

SCIENCE

CURRICULUM MAP



Our subject vision:

Aspiration	<p><u>Mission statement:</u></p> <p><i>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).</i></p> <p>Knowledge:</p> <p>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.</p> <p>Skills:</p> <p>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.</p> <p>Understanding:</p> <p>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.</p>
Opportunity	<p>Within the classroom:</p> <p>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.</p> <p>Beyond the classroom:</p> <p>Beyond the curriculum, students may participate in:</p> <ul style="list-style-type: none"> • Science club • Eco club • Carbon Research project • Lots of partnership activities as part of the Abingdon Science partnership • External talks and visits
Integrity	<p>Knowledge:</p> <p>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.</p> <p>Skills:</p> <p>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.</p> <p>Understanding:</p> <p>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.</p>



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 poster

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 – timeline

Waves

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

Assessment – test on waves, reactions and ecosystems

Reactions

- Combustion
- Thermal decomposition
- Conservation of mass
- Exothermic and endothermic
- Bond energies

Ecosystems

- Respiration
- Biotechnology
- Photosynthesis
- Plant minerals

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 – anti-drugs leaflet

Matter

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

Assessment – maths challenge

Forces

- Friction
- Squashing and stretching
- Turning forces
- Pressure

Assessment – Test on forces

Energy

- Work done and machines
- Temperature
- Radiation
- Insulation

Assessment – 6 mark question

Genes

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

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 – investigation planning

Ecosystems

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

Assessment – 6 mark question

Energy

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

Forces

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

Matter

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

Organisms

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

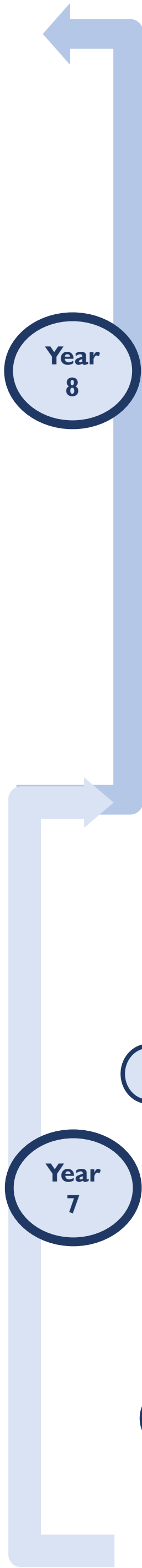
Introduction

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

**Year
7**

Extra opportunities

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



Year 8

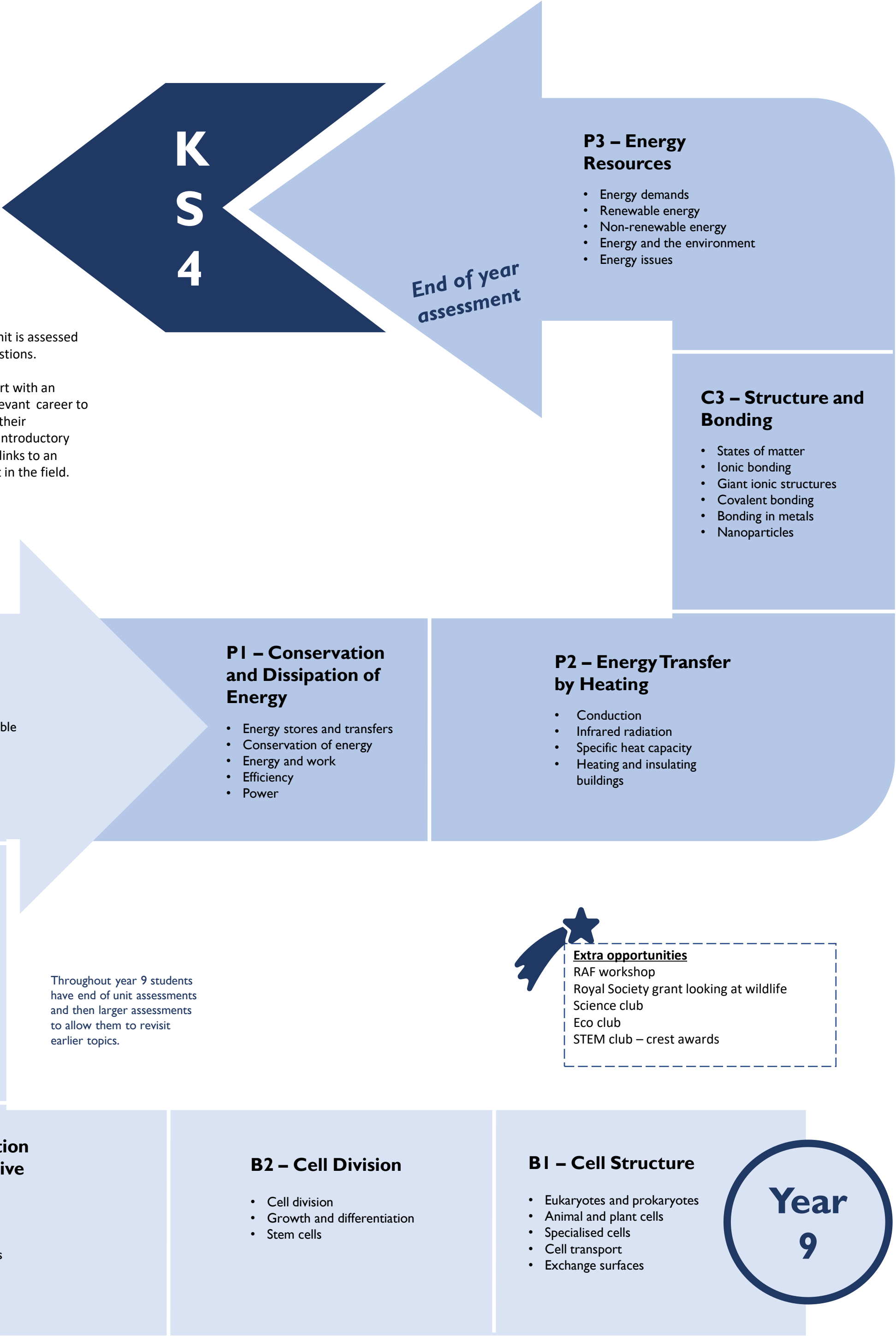
