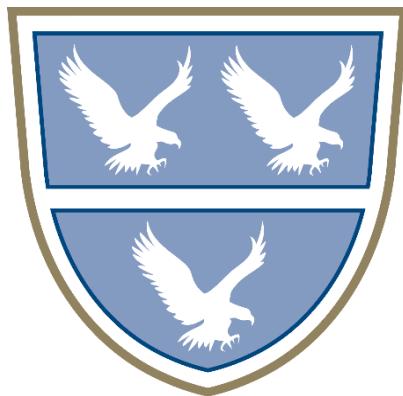


SCIENCE CURRICULUM MAP



Our subject vision:

In Science:

We aim to teach students to become scientifically literate and responsible citizens as well as our next generation of inspirational professional scientists.

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).

What do we learn?

We follow the Activate AQA scheme of work with our own Fitz adaptations to ensure students are challenged and enjoy their learning. This leads on to the AQA courses at GCSE where students study either triple or combined science.

How do we learn?

Practicals are an important part of our lessons. Students learn to work both independently and in groups to carry out experiments. They learn to plan their work, use scientific equipment, collect data, analyse results, draw conclusions and evaluate. We also have a range of strategies to ensure students can remember the large amount of subject knowledge such as retrieval quizzes and interleaved topics tests.

How this document works:

This Curriculum Map will show you everything we do in science. It shows the learning journey from year 7 to year 11 and beyond.

At each point it will show you what is covered and how it will be assessed. Click on each topic and it will automatically take you to an explanation of why we learn it.

If you have any further questions, contact Mrs Forder (Head of Science).
cforder@fitzharrys.oxon.sch.uk



SUBJECT CURRICULUM MAP: Y7/8 SCIENCE

Year 9

End of year assessment

Electromagnets

- Magnets and magnetic fields
- Electromagnets
- Uses of electromagnets

Assessment – uses of electromagnets research task

Earth

- Global warming
- The carbon cycle
- Extracting metals
- recycling

Assessment – climate change debate written task

Genes

- Natural selection
- Extinction
- Biodiversity
- Inheritance
- Genetics
- Genetic modification

Assessment – tbc

Waves

- Sound and water waves
- Radiation and energy
- Modelling waves

Assessment – test on waves, reactions and ecosystems

Careers: every topic has a related careers homework task

Year 8

End of year assessment

Earth

- Earths structure
- Rock types
- Rock cycle
- The solar system
- The moon

Electromagnets

- Potential difference
- Resistance
- Series and parallel circuits
- Current

Assessment – 6 mark question

Organisms

- Gas exchange and breathing
- Drugs, alcohol and smoking
- Digestive system
- Nutrients and diet

Assessment – tbc

Matter

- Atoms
- Compounds
- Polymers
- Periodic table
- Group 1, 7 and 0 elements

Assessment – organisms and matter test

Forces

- Friction
- Squashing and stretching
- Turning forces
- Pressure

Assessment – tbc

Energy

- Work done and machines
- Temperature
- Radiation
- Insulation

Genes

- Variation
- Adolescence
- Reproductive systems
- The menstrual cycle
- Development of a fetus

Assessment – test on last three topics

Assessment – puberty leaflet

Waves

- Sound and the ear
- Loudness and amplitude
- Frequency
- Light and the eye
- Reflection and refraction

Assessment – light diagrams

Reactions

- Acids and alkalis
- Indicators
- Neutralisation and salts
- Metal reactions

Assessment – test on last three topics

Ecosystems

- Food chains and webs
- Competition
- Flowers and pollination
- Germination

Assessment – newspaper article task

Energy

- Food and fuels
- Energy resources
- Power
- Dissipation
- Transfers

Assessment – Using data task

Forces

- Balanced and unbalanced
- Speed
- Distance – time graphs
- Gravity

Assessment – test on all topics to date

Matter

- Particle model
- Changes of state
- Diffusion and gas pressure
- Pure substances and mixtures
- Separating mixtures

Assessment – rock salt letter

Organisms

- Cell structure
- Movement of substances
- Microscopes
- The skeleton
- Muscles and joints

Assessment – Model cell

Introduction

- Hazards in science
- Chemical symbols
- Using a Bunsen burner
- Scientific questions
- Recording and analysing data
- Planning investigations

Assessment – Bunsen cartoon

Extra opportunities

- RAF workshop
- Royal Society grant looking at wildlife
- Science club
- Eco club
- STEM club – crest awards

