

# KS4 Long Term Curriculum Plan: Year 10 Separate Science 2024-2025

**Curriculum Aim:** In Science we aim to prepare students for their GCSE exams whilst also allowing students to be able to understand and interpret the world that they live in. GCSE Separate Science prepares students to leave school with a strong understanding of how science works as well as preparing them for future careers, courses and employment in science.

**Link to prior learning:** This course will build on the knowledge and skills developed during study in Year 9 and KS3. They will also develop their practical, problem solving and investigative skills.

**Rationale of sequencing:** The topics have been ordered in a way that allows them to build on prior skills and knowledge.

	Focus / Topic	Knowledge & Skills (from NC/Programmes of Study)	Assessment
Autumn 1	<b>C4</b> Chemical calculations	<p><b>C4</b> Use the periodic table to find the relative mass of elements.            Explain why chemical equations need to be balanced in terms of mole ratios. (H)            Calculate concentrations in <math>\text{g/dm}^3</math>.            To understand atom economy and to be able to calculate the yield of chemical reactions. (T)            To perform titrations and titration calculations. (T)            To calculate volumes of gases. (T)</p>	<p>Question-led lessons to develop skills to answer 6 mark questions in science.            Y10 assessment week test.</p>
	<b>C5</b> Chemical changes	<p><b>C5</b> Describe oxidation and reduction in terms of gain or loss of oxygen.            Predict observations for metals listed in the reactivity series reacting with oxygen, water, and acid.            Explain why displacement reactions occur.            Describe how metals can be extracted.            Define a salt and describe how to make one by reacting a metal with an acid.            Describe the method to produce pure, dry crystals of a salt from an insoluble substance and dilute acid.            Describe solutions as acid or alkali.</p>	
	<b>P4</b> Electric circuits	<p><b>P4</b> Identify circuit components from their symbols.            Understand electrical charges and fields (T)            Construct electric circuits and accurately measure current.            Calculate resistance and potential difference.            Describe the characteristics of an LED, LDR, and thermistor.            Find the potential difference across a component by using the p.d. rule.            Measure potential difference across parallel circuits.            Evaluate the effect of adding resistors in parallel on a circuit. (H)</p>	
	<b>P5</b> Electricity in the home	<p><b>P5</b> Describe the characteristics of the UK mains supply.            Discuss the choices of materials used on cables and plugs in terms of their physical and electrical properties.            State that the power of a device is the amount of energy transferred per second.            Perform equations involving the rearrangement of <math>Q = IT</math> and <math>E = QV</math>. (H)            Calculate energy transfer in kilowatt-hours.</p>	

Autumn 2	<p><b>C6</b> Electrolysis</p> <p><b>C7</b> Energy changes</p> <p><b>P6</b> Molecules and matter</p> <p><b>P7</b> Radioactivity</p>	<p><b>C6</b> Define electrolysis in terms of the movement of ions. Describe the electrolysis of aluminium oxide. State the products of the electrolysis of brine.</p> <p><b>C7</b> Describe reactions as either exothermic or endothermic. Draw a labelled reaction profile diagram including activation energy. Explain using the particle model how reactants become products in a chemical reaction. (H) Calculate the energy for a reaction. (H) Explain how chemicals cells, batteries and fuel cells work. (T)</p> <p><b>P6</b> Explain why some materials will float on water. Describe the properties of solids, liquids, gas and name the changes of state. Describe the behaviour of particles during changes of state. Use the concepts of kinetic and potential energy to explain changes in internal energy. (H) Calculate the latent heat of fusion and latent heat of vaporisation for a substance. Describe the behaviour of particles as a gas is heated.</p> <p><b>P7</b> Describe safety precautions when dealing with radioactive materials. Describe the plum pudding model of the atom. Use Rutherford's scattering experiment to provide evidence for the nucleus. Calculate the number of neutrons in an isotope by using nuclear notation. Complete equations for alpha and beta decay. Rank the three types of nuclear radiation in order of their penetrating power and ionisation. Define half life. Describe the uses of nuclear radiation in medicine. (T) Explain nuclear fission and fusion. (T)</p>	Question-led lessons to develop skills to answer 6 mark questions in science.
Spring 1	<b>B4</b> Organising animals and plants	<p><b>B4</b> Explain the adaptations of red blood cells. Recognise the three blood vessels and explain how their structure relates to their function. Describe the function of the heart and describe problems that can develop and their treatment. Summarise the advantages and disadvantages of the different treatments of heart problems. Explain the adaptations of alveoli and link it to gas exchange. Identify the different tissues in a leaf cross-section. Explain adaptations of the xylem and phloem. Describe how transpiration maintains the movement of water from roots to leaves. Explain how stomata control transpiration. Identify temperature, humidity, light intensity and air flow as factors that affect the rate of transpiration.</p> <p><b>B5</b> Describe the difference between communicable and non-communicable diseases.</p>	Question-led lessons to develop skills to answer 6 mark questions in science. Spring assessment.

