 12
Foundations in chemistry
Group 2
Periodic table and energy
The halogens
Sustainable development
Acids
Amount of substance
Redox
Quantitative analysis
Enthalpy changes
Recycling
Using Resources
Deforestation
Chromatography
Oxygen test
Potable Water
Nitrogen oxides
Greenhouse Gas
Pigment
Hydrogen test
Life cycle assessment
Chemistry of the Atmosphere
Solute
Chemical Analysis
YEAR 11
Waste water treatment
Greenhouse effect
Particulates
Carbon Monoxide
Rf Value
Solubility
Fossil fuel
Fractional distillation
Collision theory
Surface area
Pressure
Precipitate
The mole
Avogadro constant
Volume
Monomer
Organic Chemistry
Alkene
YEAR 10
Chemical and energy changes.
Quantitative Chemistry
Finite
Alkane
Cracking
Enzymes
Reversible
Relative formula mass
Relative atomic mass
Conservation of mass
Hydrocarbon
Activation energy
concentration
Electrolysis
Exothermic
Reactivity
Isotopes
Energy changes
Oxidation
Insoluble
Formula
Nucleus
Distillation
Catalyst
Endothermic
Chemical changes
Redox
Atomic structure and bonding
YEAR 9
Bond energy
Distillation
Neutralisation
Reactants
Reduction
Products
Filtration
Igneous
Metamorphic
Anomalies
Repeatable
Conclusion
Ductile
Reproducible
Reactivity
Mantle
Oxidation
Accuracy
Crust
The Earth & Atmosphere
YEAR 8
Observational Chemistry
Halides
Chemical reactions
combustion
Erosion
pH scale
Prediction
Flame test
Melting point
Catalyst
Boiling point
Recycling
bases
Neutralisation
Precision
Global warming
Acids and Alkalis
Litmus paper
Particle theory
Alkali
Atom
Electron
Proton
Liquids
Solids
Acid
Atoms, Elements and Compounds
Symbol
Particles
YEAR 7
Welcome to your Chemistry journey
Corrosive
Universal indicator
Atomic number
Molecule
Neutron
Density
Mixture
Periodic table
Compressed
Pressure (N/cm²) = force (N) ÷ area (cm²)
RESPONSIBILITY
ASPIRATION
PERSEVERANCE
SUCCESS

Science


Academy Transformation Trust
Pool Hayes Academy
Pool Hayes Academy
Physics Learning Journey
YOUR FUTURE
Year 13
Particles and medical physics
Newtonian world and astrophysics
Electrons, waves and photons
Year 12
Foundations in physics
Forces and motion
YEAR 11
Magnetism
Waves
Forces
YEAR 10
Particle model of matter
Atomic structure
YEAR 9
Electricity
Energy
Levers, Moments and Pressure
YEAR 8
Electricity and Electromagnetism
Energy
Forces
YEAR 7
Waves
Space
Welcome to your Physics journey
capacitors
gravitational field
circular motion
Electric field
Magnetic field
oscillations
ideal gases
quantum
astrophysics
Linear motion
Potential divider
Physical quantities and units
internal resistance
photoelectric effect
Density and pressure
Kinematics
Dynamics
moment = Fx
Induced current
Transformers
Dynamo
Wavelength
Transmission
Transverse waves
Longitudinal waves
Generator Effect
Factors affecting induced current/p.d
Plum Pudding
breaking distance
Density = mass/volume
Changes of state
Pressure
Alpha
Displacement
Gamma
Isotopes
Beta
Bohr
Chadwick
Thinking distance
Internal energy
Density
Ohmic conductor
Specific heat capacity
Alternating P.D.
Series
Transformers
Joule
National Grid
Parallel
Internal energy
Load
Effort
Current
North and south pole
Resistance
renewable
fuels
Pivot
Lever
Clockwise = anticlockwise
Air resistance
Magnets
Potential difference.
Source
Kinetic, Thermal, GPE
Balanced
Amplitude
Sound
Reflection
Orbits
planets
Unbalanced
Weight = mass x gravity
Refraction
Light
Frequency
Gravity
Day and night
RESPONSIBILITY
ASPIRATION
PERSEVERANCE
SUCCESS

Science

Links to Curriculum Map:

Assessment outline:

Formative assessment is a type of assessment used throughout the learning process to monitor student progress and provide feedback, aiming to improve both teaching and learning. It's not about assigning grades, but about helping students understand their strengths and weaknesses and how they can improve.

Summative assessments are evaluations conducted at the end of a learning period, such as a unit, course, or program, to assess a student's overall understanding and achievement. They are designed to gauge what a student has learned and whether they have met specific learning objectives.