Year 7

Year 8

<p>1 Organisms</p> <p>Why this? Students will learn about breathing and the effect of drugs as well as the digestive system and diet.</p> <p>Why now? This topic builds on the Y7 topic, their knowledge of cells, transport and movement are integral to their understanding.</p>	<p>2 Matter</p> <p>Why this? Students learn about atomic structure and compounds. They look at the periodic table and the properties of key groups.</p> <p>Why now? Building on the Y7 topic students will take their understanding of particles further looking at their interactions.</p>	<p>3 Forces</p> <p>Why this? Students learn about friction and pressure and how this explains the world around us.</p> <p>Why now? Building on the Y7 topic students will use their knowledge to explain more examples of forces and their interactions.</p>	<p>4 Energy</p> <p>Why this? Students learn about work done and machines. They will look at the transfer of heat and insulation.</p> <p>Why now? Students have looked at energy transfers in Y7. In this topic they will apply this to think critically about reducing these transfers and how this can be useful.</p>
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<p>5 Ecosystems</p> <p>Why this? Students will learn about key reactions, respiration and photosynthesis.</p> <p>Why now? Students have looked at breathing in organisms as well as cell structure in Y7. this topic builds on this knowledge to explain the key reactions photosynthesis and respiration.</p>	<p>6 Reactions</p> <p>Why this? Students will learn about key reactions and the energy involved in these reactions.</p> <p>Why now? Students have looked at atoms and their properties in matter. In this topic they explain the key reactions these atoms are having.</p>	<p>7 Waves</p> <p>Why this? Students learn about sound and water waves and how they transfer energy.</p> <p>Why now? Students have looked at energy in Y7 and Y8 this topic builds on Y7 and applies their knowledge of energy transfer by wave.</p>	<p>8 Genes</p> <p>Why this? Students learn about how variation is inherited and the impact a lack of diversity can have on our world.</p> <p>Why now? Students have looked at variation in Y7. in this topic they take this further and look at the biological basis for this variation.</p>
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9 Earth

Why this? Students learn about climate change, global warming and recycling. These topics are key to understanding our world today.

Why now? Students through chemistry and physics have looked at particles and energy. This topic requires both of these ideas to explain these real world impacts.

10 Electromagnets

Why this? Students learn how current can bring about magnetism. The uses and applications of this in the real world.

Why now? Students have looked at the principles of current and electricity in Y7. this topic builds on this and develops their ideas in the case of magnetism.

Year 7

<p>1 Introduction</p> <p>Why this? In this topic students will learn key practical and investigational skills as well as how to be safe in a laboratory.</p> <p>Why now? The skills learnt in this unit are integral for all future practical investigations.</p>	<p>2 Organisms</p> <p>Why this? Students will learn the basic structure of cells and how these then bring about movement in a range of organisms</p> <p>Why now? The skills learnt in this topic form the foundation for all future biology studies at KS3.</p>	<p>3 Matter</p> <p>Why this? Students will learn key techniques to separate materials as well as the states of matter and solubility.</p> <p>Why now? The skills learnt in this topic form the foundation for all future chemistry studies at KS3</p>	<p>4 Forces</p> <p>Why this? Students will learn how different objects interact. They will also look at speed and gravity.</p> <p>Why now? The skills learnt in this topic form the foundation knowledge for all future physics topics at KS3.</p>
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<p>5 Energy</p> <p>Why this? Students will learn about different energy stores and how energy is transferred. They will be able to apply this to real world examples.</p> <p>Why now? Forces and energy are closely linked. Having learnt about forces students can begin to develop their understanding with energy.</p>	<p>6 Ecosystems</p> <p>Why this? Students will learn how organisms interact and the integral part plants play in the biological world.</p> <p>Why now? The organisms topic gives the foundation knowledge to then allow students to apply their knowledge to interactions of organisms.</p>	<p>7 Reactions</p> <p>Why this? Students will learn about key chemicals and their reactions. They will begin to use chemical formulae regularly.</p> <p>Why now? The matter topic introduced students to particles, in this topic they will use their knowledge to see how particles behave in reactions.</p>	<p>8 Waves</p> <p>Why this? Student will look at sound and light waves and how our body receives this message.</p> <p>Why now? Students have already looked at energy, in this topic they are looking at ways this energy is transferred and applying their knowledge to it's effects.</p>
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9 Genes

Why this? Students will learn about variation and the advantages this as well as key topics of reproduction and how the body changes in adolescence.

