

CNCS

Year 11 Science: Curriculum Overview (Chemistry and Physics)

Rationale: In Year 11, students will build on prior knowledge from KS3 and KS4. After completing their Biology exam in Year 10 students will continue their development on their key foundation concepts in Chemistry and Physics. Students will continue to establish their required practical skills from the past years then apply it to GCSE questions. Students will revisit and be introduced to a range of specific subject terminology, learning how to identify and discuss this appropriately. Furthermore, students will be given opportunities to develop their own personal responses to scientific problems and consider how to apply their knowledge to them.

A learner in Year 11 will know/ have studied:

- **In Year 7,**
- ***Chemistry:*** C1: Atomic structure and the periodic table, C2: Bonding, structure and properties, C4: Chemical changes, C5: Energy changes;
- ***Physics:*** P1: Energy, P2: Electricity, P3: Particle model of matter.
- **In Year 8,**
- ***Chemistry:*** C6: Rates of reaction, C7: Organic Chemistry, C8: Chemical Analysis, C9 Chemistry of the atmosphere, C10 Using resources;
- ***Physics:*** P5: Forces, P6: Waves, P7: Magnets and P8 Space Physics
- **In Year 9**
- ***Chemistry:*** C1: Atomic Structure, C2: Bonding, C4: Chemical Changes, C5: Energy Changes, C6: Rate of reaction, C8: Chemical Analysis, C10: Using Resources
- ***Physics:*** P1: Energy, P3: Particle model of matter, P4: Atomic Structure, P6: Waves, P7; Magnetism, P8: Space Physics
- **In Year 10**
- ***Biology:*** B1: Cell Biology, B2: Organisation, B3: Infection and Response, B4: Bioenergetics, B5: Homeostasis, B6: Inheritance, B7: Ecology

A learner in Year 11 will be able to:

- Develop GCSE knowledge and practical skills in Chemistry and physics topics.
- Question, understand and apply the chemistry/ physics knowledge to real life problems and scenarios.
- Work safely in a lab and carry out investigations

Term	Outline	Assessment	Home Learning	Key Skills/ End Point
1	<p>P2 Electricity</p> <p>Students will investigate the fundamental property of electric charge and will analyse the principles behind modern circuits. Students will also discover the inner workings of the national grid and how electricity is distributed to homes and factories.</p> <ul style="list-style-type: none"> Identify problems with circuits 	<p>1.1 & 1.2 Pit stops</p> <p>P2.1 Electricity (LA & HA)</p>	Set once per week via Educake	Students are able to recall key knowledge and apply this knowledge to exam questions from different areas.

	<ul style="list-style-type: none"> • Draw common circuit symbols • Describe how common circuit components works • Recognise that potential difference depends upon • Describe how current can be affected by resistance • Investigate factors that affect resistance • Write up a practical method: • The length of a wire at constant temperature, use appropriate apparatus to measure and record length, current, potential difference and resistance. • Analyse results with appropriate calculations and graphs <p><u>C9 Chemistry of the atmosphere</u> Students will discover Earth's atmosphere and how it is forever changing. Students will study the complex problems we face and the possible solutions to them.</p> <p><u>C3 Quantitative Chemistry</u> Students will use quantitative analysis skills to determine the purity of chemical samples. These observations will allow students to classify these reactions based on patterns and predictions on their behaviour</p> <p><u>P5 Forces</u> - Students will analyse forces in a variety of machines and instruments. They will be able to describe how these machines are used in modern life.</p> <p><u>C7 Organic Chemistry</u> Students will investigate the variety of carbon compounds. This will branch into organic compounds studying compounds that are living, or once living.</p>	<p>P2.2 Electricity (LA & HA)</p> <p>P5.1 Forces (LA & HA) P5.2 Forces (LA & HA)</p> <p>C9 Chemistry of the atmosphere (LA & HA)</p> <p>C7 Organic Chemistry (LA & HA)</p> <p>C3 Quantitative Chemistry (LA & HA)</p> <p><u>1.2 End Assessment (LA & HA)</u> Mock paper 1</p> <p>Skills tested: AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures. AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures.</p>		<p>Students will interpret and then describe and explain what graphs show with reference to the data collected for a range of contexts.</p> <p>Students are able to analyse information given to them, and apply their knowledge gained through the course to evaluate data provided</p>
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		AO3: Analyse information and ideas to: interpret and evaluate; make judgements and draw conclusions; develop and improve experimental procedures.		
2	<p><u>P7 Magnetism and electromagnetism</u></p> <p>Student will be able to:</p> <ul style="list-style-type: none"> - Describe how a magnet works and interact - Explain what a solenoid is and how they work - Describe how the magnetic effect of a current can be demonstrated and draw a magnetic field pattern - Apply Fleming's left-hand rule (HT only) - Explain what is the motor effect (HT only) - Describe the generator effect (HT only) <p>Describe how a transformer works (HT only)</p>	<p><u>2.1 & 2.2 Pit stops</u></p> <p><u>2.2 End Assessment (LA & HA)</u></p> <p>Mock paper 2</p> <p>Skills tested:</p> <p>AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures.</p> <p>AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures.</p> <p>AO3: Analyse information and ideas to: interpret and evaluate; make judgements and draw conclusions; develop and improve experimental procedures.</p>	Set once per week via Educake	<p>Students are able to recall key knowledge and apply this knowledge to exam questions from different areas.</p> <p>Students will interpret and then describe and explain what graphs show with reference to the data collected for a range of contexts.</p> <p>Students are able to analyse information given to them, and apply their knowledge gained through the course to evaluate data provided.</p>
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	<p>C8 Chemical Analysis C10 Using resources</p> <ul style="list-style-type: none"> • Define a pure substance • Identify examples of pure substances • Analyse melting point and boiling point data to identify pure substances • Define a formulation • State examples of formulations • Suggest reason for the components within a formulation • Describe and explain the method for paper chromatography • Identify errors and suggest the effect on the results • Apply the correct language for the process • Apply the equation $R_f = \frac{\text{distance moved by substance}}{\text{distance moved by solvent}}$ • Use R_f values to compare known and unknown samples • Identify unknown samples from their R_f value • Describe the common tests for oxygen, chlorine, hydrogen and carbon dioxide • Identify the gases from data provided • Describe how to perform a flame test • State the results for lithium, sodium, potassium, calcium and copper compounds • Suggest contexts for the usefulness of flame tests • Describe how to test for metal hydroxides • State the results for aluminium, calcium, magnesium copper (II), iron (II) and iron (III) ions in solution 	<p>Exam questions Video to support https://www.youtube.com/watch?v=lq-wmm_9S9E</p> <p>Skills tested: AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures. AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures. AO3: Analyse information and ideas to: interpret and evaluate; make judgements and draw conclusions; develop and improve experimental procedures.</p>		<p>Students will interpret and then describe and explain what graphs show with reference to the data collected for a range of contexts.</p> <p>Students are able to analyse information given to them, and apply their knowledge gained through the course to evaluate data provided.</p>

