SCIENCE
CURRICULUM MAP

Our subject vision:

Aspiration	***Mission statement:*** *We aim to teach students to become scientifically literate and responsible citizens as well as our next generation of inspirational professional scientists. A solid understanding of science is imperative for everyone and we have an aspirational curriculum full of great opportunities for every student.* *As a faculty "we enable all students to **acquire knowledge** that takes them beyond their experience. Access to knowledge is the **right** of all pupils as future citizens" (Young, 2014).* **Knowledge:** In Science we aim to understand the world around us. We look at everything from tiny atoms to enormous stars as well as how our bodies work. We have a spiral curriculum so key ideas are revisited and built-upon such as cells, energy and atomic structure. **Skills:** Students learn how to plan experiments, use laboratory equipment, analyse data and draw valid conclusions. We encourage a deep level of analytical thinking around topical scientific issues and believe that all students should learn to think like scientists. **Understanding:** At the end of students' study of Science they will be able to understand the world around them to be able to make decisions for themselves and their families. They will be prepared to undertake further study and have developed a curiosity for how and why things work.
Opportunity	**Within the classroom:** In Science lessons, students study a range of topics along with developing their practical skills. We ensure that every topic begins with links to relevant careers for students to explore using a research-based homework. Each topic also contains a link to a relevant real-life scientist. We offer "extra-curricular" within our curriculum such as a project tracking local wildlife, sponsored by the Royal Society. **Beyond the classroom:** Beyond the curriculum, students may participate in: • Science club • Eco club • IRIS Research project • Lots of partnership activities as part of the Abingdon Science partnership • External talks and visits
Integrity	**Knowledge:** Scientific knowledge allows students to engage with the world around them, to be active and knowledgeable citizens. Students are taught key information to help them make life choices such as around reproduction, genetic engineering and climate change. **Skills:** Students often work in pairs or small groups to complete practical work. This allows them to develop team working skills such as negotiation and clear communication. They are encouraged to have a solution-focused approach to problems that arise during the practical. **Understanding:** They demonstrate their character development through their increasing ability to apply real-world knowledge to their work, and through their application of empathy and interpretation skills in discussion and in writing.

SUBJECT CURRICULUM MAP
KS4: CHEMISTRY (TRIPLE)
AQA CGSE Chemistry (8462)

Further study

- A-level in chemistry
- Apprenticeships (lab analysts and technicians, petrochemical and pharmaceutical industry)

Career pathways

- Chemistry Teacher
- Forensic Scientist
- Geochemist
- Hazardous Waste Chemist
- Materials Scientist
- Pharmacologist / toxicologist
- Water Chemist

Mock exams are a complete **GCSE Chemistry paper 2** (Rates and equilibrium, crude oil, organic chemistry, and polymers, chemical analysis, Earth's atmosphere and resources, and using resources.)

Using our resources

- Rusting
- Useful alloys
- The properties of polymers
- Glass, ceramics, and composites
- Making ammonia – the Haber process and its economics
- Making fertilisers in the lab and in industry

Summer exams

Mock exams

The Earth's atmosphere and its resources

- History of our atmosphere
- Our evolving atmosphere
- Greenhouse gases
- Global climate change
- Atmospheric pollutants
- Finite and renewable resources
- Reduce, reuse, and recycle
- Water safe to drink
- Treating waste water
- Extracting metals from ores
- Life cycle assessments

Students also use their revision guides and an application (Educake) that help them learn the basic knowledge they need to succeed.

Crude oil and fuels

- Hydrocarbons
- Fractional distillation of oil
- Burning hydrocarbon fuels
- Cracking hydrocarbons

Year 11

Organic reactions and polymers

- Reactions of the alkenes
- Structures of alcohols, carboxylic acids, and esters
- Reactions and uses of alcohols
- Carboxylic acids and esters
- Addition polymerisation
- Condensation polymerisation
- Natural polymers
- DNA

Chemical analysis

- Pure substances and mixtures
- Analysing chromatograms
- Testing for gases
- Tests for positive and negative ions
- Instrumental analysis

Rates and equilibrium

- Rate of reaction
- Collision theory and surface area
- The effects of temperature, concentration, pressure, and catalysts
- Reversible reactions and energy
- Dynamic equilibrium and altering conditions

Throughout KS4 students have end of unit assessments and then larger assessments to allow them to revisit earlier topics.

Mock exams

Mock exams

Mock exams are a complete paper 1 (atomic structure, periodic table, structure and bonding, chemical calculations, chemical changes, electrolysis and energy)

Extra opportunities
RSC Chemistry competition
Practical science workshops
Careers fairs and workshops
Chemistry grade booster

Electrolysis and energy changes

- Electrolysis of molten ionic compounds
- Electrolysis of aqueous solutions
- Extraction of Aluminium
- Exothermic/ endothermic reactions
- Useful changes
- Reaction profiles
- Bond energy calculations
- Cells, batteries and fuel cells

Chemical calculations

- Relative masses and moles
- Balanced equations
- Yields
- Atom economy
- Concentrations
- Titrations
- Volumes of gases

Chemical changes

- Reactivity series
- Displacement reactions
- Extracting metals
- Making salts
- Acids and alkalis

Year 10

Year 11

1 Organic reactions and polymers

Why this?	Organic compounds are directly related to life on Earth, and organic reactions are key in the manufacturing of medicine, cosmetics, fertilisers, detergents, and food products. Polymers, both plastics and natural polymers, fill our life. Students learn about their structures and reactions.
Why now?	Many precursors of organic compounds used in industry are issued of the oil industry. Students built on what they have learned about crude oil to learn about organic compounds and polymers. This topic expands students' knowledge about materials around us.