Why now? Students have looked at interactions between organisms and the structure of the cell. In this topic they apply that knowledge to explain the biology behind these differences and fertilisation at a cellular level.

10 Earth

Why this? Students will learn about the Earth's structure and how our Earth fits into the universe.

Why now? Students have looked at ideas of gravity, energy and the properties of materials. This applies their knowledge in the context of earth and the universe.

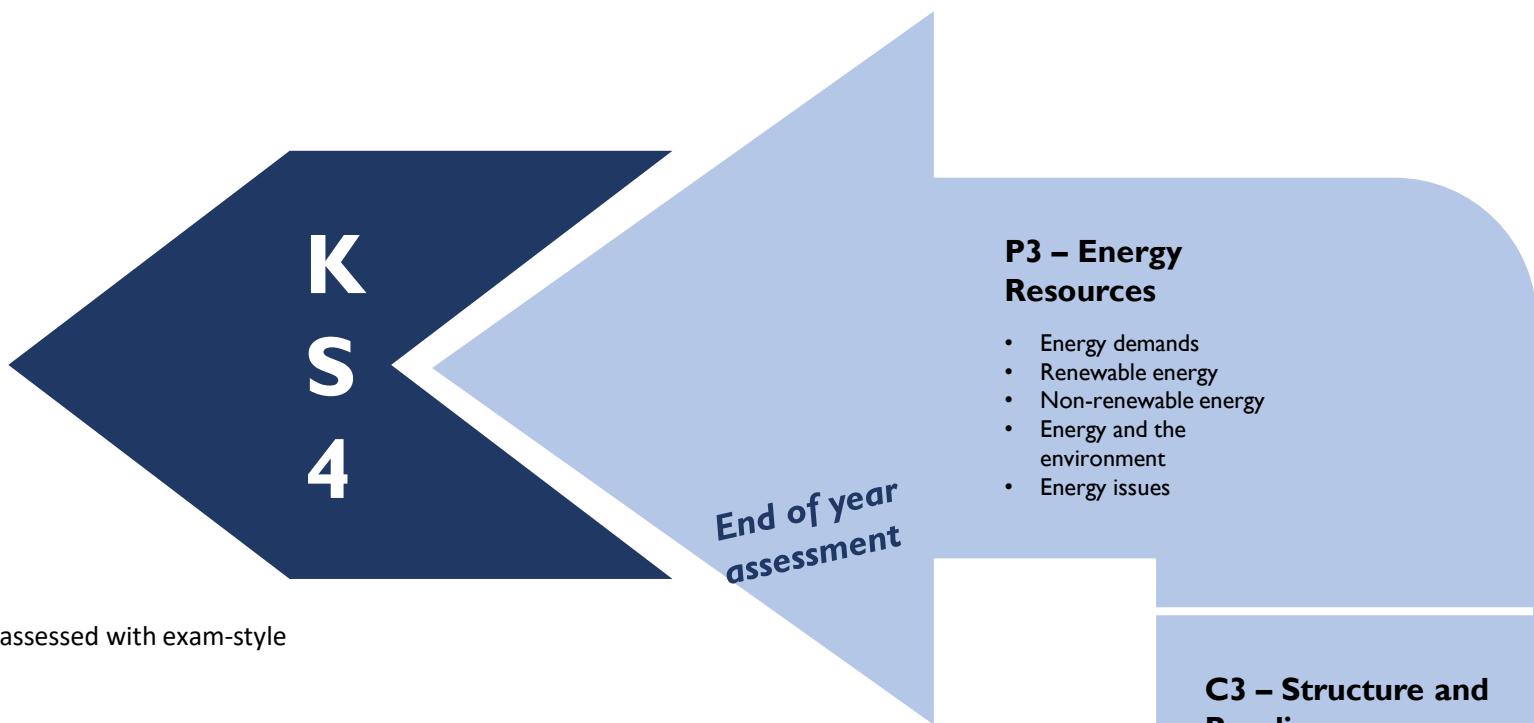
11 Electromagnets

Why this? Students will begin to explore the properties of circuits and key ideas of potential difference, current and resistance.

Why now? Students have already considered energy and can now apply this to the context of electricity and circuits.

