



The High School  
**Leckhampton**

# Year 8 **SCIENCE**



## Topic Titles

**8B1 Biology Topic 1** Respiration, Gas Exchange and Biomechanics

**8C1 Chemistry Topic 1** Energetics, The Periodic Table and Materials

**8P1 Physics Topic 1** Electricity and Magnetism

**8B2 Biology Topic 2** Genetics and Evolution

**8C2 Chemistry Topic 2** The Earth, Atmosphere and Chemical Reactions

**8P2 Physics Topic 2** Energy, Machines, Fuels and Power

**8WS Working Scientifically Topic** Being a Scientist

## Intent

Our main aim and ambition in science is for our students to develop a curiosity and a desire to want to find out and understand more about the world around them. Science is a subject rich in knowledge that can change lives and open so many doors for our students. Through teaching a varied curriculum of biology, chemistry and physics, students develop the skills that they require to be able to apply their understanding of science to situations all around them and allow them to make informed choices as an educated citizen who promotes inclusivity. Students will be encouraged to question and recognise the power of rational explanation, fostering a sense of enthusiasm and creativity about natural phenomena.

## Links with other subjects

**ART** – Drawing accurate, annotated scientific diagrams.

**DT** – Material and machine properties.

**ENGLISH** – Comparatives, etymology, recalling exact definitions, writing and following detailed instructions.

**GEOGRAPHY** – Geology and nutrient cycles.

**HISTORY** – Periodic table, genetics and evolution theory developments, extinctions & atmosphere composition.

**MATHS** – Converting units, calculations, using and rearranging equations, rounding results, drawing scatter and bar graphs.

**PE** – Effect of exercise on respiration types and gas exchange.

## How will knowledge and skills be taught?

In lessons students will learn from their teacher, and work individually or with others, to develop their scientific knowledge and conceptual understanding.

Practical activities will help students understand the nature, processes, and methods of science, as well as the uses and implications of science for today and the future.

Completing homework using provided resources will help consolidate students' understanding and prepare them for future lessons.

Optional activities will challenge and extend students' scientific application.

## How can parents help?

Encourage students to use the topic resources on the VLE, the Year 7 Science Basics booklet and the CGP KS3 Science Study Guide provided.

Extend students' understanding using appropriate YouTube channels [e.g. Cognito, PrimroseKitten, KhanAcademy, FuseSchool, AmoebaSisters, Freesciencelessons, AsapScience, Crash Course, SciShow, Veritasium, Kurzgesagt – In a Nutshell, BBC Earth Lab, TED-Ed, Royal Society of Chemistry] and relevant Science-related films, series, and documentaries on various streaming services.

Take an interest – be curious and ask students about their learning.

## Recommended Reading and Preparation for Learning

How to Grow a Human: Adventures in Who We Are and How We Are Made – Philip Ball

The Periodic Table Book: A Visual Encyclopedia of the Elements - Dorling Kindersley