2 Chemical analysis

Why this?	One big part of chemistry is being able to identify the elements and compounds present in substances and mixtures. Students learn about some basic key tests in chemical analysis such as the tests for gases, positive and negative ions, as well as chromatography.
Why now?	After looking at the atomic model, how elements and compounds react, and the factors affecting chemical reactions, students now look at how to identify unknown samples.

3 The Earth's atmosphere and the Earth's resources

Why this?	Our atmosphere has changed over millions of years, which allowed for life to develop; however, our atmosphere is endangered by our industrial activities. Students will be equipped with the knowledge necessary to take key decisions as a citizen. The concept of finite and renewable resources is also important to every citizen. Students will learn how chemistry helps mankind in manufacturing products with a lesser environmental impact on Earth.
Why now?	Throughout the chemistry curriculum, students have learned about chemistry in the lab or in industry. They now learn about the natural chemistry around us and how humans affect it.

4 Using resources

Why this?	Chemistry is key in the manufacturing of different materials (alloys, composites, ceramics) and fertilisers. This topic explores the industrial applications of chemistry.
Why now?	This topic completes the students' knowledge on Earth and chemistry.

Year 10

1 Chemical changes

Why this?	This topic introduces students to a whole range of key chemical reactions with metals or metallic comounds and a required practical – making salt.
Why now?	This is an exciting topic to start year 10 which revisits ideas from year 7 on acids & alkalis and builds on the chemistry work from year 9. Understanding of this topic will allow for application of the reactivity series in electrolysis and energy changes

2 Chemical calculations

Why this?	Quantitative chemistry is key to determine the formulae of compounds, equations for reactions, concentrations, and yield of reactions. Chemical equations give chemists a universal communication tool.
Why now?	Students have learned qualitative chemistry and are now ready to add the quantitative aspects of it and how important it is to the industry.

3 Electrolysis & energy changes

Why this?	Electrolysis is an important industrial process, for example using the key terms students will learn how aluminium is extracted. Students learn why some reactions are hot and others cold and this is applied to everyday examples. They also look at how different cells and batteries work.
Why now?	This unit allows for application of the core knowledge from the chemical changes topic about the reactivity series.

4 Rates and equilibrium

Why this?	Reactivity is not the only factor affecting how fast and efficiently reactions occur. This is a practical topic in which students change reactions' conditions to study their effects on rates of reactions and yields.
Why now?	Students now have a well-rounded knowledge of the particle model, and qualitative and quantitative chemistry. They are ready to apply this knowledge to the concepts of rates and equilibrium.

5 Crude oil and fuels

Why this?	Crude oil and fuels are the basis of our modern economy. Students learn where it comes from and what happens when it is burned or transformed as precursors of everyday life products.
Why now?	This topic is the first one in a series of topics that is relevant to every citizens. It offers a broad understanding of why crude oil is both irreplaceable to our society, and yet in need of replacing for our planet.

SUBJECT CURRICULUM MAP
KS4: CHEMISTRY (COMBINED)

AQA GCSE COMBINED SCIENCE Trilogy (8464)

Further study

- A-level in chemistry
- Apprenticeships (lab analysts and technicians, petrochemical and pharmaceutical industry)

Career pathways

- Chemistry Teacher
- Forensic Scientist
- Geochemist
- Hazardous Waste Chemist
- Materials Scientist
- Pharmacologist / Toxicologist
- Water Chemist

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Mock exams

Summer exams

[The Earth's atmosphere and its resources](#)

- History of our atmosphere
- Our evolving atmosphere
- Greenhouse gases
- Global climate change
- Atmospheric pollutants
- Finite and renewable resources
- Reduce, reuse, and recycle
- Water safe to drink
- Treating waste water
- Extracting metals from ores
- Life cycle assessments

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Year 11

[Rates and Equilibrium](#)

- Rate of reaction
- Collision theory and surface area
- The effects of temperature, concentration, pressure, and catalysts
- Reversible reactions and energy
- Dynamic equilibrium

[Crude oil and fuels](#)

- Hydrocarbons
- Fractional distillation of oil
- Burning hydrocarbon fuels
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[Chemical analysis](#)

- Pure substances and mixtures
- Analysing chromatograms
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Mock exams

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Year 10

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[Chemical calculations](#)

- Relative masses and moles
- Balanced equations
- Concentrations

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- Reactivity series
- Displacement reactions
- Extracting metals
- Making salts
- Acids and alkalis

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