



The High School
Leckhampton

Year 9 **SCIENCE**



Topic Titles

9B1 Biology Topic 1 Cell Structure, Cell Division and Transport in Cells

9C1 Chemistry Topic 1 Atomic Structure and the Periodic Table

9P1 Physics Topic 1 National and Global Energy Resources

9B2 Biology Topic 2 Infectious Diseases, Defence Systems and Medicines

9C2 Chemistry Topic 2 The Earth's Atmosphere and Using Earth's Resources

9P2 Physics Topic 2 Electricity I

9P3 Physics Topic 3 Motion, Forces and Elasticity

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 – Properties of materials.

ENGLISH – Using comparative terms, learning word etymology, recalling exact definitions, writing and following detailed instructions.

GEOGRAPHY – Nutrient cycles and resources.

HISTORY – Development of the periodic table, vaccinations and medication, and atmosphere composition.

MATHS - Converting units, calculations, using and rearranging equations, rounding results, identifying patterns, and drawing scatter and bar graphs.

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 9 Science Topic Basics 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

Ingredients: The Strange Chemistry of What We Put in Us and on Us – George Zaidan

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

Thing Explainer: Complicated Stuff in Simple Words – Randall Munroe

100 Things to Know About Saving the Planet – Usborne Publishing

Built: The Hidden Stories Behind our Structures – Roma Agrawal

Science Tales: Lies, Hoaxes and Scams – Darryl Cunningham

Galen and the Gateway to Medicine – Jeanne Bendick

A Short History of Nearly Everything – Bill Bryson

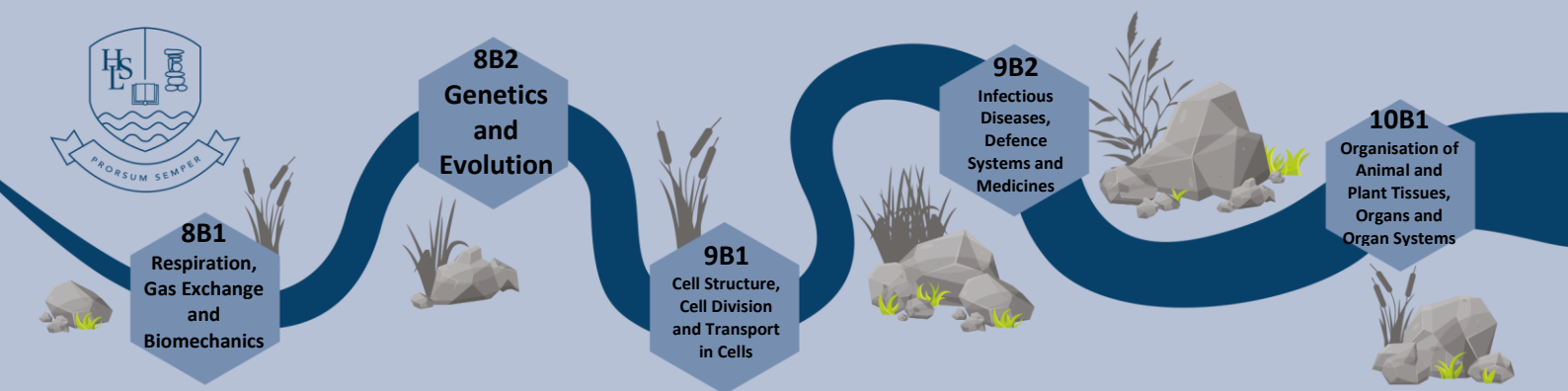
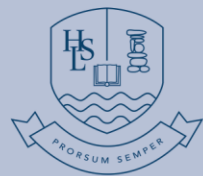
There Is No Planet B - Mike Berners-Lee