<div>1</div> <div>Organisms</div> <div><div>Why this?</div><div>Students will learn about breathing and the effect of drugs as well as the digestive system and diet.</div></div> <div><div>Why now?</div><div>This topic builds on the Y7 topic, their knowledge of cells, transport and movement are integral to their understanding.</div></div>	<div>2</div> <div>Matter</div> <div><div>Why this?</div><div>Students learn about atomic structure and compounds. They look at the periodic table and the properties of key groups.</div></div> <div><div>Why now?</div><div>Building on the Y7 topic students will take their understanding of particles further looking at their interactions.</div></div>	<div>3</div> <div>Forces</div> <div><div>Why this?</div><div>Students learn about friction and pressure and how this explains the world around us.</div></div> <div><div>Why now?</div><div>Building on the Y7 topic students will use their knowledge to explain more examples of forces and their interactions.</div></div>	<div>4</div> <div>Energy</div> <div><div>Why this?</div><div>Students learn about work done and machines. They will look at the transfer of heat and insulation.</div></div> <div><div>Why now?</div><div>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.</div></div>
<div>5</div> <div>Ecosystems</div> <div><div>Why this?</div><div>Students will learn about key reactions, respiration and photosynthesis.</div></div> <div><div>Why now?</div><div>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.</div></div>	<div>6</div> <div>Reactions</div> <div><div>Why this?</div><div>Students will learn about key reactions and the energy involved in these reactions.</div></div> <div><div>Why now?</div><div>Students have looked at atoms and their properties in matter. In this topic they explain the key reactions these atoms are having.</div></div>	<div>7</div> <div>Waves</div> <div><div>Why this?</div><div>Students learn about sound and water waves and how they transfer energy.</div></div> <div><div>Why now?</div><div>Students have looked at energy in Y7 and Y8 this topic builds on Y7 and applies their knowledge of energy transfer by wave.</div></div>	<div>8</div> <div>Genes</div> <div><div>Why this?</div><div>Students learn about how variation is inherited and the impact a lack of diversity can have on our world.</div></div> <div><div>Why now?</div><div>Students have looked at variation in Y7. in this topic they take this further and look at the biological basis for this variation.</div></div>
<div>9</div> <div>Earth</div> <div><div>Why this?</div><div>Students learn about climate change, global warming and recycling. These topics are key to understanding our world today.</div></div> <div><div>Why now?</div><div>Students through chemistry and physics have looked at particles and energy. This topic requires both of these ideas to explain these real world impacts.</div></div>	<div>10</div> <div>Electromagnets</div> <div><div>Why this?</div><div>Students learn how current can bring about magnetism. The uses and applications of this in the real world.</div></div> <div><div>Why now?</div><div>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.</div></div>		