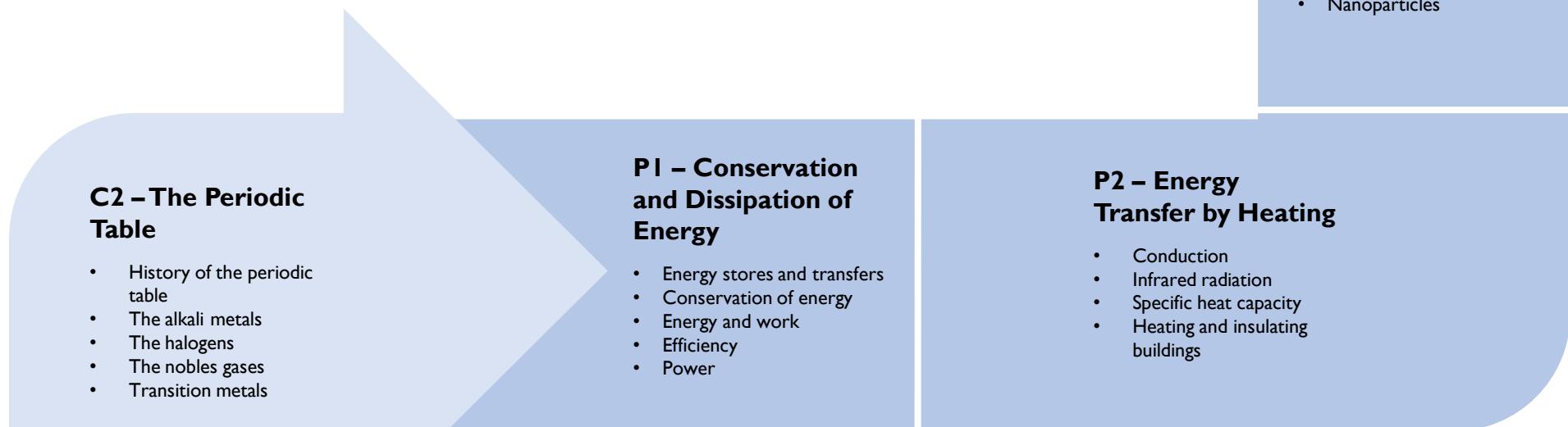


SUBJECT CURRICULUM MAP: Year 9



Assessment: each unit is assessed with exam-style questions.

Careers: all units start with an introduction of a relevant career to help students apply their understanding. The introductory lesson also includes links to an aspirational scientist in the field.

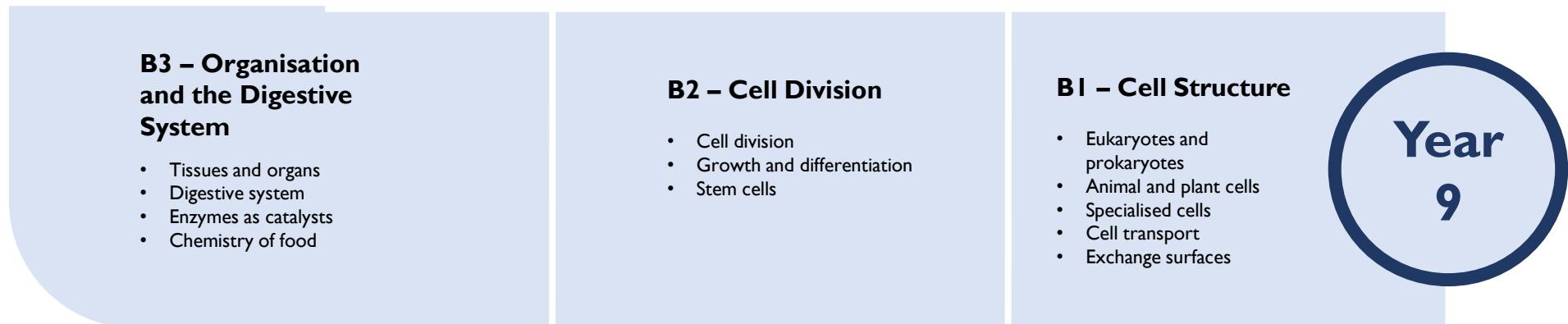


C1 – Atomic Structure

- Structure of the atom
- Electronic configuration
- Chemical equations
- Separation techniques
- Ions and isotopes



- Trips and visits
- Workshops at Abingdon School
- Careers workshops
- GCSE Science Live trip





Year
9

1 B1 - Cell Structure

Why this? Students learn the role of components of the cell and how substances move into and out of cells. Student will also undertake two required practical's – Using microscopes and osmosis.