Formative:

- Cold calling
- Mini-whiteboard tasks
- Effective questioning to check understanding
- Peer assessment
- Self-assessment
- Debate
- Quizzes
- Think-Pair-Share opportunities
- Exit tickets
- BEST resources to tackle misconceptions
- Concept cartoons to find and tackle misconceptions

Summative:

- Mid unit tests
- End of unit tests
- End of year tests
- National level tests i.e. Mocks
- Formal Practical Investigations
- Stem cell/Cloning/Genetic engineering etc debates
- Practical investigation planning
- Models and demonstrations
- Data analysis tasks

Science

Trips that are used to support the curriculum:

- **Big Bang trip** to NEC
- **Thinktank, Birmingham Science Museum:** Interactive science & technology exhibits, 4K digital planetarium and outdoor science garden, tailored STEM workshops, theatre shows, and planetarium sessions for Key Stages 3–5
- **Lapworth Museum of Geology (University of Birmingham):** Showcases earth history, fossils, rocks, and how our environment has changed over 4.5 billion years. Provides hands-on workshops, behind-the-scenes tours, and curriculum-linked activities.
- **Birmingham Botanical Gardens:** Covers biology, ecology, plant science, and environmental studies. Guided sessions in the glasshouses, exploring plant diversity and conservation.
- **University of Birmingham: Physics Outreach:** Lab tours, live demonstrations, and talks using real research equipment.
- **University of Wolverhampton: STEM Response Team:** In campus STEM workshops covering engineering, computing, life sciences, and more.

Extra curricula activities:

- KS3 Science STEM club
- Green skills: Energising Futures with Year 7-9
- STEM Challenges & Competitions (from next year)
- Science Photography or Art Competition (from next year)
- Guest Speakers / Career Talks/ STEM ambassadors (from next year)
- Medical mavericks (from next year)
- Eco or Environmental Club (from next year)
- Science Book or Film Club (from next year)
- Science Quizzes and Kahoot Tournaments (from next year)
- Science Fair (from next year)

Our Pupil Pledge:

At Pool Hayes Academy, our Science curriculum is a cornerstone of academic excellence and curiosity. It is ambitious, inclusive, and empowering, built on the belief that every student deserves to understand the world, think critically, and leave school equipped to shape a sustainable and innovative future.

1. Breadth, Depth, and Wonder

We offer a Science curriculum spanning Biology, Chemistry, and Physics, balancing fundamental concepts with modern scientific discoveries. From the molecular scale to the vastness of space, students explore the natural world and cutting-edge STEM developments. Our curriculum is designed to inspire awe and foster a lifelong passion for scientific inquiry.

2. Thinking Like Scientists

Science is more than facts—it's a way of thinking. Our students learn to question, investigate, analyse data, and draw evidence-based conclusions. We develop critical thinking skills so students don't accept information blindly, but can critically evaluate sources, identify misinformation, and make informed, conscious choices.

Science

3. Science That Matters: Everyday Life, Careers, and Sustainability

We connect science learning to real-world contexts that matter to students' lives and futures. From health and technology to environmental sustainability, our curriculum links classroom learning with everyday experiences and global challenges. We actively promote sustainability awareness and encourage students to become responsible stewards of the planet. Through career-focused lessons and enrichment, we raise aspirations and show how science opens doors to diverse, exciting careers in STEM and beyond.

4. Practical and Purposeful Learning

Practical work is at the heart of our curriculum. Regular hands-on experiments develop students' investigative skills, precision, and scientific reasoning. We prioritise safety, collaboration, and reflective practice. Alongside practical, targeted exam preparation equips students with the strategies and confidence to achieve their best grades, balancing knowledge recall with application and problem-solving.

5. Inclusion and High Aspiration for All

Science is for everyone. Our curriculum is carefully designed to be accessible, supportive, and challenging, ensuring all students can thrive. We use differentiated teaching and scaffolded resources to raise aspirations and unlock potential, helping every learner see themselves as a future scientist, engineer, or innovator.

6. Science as a Human Story

We highlight the people behind scientific discoveries—past and present—celebrating diversity, resilience, and creativity. Students explore how science has shaped human history and culture, and how today's researchers continue to push boundaries. This human perspective nurtures empathy, motivation, and a sense of belonging within the scientific community.

7. Preparing for Tomorrow

Our curriculum prepares students for life beyond the classroom, equipping them with scientific knowledge, critical thinking skills, and ethical awareness. Whether they pursue STEM further or navigate a science-rich world as informed citizens, our students leave with confidence, curiosity, and a commitment to lifelong learning and sustainable progress equipping them with greener skills necessary for future jobs.