	<ul style="list-style-type: none"> • Suggest contexts for the usefulness of identifying metal hydroxides • Describe how to test for sulfate, carbonate and halide ions • State the results for sulfate, carbonate and halide ions • Suggest contexts for the usefulness of identifying for sulfate, carbonate and halide ions • Describe how to test your unknown substance • Write a risk assessment for your procedure • Perform the necessary tests on the unknown substance • Suggest with evidence the identity of the unknown substance • Describe the process of flame emission spectroscopy (flame photometers) • Identify the substances from data provided • Suggest contexts for the usefulness of flame emission spectroscopy 			
	<ul style="list-style-type: none"> • C10 Using resources • State examples of natural products that are supplemented or replaced by agricultural and synthetic products • Describe what sustainable development is • Distinguish between finite and renewable resources given appropriate information • Distinguish between potable water and pure water • Describe the differences in treatment of ground water and salty water. • Give reasons for the steps used to produce potable water. • Describe the process of desalinisation. • Write a clear method for the practical activity, record results accurately. 	<p>Skills tested:</p> <p>AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures.</p> <p>AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures.</p> <p>AO3: Analyse information and ideas to: interpret and evaluate; make judgements and draw conclusions; develop and improve experimental procedures.</p>		<p>Students will interpret and then describe and explain what graphs show with reference to the data collected for a range of contexts.</p> <p>Students are able to analyse information given to them, and apply their knowledge gained through the course to evaluate data provided.</p>

	<ul style="list-style-type: none"> • Use of appropriate apparatus and techniques for the measurement of pH in different situations. • Evaluate the methodology of water purification • Recognise that urban lifestyles and industrial processes produce large amounts of waste water • Describe different methods of sewage treatment • Recognise what a metal ore is and that they are limited. • Describe the process of phytomining and bioleaching. • Recognise how we can process metal compounds to obtain the metal • Recognise what a Life Cycle Assessment is and the stages of assessment • Recognise that a LCA is not purely an objective process. • Recognise what a limited raw material is. • Describe the environmental impact of quarrying and mining • Describe how some product can be reused and some cannot so are recycled, • Describe what corrosion and rusting is. • Describe how we can protect objects from corrosion • Describe experiments and interpret results to show that both air and water are necessary for rusting. • Recognise what an alloy is and some examples of it. • Recognise that gold in jewellery is not always pure gold. • Describe the different properties of high and low carbon Steel and alloy's uses. • Explain how low density and high-density poly(ethene) are both produced from ethane, • Explain the difference between thermosoftening and thermosetting polymers in terms of their structures • Compare the physical properties of glass and clay ceramics, polymers, composites and metals. 			
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	<ul style="list-style-type: none"> • Explain how the properties of materials are related to their uses and select appropriate materials • Describe the Haber process • Explain how the commercially used conditions for the Haber process are related to the availability and cost of raw materials and energy supplies, control of equilibrium position and rate. • Describe what an NPK fertiliser is, • Recall the names of the salts produced when phosphate rock is treated with nitric acid, sulfuric acid and phosphoric acid. 			
3	Students will have now finished their GCSE content and will begin revision, starting with Year 9 content.	3.1 & 3.2 Pit stops Bespoke to the needs of the class 3.2 End Assessment External GCSE assessment		