How the Body Works: The Facts Simply Explained – Dorling Kindersley

Magnetic Electricity! The Power of Magnets and Their Role in

Electricity - Science for Kids - Children's Energy Books

Genes and DNA (Kingfisher Knowledge) – Richard Walker

The Incredible Human Journey – Alice Roberts

Horrible Science Collection – Nick Arnold

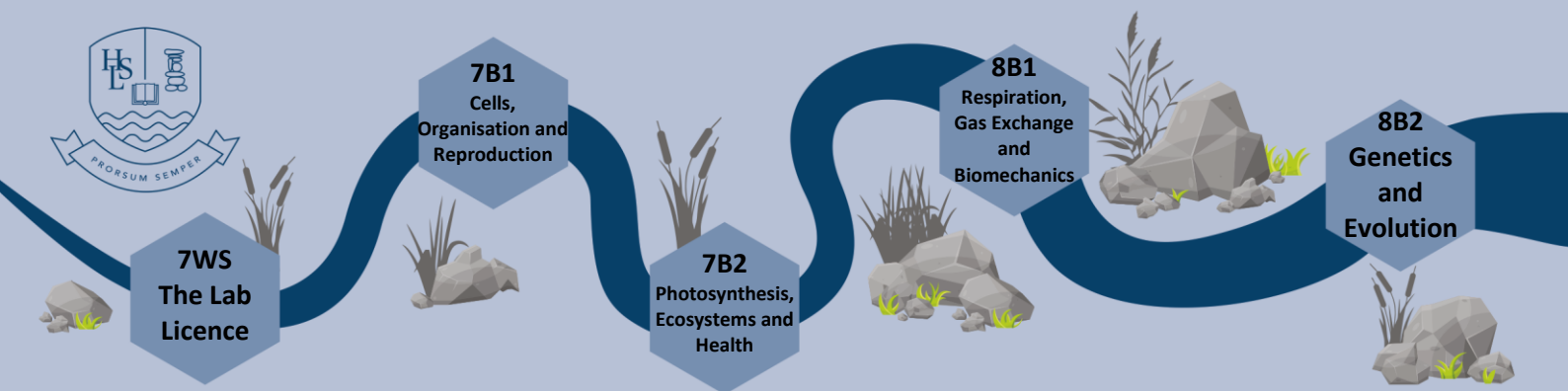
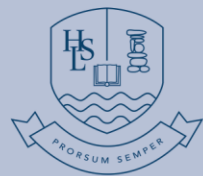
The Secret Life of Genes – Derek Harvey

There Is No Planet B - Mike Berners-Lee

Genetics in Minutes – Tom Jackson

The Periodic Table – Primo Levi

More recommendations at:  
<https://www.hsl.gloucs.sch.uk/literacy-and-recommended-reading>



Science		Year 8		Autumn Term	
8B1 Biology Topic 1 – Respiration, Gas Exchange and Biomechanics					
<b>Topic Outline &amp; Aims (Intent)</b> 1. <u>Aerobic Respiration</u> : What is aerobic respiration? 2. <u>Anaerobic Respiration</u> : What is anaerobic respiration? 3. <u>Human Gas Exchange</u> : How does gas exchange happen in humans? 4. <u>Asthma and Smoking</u> : How does asthma and smoking affect the lungs?			5. <u>Skeleton and Joints</u> : What is the structure and function of the human skeleton? 6. <u>Muscles</u> : How do muscles function to help the skeleton move? 7. <u>Exercise</u> : How does exercise affect the human gas exchange system?		
<b>Key Skills and Knowledge taught through this topic (Intent)</b> ✓ Recall where respiration takes place in cells; Define respiration; Describe aerobic respiration; Compare respiration and breathing. ✓ Define anaerobic respiration in different organisms; Describe anaerobic respiration in muscle cells; Describe anaerobic respiration in yeast cells; Compare aerobic and anaerobic respiration. ✓ Identify and describe the structure of the lungs; Describe how ventilation of the lungs occurs; Describe how gas exchange occurs in the lungs; Estimate total lung capacity.			✓ Define asthma; Describe the symptoms, triggers and effects of an asthma attack on the lungs; Identify harmful chemicals in cigarettes; Describe the effects of smoking on the lungs. ✓ Identify bones in the human skeleton; Describe the functions of the human skeleton; Define joints; Describe the structure and function of synovial joints. ✓ Define skeletal muscles; Describe how skeletal muscles function in antagonistic pairs to move the skeleton; Measure the force exerted by different skeletal muscles. ✓ Define exercise; Describe how exercise affects the human gas exchange system; Investigate how exercise affects heart rate and breathing rate.		