Year 7

<div>1</div> <div>Introduction</div> <div><div>Why this?</div><div>In this topic students will learn key practical and investigational skills as well as how to be safe in a laboratory.</div></div> <div><div>Why now?</div><div>The skills learnt in this unit are integral for all future practical investigations.</div></div>	<div>2</div> <div>Organisms</div> <div><div>Why this?</div><div>Students will learn the basic structure of cells and how these then bring about movement in a range of organisms</div></div> <div><div>Why now?</div><div>The skills learnt in this topic form the foundation for all future biology studies at KS3.</div></div>	<div>3</div> <div>Matter</div> <div><div>Why this?</div><div>Students will learn key techniques to separate materials as well as the states of matter and solubility.</div></div> <div><div>Why now?</div><div>The skills learnt in this topic form the foundation for all future chemistry studies at KS3</div></div>	<div>4</div> <div>Forces</div> <div><div>Why this?</div><div>Students will learn how different objects interact. They will also look at speed and gravity.</div></div> <div><div>Why now?</div><div>The skills learnt in this topic form the foundation knowledge for all future physics topics at KS3.</div></div>
<div>5</div> <div>Energy</div> <div><div>Why this?</div><div>Students will learn about different energy stores and how energy is transferred. They will be able to apply this to real world examples.</div></div> <div><div>Why now?</div><div>Forces and energy are closely linked. Having learnt about forces students can begin to develop their understanding with energy.</div></div>	<div>6</div> <div>Ecosystems</div> <div><div>Why this?</div><div>Students will learn how organisms interact and the integral part plants play in the biological world.</div></div> <div><div>Why now?</div><div>The organisms topic gives the foundation knowledge to then allow students to apply their knowledge to interactions of organisms.</div></div>	<div>7</div> <div>Reactions</div> <div><div>Why this?</div><div>Students will learn about key chemicals and their reactions. They will begin to use chemical formulae regularly.</div></div> <div><div>Why now?</div><div>The matter topic introduced students to particles, in this topic they will use their knowledge to see how particles behave in reactions.</div></div>	<div>8</div> <div>Waves</div> <div><div>Why this?</div><div>Student will look at sound and light waves and how our body receives this message.</div></div> <div><div>Why now?</div><div>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.</div></div>
<div>9</div> <div>Genes</div> <div><div>Why this?</div><div>Students will learn about variation and the advantages this as well as key topics of reproduction and how the body changes in adolescence.</div></div> <div><div>Why now?</div><div>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.</div></div>	<div>10</div> <div>Earth</div> <div><div>Why this?</div><div>Students will learn about the Earth's structure and how our Earth fits into the universe.</div></div> <div><div>Why now?</div><div>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.</div></div>	<div>11</div> <div>Electromagnets</div> <div><div>Why this?</div><div>Students will begin to explore the properties of circuits and key ideas of potential difference, current and resistance.</div></div> <div><div>Why now?</div><div>Students have already considered energy and can now apply this to the context of electricity and circuits.</div></div>	



