

What are the fundamental concepts of science?

Science not only builds on mathematical and literacy skills covered by the other core subjects but problem solving, using critical thinking and evidence to create solutions and make decisions; essential skills required for many careers not only those of science, engineering and technology.

Students should:

- Develop a deeper and broader range of scientific knowledge and conceptual understanding through the subject disciplines of biology, chemistry and physics.
- Be able to relate scientific explanations to phenomena in the world around them and start to use modelling and abstract ideas to develop and evaluate explanations.
- Understand that science is about working objectively, modifying explanations to take account of new evidence and ideas and subjecting results to peer review.
- Work scientifically: be able to select the appropriate type of scientific enquiry and to develop a deeper understanding of factors to be taken into account when collecting, recording and processing data.
- Learn to use technical vocabulary accurately and precisely.
- Be able to apply mathematical knowledge to their understanding of science.
- Understand the implications of using science today and in the future.

What topics do students study in each year?

Year 7

Biology	Chemistry	Physics
Working Scientifically		
Cells	Particles & Their Behaviour	Forces
Body Systems	Atoms, Elements & Compounds	Space
Reproduction	Reactions	Sound
Health & Lifestyle	Acids & Alkalis	Light
	The Periodic Table	

Year 8

Biology	Chemistry	Physics
Biological Processes	The Periodic Table	Electricity & Magnetism
Ecosystems	Separation Techniques	Energy
Inheritance	Metals & Acids	Motion & Pressure
Cells	Earth	

Year 9

Biology	Chemistry	Physics
Photosynthesis and Respiration	Chemical reactions	Mechanical work
Inheritance	Energetics & Materials	Electrical work

Year 10 and 11 (GCSE)

Triple Science - The topic titles are the same as Combined Science in biology and chemistry but there is a greater level of content within each unit for the triple award sciences.

Biology	Chemistry	Physics
Cells	Atmosphere	<u>Trilogy</u>
Organisation	Atomic structure	Energy & Matter
Transport	Structure & Bonding	Energy & Electricity
Photosynthesis & Respiration	Chemical changes	Forces & Motion
Ecosystems	Quantitative	Waves & Electromagnetism
Infection & Response	Rates	<u>Triple</u>
Co-ordination and control	Energy changes	Energy & Matter
Inheritance, variation and evolution	Reversible reactions	Atoms & Energy
	Organic chemistry	Energy & Electricity
	Chemical Analysis	Forces & Equilibrium
	Using resources	Forces & Motion
		Radiation & The universe
		Magnets & Electromagnetism
		Gravity & Space

Year 12 and 13 (A-level)

Biology	Chemistry	Physics
Biological Molecules	Physical	Measurements & Their Errors
Cells	Atomic Structure	Particles & Radiation
Exchange	Amount of Substance	Waves
Genetic Information, Variation & Relationships Between Organisms	Bonding	Mechanics & Materials
Energy Transfers	Energetics	Electricity
Responses to Change	Kinetics	Further Mechanics & Thermal Physics
Genetics, Populations, Evolution & Ecosystems	Equilibria	Fields & Their Consequences
The Control of Gene Expression	Redox Reactions	Nuclear Physics
Gene Technologies	Thermodynamics	
	Rates	
	Electrode Potentials & Electrochemical Cells	
	Acids & Bases	
	Inorganic	
	Periodicity	
	Reactions of Groups 2 and 7	
	Properties of Period 3	
	Transition Metals	
	Reactions of Ions	
	Organic	
	Alkanes & Halogenoalkanes	
	Alkenes	
	Alcohols	
	Organic Analysis	
	Optical Isomerism	
	Aldehydes & Ketones	
	Carboxylic Acids	
	Aromatic Chemistry	
	Amines	
	Polymers	
	Amino Acids, Proteins & DNA	
	Organic Synthesis	
	NMR Spectroscopy	
	Chromatography	

What key skills will the pupils develop over time?

Students will develop an understanding of the world built on current scientific theories. They should learn to be curious and ask questions.

They will apply techniques and learning covered in previous years and in other areas of study to aid them in their understanding of new concepts. They will be supported to retrieve that prior knowledge through classroom activities.

They should develop problem solving skills to allow them to draw conclusions based on data and evidence supplied, enabling them to find solutions and/or make decisions. This includes planning, analysing and evaluating practical investigations, controlling variables to test their ideas. They should also develop mathematical skills in science by applying formulae, making calculations, interpreting patterns in data and understanding measurements.