<b>Prior Learning (Context)</b> <a href="#">KS2: Science Programmes of Study</a> ➤ Animals, including humans (pages 17, 31)		<b>Future Learning (Context)</b> <a href="#">KS3: Science Programmes of Study</a> ➤ Inheritance, chromosomes, DNA and genes (page 7) <a href="#">KS4: Science Programmes of Study</a> ➤ Cell biology (pages 7-8)		<b>National Curriculum Links (Context)</b> <a href="#">KS3: Science Programmes of Study</a> ➤ Cellular respiration (page 7) ➤ Gas exchange systems (page 6) ➤ The skeletal and muscular systems (page 5)	
<b>RRSA Links</b> ARTICLE 6: Life, survival and development. ARTICLE 13: Freedom of expression. ARTICLE 24: Health and health services. ARTICLE 28: Right to education. ARTICLE 12: Respect for the views of the child. ARTICLE 31: Leisure, play and culture ARTICLE 23: Children with a disability. ARTICLE 29: Goals of education.				<b>Assessment of Learning (Impact)</b> • Individual questioning, lesson and homework activities • Classwork in student folders with Review lesson • Practical activities carried out throughout topic • 8B1 Standard Homework 1 and 2 with Feedback lesson • 8B1 Topic Test with Revision and Feedback lessons	
<b>British Values Links</b> MUTUAL RESPECT: Working together with tolerance and mutual understanding, treating each other with respect. THE RULE OF LAW: Understanding and following lab rules and the laws of nature. INDIVIDUAL LIBERTY: Thinking independently and expressing views appropriately with confidence in a safe, supporting environment.					
<b>Eco-Schools Links</b> HEALTHY LIVING: Addressing your, and our planet’s health. TRANSPORT: Promoting and Encouraging Sustainable Transport.					
<b>Reading / Enrichment</b> How the Body Works: The Facts Simply Explained – Tom Jackson All About Biology (Big Questions) – Robert Winston The Science Book: Big Ideas Simply Explained – Dorling Kindersley <a href="#">Recommended Reading List.</a>		<b>Key Vocabulary (Literacy)</b> Respiration; Aerobic respiration; Anaerobic respiration; Breathing; Fermentation; Asthma; Nicotine; Tar; Carbon monoxide; Joints; Skeleton; Skeletal muscles; Antagonistic pair; Exercise. <i>Complete topic glossary provided.</i>			
<b>Career Links</b> Cell Biologist; Baker; Chef; Brewer; Winemaker; Pulmonologist; Oncologist; Allergist; Physiotherapist; Chiropractor; Orthopaedist; Rheumatologist; Athlete; Personal trainer; Doctor; Nurse; Teacher; Research Scientist.					