SUBJECT CURRICULUM MAP: Year 9





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

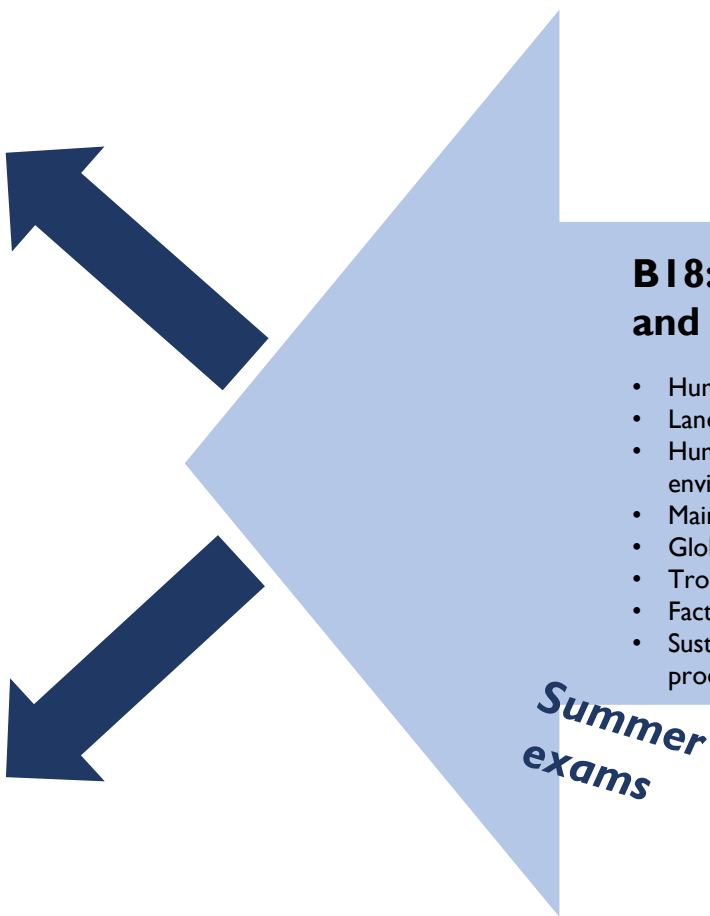
BIOLOGY

Further study

- A-level in Biology, PE and psychology
- Apprenticeships

Career pathways

- Biology teacher
- Medicine
- Marine biologist
- Ecologist
- Technician



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

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

B12: Homeostasis in action (triple)

- Controlling temperature
- Water balance
- The kidney

B11: Hormonal Coordination

- Hormones
- Blood glucose and diabetes
- Human reproduction
- Triple only**
- Plant hormones

B10 The Human Nervous System

- Neurones
- Reflex response
- Triple only**
- The brain
- The eye

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

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
11

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

B14: Variation and Evolution

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

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

Mock
exams

Mock
exams

Mock exams are a complete paper 1 (topics 1-9)

Extra opportunities
Practical science workshops
Careers fairs and workshops

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.

1 B4: Organising animals and plants	
Why this?	This topic introduces pupils to key organ systems in both animals and plants. This topic allows for some exciting practical's like dissections to further understand the topic.
Why now?	This topic builds on students understanding of cell structure in B1 as well as the digestive system in B3.

2 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.

3 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.

4 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.

5 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.

6 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.

7 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.

8 B11: Hormonal Coordination	
Why this?	This topic explores how humans respond to their surroundings, focusing in particular on diabetes and reproduction. It helps students to understand their bodies and the world around them.
Why now?	This topic builds on students understanding of homeostasis starter in B10 as well as organ systems in B4.

9 B12: Homeostasis in Action	
Why this?	This topic explores how water is balanced in the body and temperature .This helps students understand vital processes necessary for their survival.
Why now?	This topic builds on students knowledge of homeostasis and hormones in B11. Taking their understanding into further depth with new examples.

Year 10



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.