Why now? This unit provides the core knowledge for all future biology topics. It allows students to develop their key practical skills.

2 B2 - Cell Division

Why this? Cell division is key to growth and development in all organisms. Stem cells have exciting potential in medical treatments with current research taking place.

Why now? Students have studied the core knowledge on cell structure in B1 and are able to use this in their understanding of cell division.

3 B3 – Organisation and the Digestive System

Why this? Enzymes are involved in many different reactions in living organisms – understanding of this is key for students.

Why now? Students have studied exchange surfaces in B1 Cell structure, this topic builds on this focusing on the exchange surfaces in the digestive system. It also focuses on some core knowledge on enzymes which will appear repeatedly during the course. Students will complete two required practical's – food tests and enzyme reactions.

4 C1 – Atomic Structure

Why this? Students learn about the structure of an atom, ions and isotopes. They will learn how to write chemical equations and how to separate mixtures.

Why now? This unit provides the core knowledge for all future chemistry topics.

5 C2 – The Periodic Table

Why this? Students will learn about patterns in the periodic table, it's history and the properties of key elements.

Why now? Students have studied the core knowledge of atomic structure in C1 they are now able to apply this to begin to explain patterns and reactivity in this unit.

6 P1 – Conservation and Dissipation of Energy

Why this? Students learn about the different types of energy store and how this energy can be transferred. Using their knowledge they can apply this to examples in their everyday life.

Why now? This unit provides students with core knowledge for all future physics topics.

7 P2 – Energy Transfer by Heating

Why this? Students will learn about energy transfers involving heat looking specifically at conduction, specific heat capacity and insulation.

Why now? Students have studied the core knowledge of energy stores and transfers in P1. in this unit they are able to apply this knowledge further and explain how properties of materials impact the energy transferred. Students will complete two required practical – specific heat capacity and insulation.

8 C3 – Structure and Bonding

Why this? Students will learn about interactions between atoms and ions in the forming of larger chemical structures. These structures and their properties are fundamental to their understanding of chemistry.

Why now? Students have studied the structure of both atoms and ions and the properties of key elements in C1 and C2. In this unit students will begin to take this knowledge and explain how these properties lead to reactions and bonding. The skills from this unit will be used regularly throughout the GCSE course.

9 P3 – Energy Resources

Why this? Students will learn where the energy we use comes from. They will look at both renewable and non-renewable methods and make judgements on the advantages and disadvantages of each.

Why now? Students have grasped how energy is stored and transferred in P1 and P2. in this unit students are able to see how we as humans transfer that energy usefully to us. It allows students to become critical thinkers as they analyse different strategies and their advantages and disadvantages.



SUBJECT CURRICULUM MAP: KS4 Biology

Further study

Many students go onto A'level science but GCSE sciences are an important foundation for all courses.

Career pathways

Medicine, veterinary science, forensic science, ecology, law, finance, nursing, research scientist, dentist.

In year 11 students become more independent learners by using their revision guides to complete guided revision. They also have Tassomai (a research-based revision app).

Assessment – students complete an end of unit test after each unit. This is marked by their teacher and then time is dedicated to making improvements and addressing misconceptions.

Summer exams

B18: Biodiversity and ecosystems

- Human population explosion
- Land, Air and Water pollution
- Human effects on the environment
- Maintaining biodiversity
- Global warming
- Trophic levels and biomass
- Factors affecting food security
- Sustainable and efficient food production

B17: Organising an ecosystem

- Carbon cycle
 - Water cycle
 - Feeding relationships (food chains, predator/prey)
- Triple only**
- Decomposers
 - Rates of decomposition

B16: Adaptations, interdependence and competition

- Adaptation in animals and plants
- Competition in animals and plants
- Distribution and abundance of organisms in their environment

B15: Genetics and evolution

- Evidence for evolution
 - Fossils and Extinction
 - Antibiotic Resistance
 - Classification
- Triple only:**
- Accepting Darwin's theory
 - History of genetics and evolution
 - Speciation

B14: Variation and Evolution

- Variation
 - Evolution by natural selection
 - Selective breeding
 - Genetic Engineering and ethics
- Triple only:**
- Cloning
 - Adult cell cloning

B13: Reproduction

- A-sexual and sexual reproduction
 - Meiosis
 - DNA and the genome
 - Inherited disorders and genetics
 - Genetic screening
- Triple only:**
- DNA structure
 - Protein Synthesis
 - Gene expression and mutation

Year 11

Topic title

Summary of key content

B9 Respiration:

- Aerobic and anaerobic respiration
- Responding to exercise
- Metabolism and the liver

B8: Photosynthesis

- Photosynthesis
- Rate of photosynthesis
- How plants use glucose
- Making the most of photosynthesis

Mock exams

At the end of year 10 a complete paper is completed.