**7WS**  
The Lab  
Licence

**7C1**  
Matter, Particles  
and Physical  
Changes

**7C2**  
Atoms,  
Elements,  
Compounds and  
Mixtures

**8C1**  
Energetics,  
The Periodic  
Table and  
Materials

**8C2**  
The Earth,  
Atmosphere  
and Chemical  
Reactions

Science		Year 8		Autumn Term	
8C1 Chemistry Topic 1 – Energetics, The Periodic Table and Materials					
<b>Topic Outline &amp; Aims (Intent)</b> 1. <u>Changes of State</u> : What causes changes of state? 2. <u>Endothermic and Exothermic Reactions</u> : How do chemical reactions affect their environment? 3. <u>The Periodic Table</u> : What does the periodic table show? 4. <u>Metals and Non-Metals</u> : What are the differences between metals and non-metals? 5. <u>Metal and Non-Metal Oxides</u> : What are metal and non-metal oxides?			6. <u>Reactivity of Metals</u> : How reactive are metals? 7. <u>Displacement Reactions</u> : Which metals displace each other? 8. <u>Extracting Metals</u> : How can we extract metals? 9. <u>Useful Materials</u> : How can we use different materials? 10. <u>Composites</u> : What are the components of a composite? 11. <u>Investigating Composites</u> : What affects the properties of a composite? 12. <u>Polymers</u> : What affects the properties of polymers? 13. <u>Assessing Risk</u> : How are risk assessments carried out?		
<b>Key Skills and Knowledge taught through this topic (Intent)</b> ✓ Describe the arrangement of particles for each state; Name changes of state; Describe the energy changes during changes of state; Investigate energy changes in different substances. ✓ Identify signs of a chemical reaction; Define exothermic and endothermic; Investigate whether reactions are exothermic or endothermic. ✓ Identify the structure of the periodic table; Describe how scientists designed the periodic table; Predict patterns using the periodic table. ✓ Define the properties of substances; Compare the properties of metals and non-metals; Identify metals from their properties. ✓ Define metal and non-metal oxides; Identify the chemical and physical properties of oxides; State chemical equations for oxidation reactions. ✓ Identify what metals can react with; Investigate the reactivity of metals; State the reactivity series.			✓ Define displacement; Recall the reactivity series; Investigate displacement reactions; State word equations for displacement reactions. ✓ Describe how metals are normally found; Define a metal ore; Describe how metals can be extracted from metal ores; Explain why carbon is typically used when extracting metals. ✓ Recall properties of metals and non-metals; Identify properties of different materials that make them useful; Evaluate the properties and uses of ceramics, polymers and composites. ✓ Recall examples of composites; Identify components of composites; Investigate what affects the properties of a composite. ✓ Record accurate results in a detailed results table; Conclude whether the quantity of filler affected the properties of a composite; Evaluate the composite investigation. ✓ Define polymer; Describe how polymers are made; Investigate the properties of polymers; Evaluate the use of polymers. ✓ Recall definitions of hazard, risk and precaution; Identify hazards, risks and precautions in a risk assessment; Safely investigate exothermic reactions.		
<b>Prior Learning (Context)</b> <a href="#">KS2: Science Programmes of Study</a> ➤ Properties and changes of materials (page 28)		<b>Future Learning (Context)</b> <a href="#">KS3: Science Programmes of Study</a> ➤ Chemical reactions (page 8) ➤ Earth and atmosphere (page 9) <a href="#">KS4: Science Programmes of Study</a> ➤ Energy changes in chemistry (page 12) ➤ Atomic structure and the Periodic Table (pages 11-12) ➤ Chemical and allied industries (page 13) ➤ Structure, bonding and the properties of matter (page 12)		<b>National Curriculum Links (Context)</b> <a href="#">KS3: Science Programmes of Study</a> ➤ Energetics (page 8) ➤ The Periodic Table (page 9) ➤ Materials (page 9)	
<b>RRSA Links</b> ARTICLE 12: Respect for the views of the child. ARTICLE 13: Freedom of expression. ARTICLE 28: Right to education. ARTICLE 29: Goals of education.				<b>Assessment of Learning (Impact)</b> • Individual questioning, lesson and homework activities • Classwork in student folders with Review lesson • Practical activities carried out throughout topic • 8C1 Standard Homework 1 and 2 with Feedback lesson • 8C1 Topic Test with Revision and Feedback lessons	
<b>British Values Links</b> MUTUAL RESPECT: Working together with tolerance and mutual understanding, treating each other with respect. THE RULE OF LAW: Understanding and following lab rules and the laws of nature. INDIVIDUAL LIBERTY: Thinking independently and expressing views appropriately with confidence in a safe, supporting environment.					
<b>Eco-Schools Links</b> WASTE: Refusing, reducing, reusing, repairing, recycling. LITTER: Reducing litter, which harms wildlife and costs millions to clear every year.					
<b>Reading / Enrichment</b> The Periodic Table Book – Dorling Kindersley Built To Last – David Macaulay Built – Roma Agrawal <a href="#">Recommended Reading List.</a>		<b>Key Vocabulary (Literacy)</b> Exothermic; Endothermic; Properties; Periodic table; Metal oxide; Non-metal oxide; Displacement; Metal ore; Composite; Polymer; Ceramic; Hazard; Risk; Precaution. <i>Complete topic glossary provided.</i>			
				<b>Career Links</b> Chemical Engineer; Surveyor; Environmental Chemist; Metalworker; Architect; Materials Scientist; Metallurgist; Engineer; Operations Manager; Risk Manager; Manufacturer; Teacher; Research Scientist.	