Summer
exams

C15 – 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

C14 – The Earth's resources

- Finite and renewable resources
- Water safe to drink
- Treating waste water
- Extracting metals from ores
- Life cycle assessments
- Reduce, reuse, and recycle

C13 – The Earth's atmosphere

- History of our atmosphere
- Our evolving atmosphere
- Greenhouse gases
- Global climate change
- Atmospheric pollutants

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

C9 – Crude oil and fuels

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

Year
11

C10 – Organic reactions

- Reactions of the alkenes
- Structures of alcohols, carboxylic acids, and esters
- Reactions and uses of alcohols
- Carboxylic acids and esters

C11 - Polymers

- Addition polymerisation
- Condensation polymerisation
- Natural polymers
- DNA

C12 – Chemical analysis

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

Mock
exams

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

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.



Extra opportunities

RSC Chemistry competition
Practical science workshops
Careers fairs and workshops

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
II

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 (C13 and C14).

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.

Year
10



SUBJECT CURRICULUM MAP: KS4

PHYSICS

Further study

- A-level in Physics
- Apprenticeships
- BTEC Applied Science

Career pathways

- Physics Teacher
- Engineer (Mechanical / Electronic / Aerospace)
- Astrophysicist
- Architect
- Medical physicist / Radiotherapist
- Laboratory technician

Summer exams

P16 – Space

- Formation of the solar system
- Life history of a star
- Planets, satellites and orbits
- The expanding Universe
- The beginning and future of the Universe

P15 – Electromagnetism

- Magnetic fields
- Magnetic effect of electric currents
- Electromagnets in devices
- Motor effect
- Generator effect
- Transformers and their uses

P14 – Light

- Reflection of light
- Refraction of light
- Light and colour
- Lenses
- Using lenses

P13 – Electromagnetic waves

- Electromagnetic spectrum
- Light, infrared, microwaves and radio waves
- Communications
- Ultra violet, X-rays and Gamma rays
- X-rays in medicine

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

P9 – Motion

- Distance-time graphs
- Velocity and acceleration
- Velocity-time graphs
- Analysing motion graphs

P10 – Force and motion

- Force and acceleration
- Weight and terminal velocity
- Forces and braking
- Momentum
- Using conservation of momentum
- Impact forces and safety
- Forces and elasticity

P11 – Force and pressure

- Pressure and surfaces
- Pressure in a liquid at rest
- Atmospheric pressure
- Upthrust and flotation

P12 – Wave properties

- Nature and property of waves
- Reflection and refraction
- Sound waves
- Uses of ultrasound
- Seismic waves

Mock exams

P8- Forces in balance

- Vectors and scalars
- Forces between objects
- Resultant forces
- Moments at work
- Levers and gears
- Centre of mass
- Moments and equilibrium
- Parallelogram of forces
- Resolution of forces

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.

Extra opportunities

Physics Olympiad and Physics Challenge
Practical science workshops
Careers fairs and workshops

P7 – Radioactivity

- Atoms and radiation
- Discovery of the nucleus
- Changes in the nucleus
- Alpha, Beta and Gamma radiation
- Activity and half-life
- Nuclear radiation in medicine
- Fission and fusion

P6 – Molecules and matter

- Density
- States of matter
- Changes of state
- Internal energy
- Specific latent heat
- Gas pressure and volume

P5 – Electricity in the home

- Alternating current
- Cables and plugs
- Electrical power and potential difference
- Electrical currents and energy transfer
- Appliances and efficiency

P4 – Electrical circuits

- Electric charges and fields
- Current and charge
- Potential difference and resistance
- Component characteristics
- Series and parallel circuits

Year 10



Year 11

1

P10 – Forces and motion

Why this? The motion and the changes in motion of objects can all be explained by considering the forces that are acting. Having studied the different forces involved, the topic now moves on to look at the effects these forces have on the movement of objects

Why now? This topic allows for consolidation and detailed extension of the key principles of forces and their effects on motion.

2

P11 – Forces and pressure

Why this? The final section of the forces topic is to consider the pressure exerted on a surface by solids, liquids and gases. Explaining the origin of this pressure allows for explanation of its effects and on the design of objects.

Why now? This topic completes the forces unit and also allows for consolidation of some key ideas of kinetic theory from P6.