Trips and visits
Workshops at Abingdon School
Careers workshops
GCSE Science Live trip

B7: Non-communicable diseases

- Non-communicable disease
- Cancer
- Risks of disease (smoking, diet, exercise, alcohol and carcinogens)

B6: Preventing and treating diseases

- Vaccination
 - Antibiotics and painkillers
 - Discovering and developing drugs
- Triple only:**
- Making and using monoclonal antibodies

B5: Communicable diseases

- Health and Disease
 - Pathogens
 - Diseases caused by fungi, bacteria, viruses and protists
 - Primary and secondary defence mechanisms in humans
- Triple only**
- Growing bacteria in the lab and preventing bacterial growth
 - Plant diseases
 - Plant responses

B4: Organising animals and plants

- Components of the blood and blood vessels
- The heart
- Heart Disease and Treatments
- Gas Exchanges
- Plant Tissue
- Transpiration and Evaporation

Year 10



Year 11

1 B13: Reproduction

Why this?	This looks at the different types of reproduction, as well as DNA and inheritance.
Why now?	This topic explores how organisms allow their genes to be passed onto offspring. It also explores genetic disorders and how we can screen for these.

2 B14: Variation and Evolution

Why this?	This topic looks at Charles Darwin's theory of natural selection and builds on topics learnt in B13. In this topic we explore genetic engineering and some of the ethical issues with this.
Why now?	This topic builds on key topics, such as DNA, which was studied in B13. It looks at topics, such as at how we can genetically engineer DNA in the lab.

3 B15: Genetics and Evolution

Why this?	This topic explores how scientific theories have developed over time, as well as how we classify the organisms which surround us. Triple only students will explore the socio-historical context and reactions to Darwin's theory of evolution. The cross curricular links draw together science and history.
Why now?	This topic builds on B13 and B14 by looking at the evidence for Darwin's theory of evolution. As well as trying to put Darwin's theory into context.

4 B16: Adaptation, Independence and competition.

Why this?	This topic builds on Darwin's theory of evolution by natural selection, by looking at how animals and plants adapt to their environment. You will also carry out a practical to measure the abundance of organisms in an ecosystem.
Why now?	This builds on prior understanding about natural selection learnt in topics B14-B15.

5 B17: Organising an Ecosystem

Why this?	Understanding the importance of how water and carbon are recycled, is vital to understanding the factors which are needed to maintain our ecosystem. <i>Triple only students will carry out a practical which explores the rates of decomposition.</i>
Why now?	This topic allows us to build on how plants and animals are adapted to their ecosystem. It then gives us a greater understanding of how materials are recycled and why this is important.

6 B18: Biodiversity

Why this?	This topic looks at the effects of the human population explosion. This is important to allow us to understand how we can reduce our carbon footprint and support biodiversity.
Why now?	This topic consolidates B16 and B17 and allows us to think about how we can reduce the waste we emit, and support our ecosystems.

Year 10

1 B5: Communicable Diseases

Why this?	This topic introduces pupils to a range of pathogens which cause disease. This is a very exciting topic, which allows pupils to apply their knowledge to real life situations.
Why now?	This topic builds on pupils knowledge of eukaryotic and prokaryotic cell structure from B1, as well as how pathogens cause disease.

2 B6: Preventing and Treating Disease

Why this?	This topic explores how we can treat infectious diseases and how we develop drugs which are sold over the counter.
Why now?	This topic builds on the knowledge learnt in B5 and extends pupils learning by exploring how we can treat infectious diseases. As well as the science behind developing a vaccine and drug.

3 B7: Non-communicable disease

Why this?	This topic looks at other risk factors of ill health, such as diet and lifestyle.
Why now?	This topic looks at non-communicable diseases. It builds on what was learnt in B5 and B6, by looking at lifestyle factors which can increase your risk of disease.

4 B8: Photosynthesis

Why this?	This topic looks at how plants make their own food by the processes of photosynthesis. This is vital for plants survival.
Why now?	Builds on the knowledge of B1 and B4, where pupils learnt about cell structure and enzymes.