They will have opportunities to develop the ability to work independently or collaboratively with others, including on practical tasks. They will learn to use equipment safely and accurately, and make precise observations whilst recording data systematically.

Students will have opportunities to develop the confidence to discuss their work, concepts and ideas objectively with the teacher/peer group and formulate ideas that allow successful evaluation of their work.

Students should develop their resilience to help them to persevere when met with challenges with their learning and not be afraid to ask for help. They should be able to identify their own strengths and weaknesses and carry out intervention activities.

How are all pupils learning in science?

The science curriculum is designed to support students of all abilities by integrating the principles of the EEF (Education Endowment Foundation) drivers, ensuring a structured yet challenging learning environment that fosters progress for all. This includes:

APK – opportunities to activate prior knowledge and link to previous learning

ESI – explicit strategy instruction, which may include teacher modelling followed by independent practice (IP)

SRR – opportunities for structured reflection and review

Classroom resources tend to be paper-based but we often use digital tasks for homework. Students keep exercise books where they complete their written work during lessons. A small number of students are supported to access technology like laptops, where appropriate. All lessons are adapted to ensure support and challenge are offered and we differentiate through setting students different tasks; through our questioning and feedback; through the level of one-one support we offer and through the resource we provide.

How are pupils assessed in science?

Students' understanding and skills are evaluated through a range of formative methods, including:

- Classroom discussions and questioning: Encouraging active participation and critical thinking.
- Investigative and research tasks: Promoting independent inquiry and problem-solving.
- Decision-making exercises: Enhancing evaluative skills and real-world application of science.
- Practical investigations
- Low-stake quizzes in lessons
- Educake or Kerboodle electronic quizzes
- The setting and monitoring of homework

Students also have summative formal written assessments for each taught topic, which test knowledge and application of key scientific concepts. Students in Years 10 and 12 have centre assessments at the end of the year. Students in Years 11 and 13 have centre assessments in November and February.

All students receive written feedback on their assessments, accompanied by structured opportunities to review and reflect on their work. This reflective process helps students identify strengths, address areas for improvement, and set goals for further progress.

Student work is marked and reviewed using the CAN system, focusing on where the work Complete, Accurate and Neat and making corrections developing good practice for the future.

How can students progress in science?

In Year 9, students can opt to take Triple Science (separate sciences) or Combined Science at GCSE. This is a free choice.

In Year 11, students may opt to stay with us to study science A-levels. We currently offer Biology, Chemistry and Physics at A-level in our 6th Form. In the past we have also offered a BTEC Level 3 Extended Certificate in Applied Science, as an alternative to A-levels.

Students may also choose to take up Level 3 science qualifications at other providers.

Many students opt for Level 2, 3 and 4 apprenticeships in a relevant scientific field, for example, engineering.

After A-level, students may opt to go to university to study a scientific discipline, or they may successfully apply for a degree-level apprenticeship in STEM.

Popular scientific disciplines at university include:

- Animal Science
- Astrophysics
- Biological Sciences
- Biochemistry
- Biomedical Sciences
- Chemical Engineering
- Chemistry
- Ecology
- Engineering
- Environmental Sciences
- Forensics
- Geology
- Marine Science
- Medicine
- Natural Sciences
- Pharmacology
- Pharmacy
- Physics
- Science Education (teaching)
- Veterinary Science

Level 3 science qualifications can lead directly into science vocations such as medicine, nursing, engineering. But they are also highly regarded qualifications for studying subjects like economics, law and psychology.

How can pupils enrich their knowledge and understanding in science

- Consider buying extra resources such as study guides and on-line revision websites and apps. Cognito and BBC Bitesize are both recommended.
- Use Focus Learning and other linked resources found on the Millom School website.
- Use Educake or Kerboodle to access structured quizzes and interventions.
- Get involved in STEM activities.
- Choose science enrichment activities.
- Attend intervention and revision sessions.
- Attend BAE Systems and REACT Foundation roadshows.
- Watch scientific documentaries on TV on streaming platforms.
- Try to visit science museums or exhibitions where possible.
- Buy magazines like New Scientist and National Geographic.
- Read this book: A Short History of Nearly Everything by Bill Bryson.