3

P12 – Wave properties

Why this? Waves are all around us and are used in a variety of ways. In this topic the nature of waves and their properties is explored. The interaction of waves with materials is also identified, this leads on to how waves can be used for sending information, imaging the body and exploring the structure of the Earth

Why now? This unit provides the core knowledge needed for the waves topic. Appreciating the nature and properties of waves allows their uses to be investigated in detail.

4

P13 – Electromagnetic waves

Why this? Electromagnetic waves are used for a huge range of applications in the modern world. In this topic the properties, uses and the dangers associated with each of the electromagnetic waves are explored.

Why now? Having identified wave properties in P12, this topic provides a great opportunity to look at the many uses of electromagnetic waves in our modern world.

5

P14 – Light

Why this? This topic now focuses on the most familiar electromagnetic wave, visible light. The properties of reflection, refraction, colour and the use of lenses is explored in greater detail.

Why now? This topic completes the waves unit and also allows for consolidation of some key ideas of waves from P12 and P13.

6

P15 – Electromagnetism

Why this? The link between electric currents and magnetic fields is explored in this topic of electromagnetism. Electromagnetic devices such as motors, circuit breakers and relay switches are investigated and the key principle of electromagnetic induction is explored.

Why now? This topic provides a great opportunity to revisit key ideas from P3 and P5 and to look at them in more detail. The principles behind the workings of motors, generators and transformers are revealed.

7

P16 – Space

Why this? A topic full of wonder and big questions! In this topic the focus moves from the formation of the solar system, to the life cycle of stars and finishes with evidence to support the Big Bang theory, and what this tells us about the beginning and the future of the universe.

Why now? An exciting culmination to the GCSE Physics course and a topic that always encourages deep thought and big questions. This topic provides an opportunity to explore ancient and cutting edge astronomy.

1

P4 – Electrical circuits

Why this? This topic introduces the pupils to electrical circuits. There is plenty of opportunity for investigative work as current, potential difference and resistance in different circuits is studied.

Why now? This is an exciting topic to start year 10 which revisits ideas from year 7 on electrical circuits and builds on the energy topic from year 9. Understanding this topic will allow for application in the Electricity in the home topic, P5

2

P5 – Electricity in the home

Why this? An important topic, the safe use of mains electricity in the home. Looking at the design and function of the 3-pin plug and how electricity can be transmitted from the power station to the consumers

Why now? The topic builds upon key ideas studied in P4 and knowledge of this topic can be applied to the safe use of mains electricity in the home.

3

P6 – Molecules and matter

Why this? The topic looks at the different states of matter, using kinetic theory to explain their properties. Changes of state and changes of temperature are investigated by considering the changes of internal energy involved.

Why now? The topic builds upon key ideas of matter studied in Key Stage 3, and introduces calculations to be able to quantitatively determine the energy changes involved. It also provides opportunity to revisit ideas from the Energy topic in Year 9.

Year 10

4

P7 - Radioactivity

Why this? Having looked at the properties of solids, liquids and gases, we now delve deeper and look at the structure of atoms and consider the radiation emitted by an unstable nucleus.

Why now? This topic follows on from the bulk properties of matter and now considers the structure of the atom. Properties, uses and the dangers associated with alpha, beta and gamma radiation are explored.

5

P8 – Forces in balance

Why this? All objects around us are acted upon by forces. This topic introduces the foundations of the forces topic, looking at what forces do, how they can be measured and looking at the effects that forces can have on an object.

Why now? This unit provides the core knowledge needed for the remainder of the forces topic Identifying forces and their effects on objects allows us to explain the motion and changes in shape that may occur.

6

P9 – Motion

Why this? Forces can cause the motion of an object to change. Having studied the common forces and their effects, the topic now focuses on describing the motion of an object in terms of calculated its speed or acceleration, or calculating the distance travelled.

Why now? This topic follows logically after the effects of forces and allows calculation of the motion of objects acted upon by forces. It is also ideal preparation for the next topic, P10, which considers forces and motion in more detail.