	<b>B5 Communicable diseases</b>	<p>Describe how bacteria and viruses cause disease.          Explain how the spread of disease can be reduced and prevented.          Identify measles, HIV and TMV as viral diseases.          Identify salmonella and gonorrhoea as bacterial diseases.          Identify malaria as a disease caused by protists and rose black spot as a fungal disease.          Describe how the human body defence mechanisms stop the early entry of pathogens. Explain how the production of antibodies leads to the body fighting off invading pathogens.          How to grow bacteria in the lab and how to prevent bacterial growth. (T)          Describe plant diseases and explain how plants defend themselves. (T)</p>	
Spring 2	<p><b>B6 Preventing and treating diseases</b></p> <p><b>B7 Non-communicable diseases</b></p> <p><b>B8 Photosynthesis</b></p> <p><b>B9 Respiration</b></p>	<p><b>B6</b> Explain the role of vaccination in reducing the spread of pathogens.          Describe how antibiotics work and explain how antibiotic resistant bacteria arise.          Describe the process of developing new antibiotics and how to test them for effectiveness.          Explain the procedure of trialling and developing a new drug including the use of placebos and double blind trials.          Describe the making and uses of monoclonal antibodies. (T)</p> <p><b>B7</b> Classify diseases as communicable and non-communicable.          State causes of cancer. Define a tumour as a mass of abnormally growing cells. Describe the difference between benign and malignant tumours.          Describe the effects of the harmful substances found in tobacco smoke. Describe causal mechanisms linking smoking and lung disease.          Describe the mechanisms for the link between exercise and health.          Explain the effect of drinking alcohol on the nervous system and on a developing baby.</p> <p><b>B8</b> Describe how the leaf is adapted to photosynthesis.          Write the word and symbol equations for photosynthesis.          List the limiting factors of photosynthesis.          Describe how plants use glucose.          Explain how using greenhouses can control the limiting factors and increase the rate of photosynthesis.</p> <p><b>B9</b> Write the word and symbol equation for respiration.          Link heart rate, breathing rate, and breath volume change to exercise.          State the word and symbol equation for anaerobic respiration in plants and microorganisms.          Compare aerobic and anaerobic respiration.          Define metabolism.</p>	Question-led lessons to develop skills to answer 6 mark questions in science.
Summer 1	<b>C8 Rates and equilibrium</b>	<p><b>C8</b> Define rate of reaction and be able to calculate mean rate of reaction.          Describe how changing surface area, temperature and concentration affect rate of reaction.          Describe the effect of a catalyst in affecting the rate of reaction.          Write a word equation for familiar reversible reactions.          Use Le Chatelier's principle to predict the effect of rate of reaction when conditions of a dynamic equilibrium are changed. (H).</p>	Question-led lessons to develop skills to answer 6 mark questions in science.

	<b>P8</b> Forces in balance	<p><b>P8</b> Draw a scale diagram to represent a single vector.  Give examples of contact and non-contact forces using diagrams to show the forces.  Calculate the resultant force acting on an object.  Describe an experimental technique to determine the centre of mass of an object.  Investigate non-parallel forces acting on a system in equilibrium to verify the parallelogram of forces. (H)  To be able to calculate moments. (T)</p>	
Summer 2	<b>C9</b> Crude oil and fuels  <b>P9</b> Motion  Revision	<p><b>C9</b> Describe how to separate crude oil into its fractions.  Define hydrocarbons and alkanes.  Recognise trends in colour, viscosity, flammability, and boiling point as hydrocarbon chain length changes.  Write equations for the combustion of hydrocarbons.  Describe the process of cracking.</p> <p><b>P9</b> Use gradients of distance-time graphs to compare the speeds of objects.  Describe the difference between speed and velocity.  Recall and rearrange equations relating velocity, acceleration, and time.  Describe sections of velocity-time graphs.</p> <p>Revision for the end of year assessment on all paper 1 topics.</p>	End of year assessments on all paper 1 topics.

#### Further Information

AQA Specification: <https://www.aqa.org.uk/subjects/science/gcse/combined-science-trilogy-8464>

Chace GCSE Science website: <https://sites.google.com/chace.enfield.sch.uk/year11revision>

Seneca: <https://senecalarning.com/en-GB/>

Kerboodle: <https://www.kerboodle.com/users/login>

BBC bitesize: <https://www.bbc.co.uk/bitesize/examspecs/z8r997h>