**7WS**  
**The Lab**  
**Licence**

**7P1**  
**Waves**  
**and Space**

**7P2**  
**Motion,**  
**Forces and**  
**Pressure**

**8P1**  
**Electricity**  
**and**  
**Magnetism**

**8P2**  
**Energy,**  
**Machines,**  
**Fuels and**  
**Power**

Science	Year 8		Autumn Term	
8P1 Physics Topic 1 – Electricity and Magnetism				
<b>Topic Outline &amp; Aims (Intent)</b> 1. <u>Charge</u> : How does charge affect substances? 2. <u>Static Electricity</u> : What causes static electricity? 3. <u>Current and Potential Difference</u> : What is current and potential difference? 4. <u>Series Circuits and Circuit Symbols</u> : What are the components of a series circuit? 5. <u>Current</u> : How does current flow in circuits? 6. <u>Parallel Circuits</u> : How are ammeters and voltmeters used in circuits?		7. <u>Resistance</u> : What is resistance in circuits? 8. <u>Investigating Resistance</u> : What affects resistance in circuits? 9. <u>Calculating Resistance</u> : How is resistance in circuits calculated? 10. <u>Magnetic Poles and Field Lines</u> : What are the properties of permanent magnets? 11. <u>The Earth as a Magnet</u> : What are the functions of the Earth’s magnetic field? 12. <u>Electromagnets</u> : What is an electromagnet? 13. <u>Uses of Electromagnets</u> : What are the uses of electromagnets? 14. <u>Electric Motors</u> : How does a simple electric motor work?		
<b>Key Skills and Knowledge taught through this topic (Intent)</b> ✓ Recall the structure of an atom; Describe charge; Identify the charges of sub-atomic particles; Explain the difference between conductors and insulators. ✓ Describe an electric field; Explain how objects can become charged; Investigate the effect of electrostatic forces. ✓ Describe electricity; Define electric current; Describe potential difference; Evaluate models of current and potential difference. ✓ Describe how to draw circuit diagrams; Identify circuit symbols for electrical components; Describe the properties of a series circuit. ✓ Recall the definition of electric current; Describe how current flows in a series circuit; Describe how current flows in a parallel circuit. ✓ Identify parallel circuits; Describe how to use an ammeter and voltmeter in a circuit. ✓ Describe resistance in circuits; Describe how resistance is measured in circuits; Investigate how variable resistors work.		✓ Describe what causes resistance in circuits; Recall the variables in an experiment; Investigate how the length of a wire affects the resistance in a circuit; Recall how to draw a scatter graph of results. ✓ Identify what affects the resistance of a conductor; State Ohm’s Law; Calculate resistance in circuits using Ohm’s Law. ✓ Define a permanent magnet; Describe how magnets and magnetic materials interact; Investigate magnetic field lines around a magnet. ✓ Describe and explain the Earth’s magnetic field; Describe the function of a compass; Investigate how to make a magnetic compass. ✓ Define an electromagnet; Draw the magnetic field around electromagnets; Describe how to increase the strength of an electromagnet. ✓ Identify uses of electromagnets; Label the parts of an electric bell; Describe how an electric bell works. ✓ Recall the function of a motor; Label the parts of a simple electric motor; Describe how a simple electric motor works.		
<b>Prior Learning (Context)</b> <a href="#">KS2: Science Programmes of Study</a> ➤ Electricity (pages 23, 34) ➤ Forces and magnets (page 19)		<b>Future Learning (Context)</b> <a href="#">KS3: Science Programmes of Study</a> ➤ Energy (pages 9-10) <a href="#">KS4: Science Programmes of Study</a> ➤ Electricity (pages 15-16) ➤ Magnetism and electromagnetism (page 16)		<b>National Curriculum Links (Context)</b> <a href="#">KS3: Science Programmes of Study</a> ➤ Static electricity (page 12) ➤ Current electricity (page 12) ➤ Magnetism (page 12)
<b>RRSA Links</b> ARTICLE 12: Respect for the views of the child. ARTICLE 13: Freedom of expression. ARTICLE 28: Right to education. ARTICLE 29: Goals of education.				<b>Assessment of Learning (Impact)</b> • Individual questioning, lesson and homework activities • Classwork in student folders with Review lesson • Practical activities carried out throughout topic • 8P1 Standard Homework 1 and 2 with Feedback lesson • 8P1 Topic Test with Revision and Feedback lessons
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<b>Eco-Schools Links</b> ENERGY: Reducing energy use and investigating greener energy sources. WASTE: Refusing, reducing, reusing, repairing, recycling.				
<b>Reading / Enrichment</b> All About Physics (Big Questions) – Richard Hammond Magnetic Electricity! The Power of Magnets and Their Role in Electricity - Baby IQ Builder Books  <a href="#">Recommended Reading List.</a>	<b>Key Vocabulary (Literacy)</b> Charge; Electric Field; Electricity; Electric current; Potential difference; Resistance; Series circuit; Parallel circuit; Permanent magnet; Magnetic field; Electromagnet; Electric Bell; Electric Motor.  <i>Complete topic glossary provided.</i>	<b>Numeracy Opportunities</b> Making measurements; Comparing size; Converting units; Using and rearranging equations; Calculating averages and percentages; Rounding results; Drawing and analysing accurate scientific diagrams, results tables, and scatter graphs.	<b>Career Links</b> Electrician; Electrical Engineer; Circuit Developer; Geologist; IT Technician; Navigator; Software Designer; Teacher; Magnetic Engineer; Geomagnetist; Radiographer; Automotive Designer; Engineer; Research Scientist.	