5 B9: Respiration

Why this?	This topic explores the process of respiration and how organisms use oxygen and glucose to meet their energy demands.
Why now?	This topic builds on the knowledge of enzymes and cell structure learnt in B1 and B4. It also builds on knowledge learnt in B8 about how plants use glucose.

6 B10: The Human Nervous System

Why this?	This topics explores humans respond to their surroundings and coordinate their responses. It looks at the central nervous system.
Why now?	This topic builds on knowledge learnt in B1, specialised cells. It looks at how we coordinate our responses.



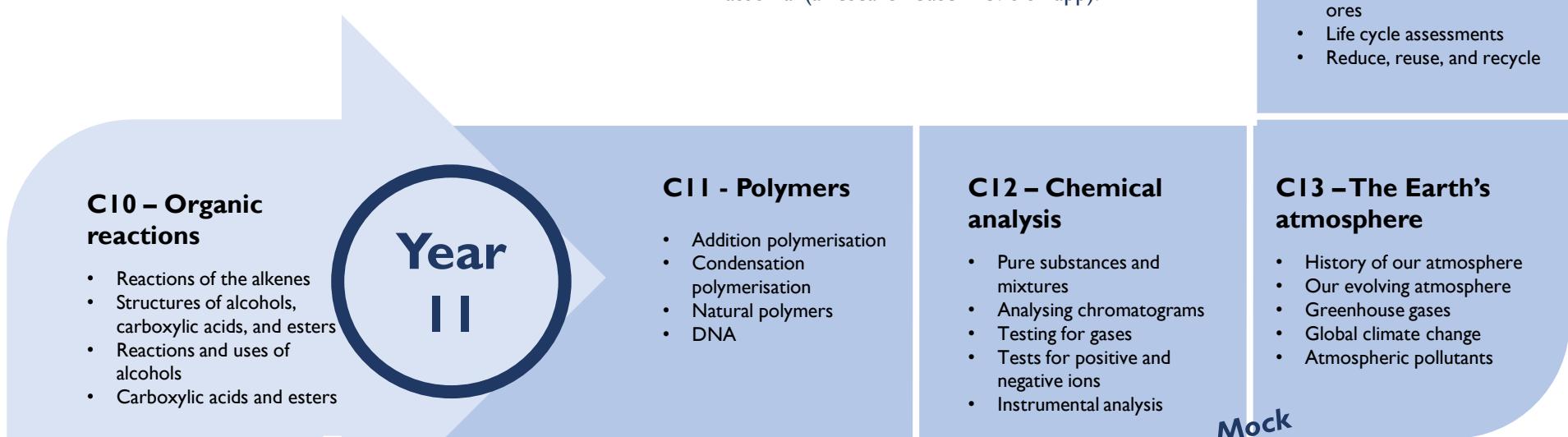
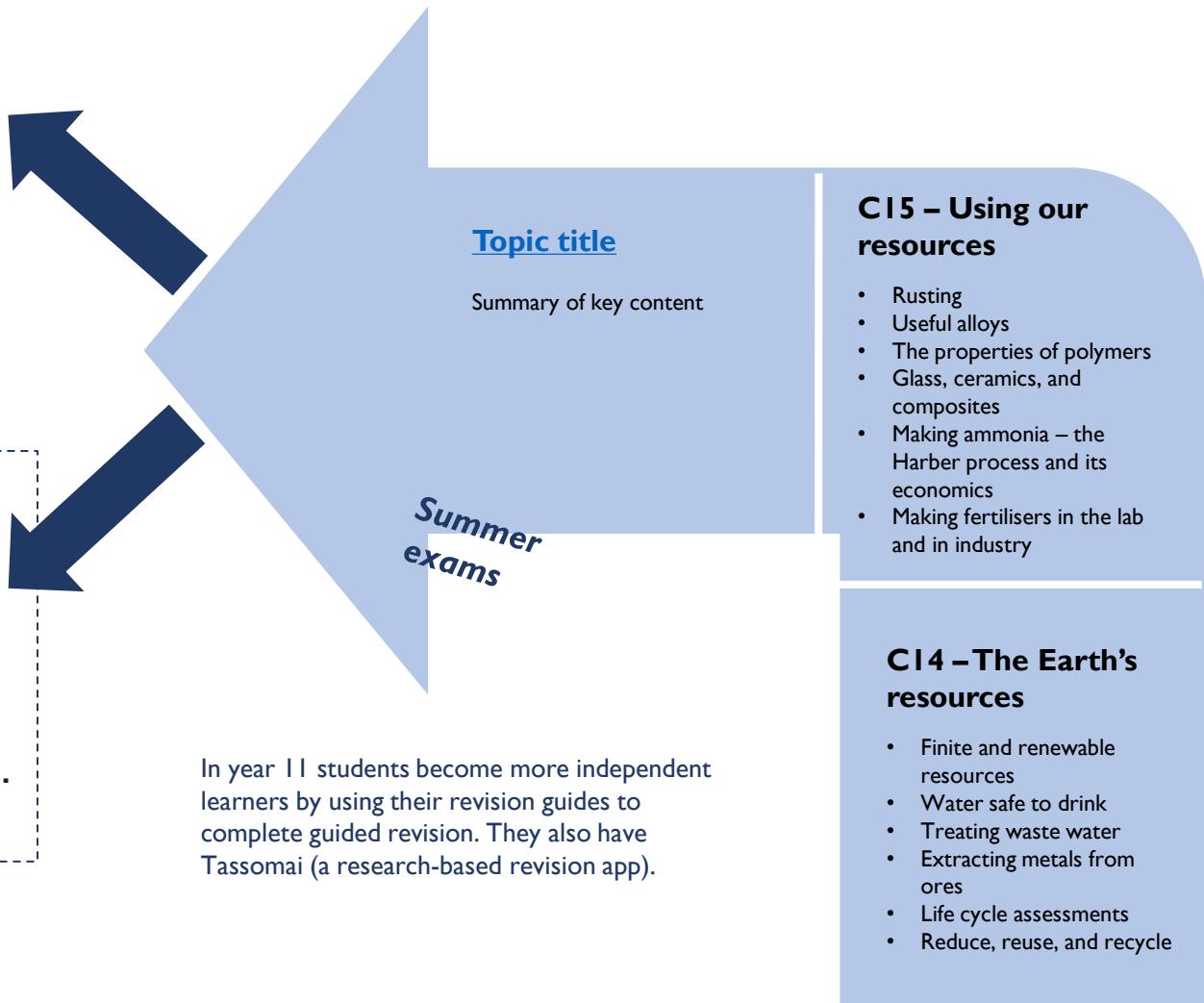
SUBJECT CURRICULUM MAP: KS4 CHEMISTRY

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.



C9 – Crude oil and fuels

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

Mock exams

Mock exams are a complete paper 1 (topics 1-7)

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

Trips and visits
Workshops at Abingdon School
Careers workshops
GCSE Science Live trip

C8- 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

C4 – Chemical calculations

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

C7 – Energy Changes

- Exothermic/ endothermic
- Useful changes
- Reaction profiles
- Bond energy calculations
- Cells, batteries and fuel cells

C6 - Electrolysis

- Key method
- Extraction of Aluminium
- Electrolysis of aqueous solutions

C5 – Chemical changes

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

Year 10



Year
11

1 C10 – Organic reactions

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.

Why now? Many precursors of organic compounds used in industry are issued of the oil industry. Students built on what they have learned in the C9 topic.

2 C11 - Polymers

Why this? Polymers, both plastics and natural polymers (the ones found in nature), fill our life. Students learn about their structures and reactions.

Why now? This topic is directly related to crude oil (precursor of plastics) and organic chemistry, and expands students' knowledge about materials around us.

3 C12 – 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.

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.

4 C13 – The Earth's atmosphere

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.

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.

5 C14 – The Earth's resources

Why this? 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? This topic is directly related to the C13 topic and how mankind can preserve Earth.

6 C15 – 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 is the final instalment about Earth and chemistry (13 and C14).

Year
10

1 C5 – Chemical changes

Why this? This topic introduces students to a whole range of key chemical reactions 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 C2 work from year 9. Understanding of this topic will allow for application of the reactivity series in C6 & C7.

2 C6 - Electrolysis

Why this? Electrolysis is an important industrial process, for example using the key terms students will learn how aluminium is extracted.

Why now? This unit allows for application of the core knowledge from C5 about the reactivity series.

3 C7 – Energy Changes

Why this? 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 is a further application of the C5 unit so builds on this core knowledge.

4 C4 - 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.

5 C8 – 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.

6 C9 – 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.