The Disappearing Spoon – Sam Kean

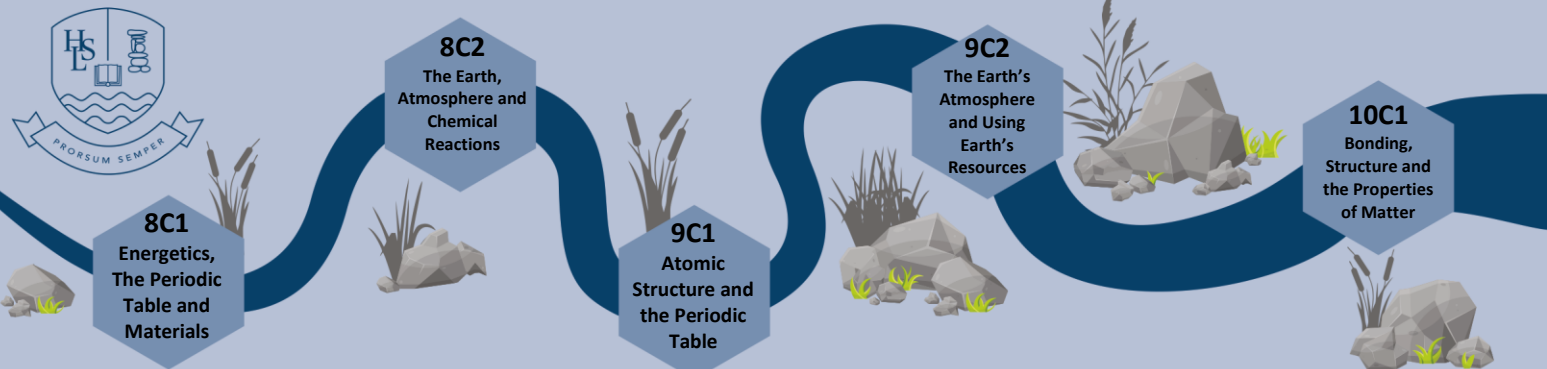
Get Your Boots On – Alex White

The Periodic Table – Primo Levi

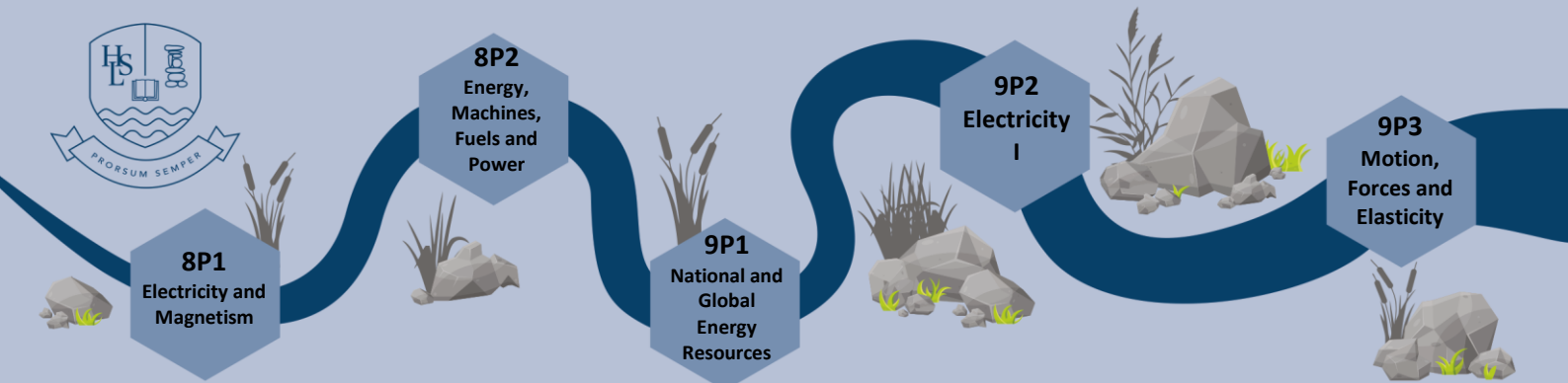
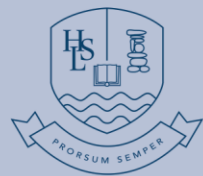
More recommendations at:
<https://www.hsl.glouchs.sch.uk/literacy-and-recommended-reading>



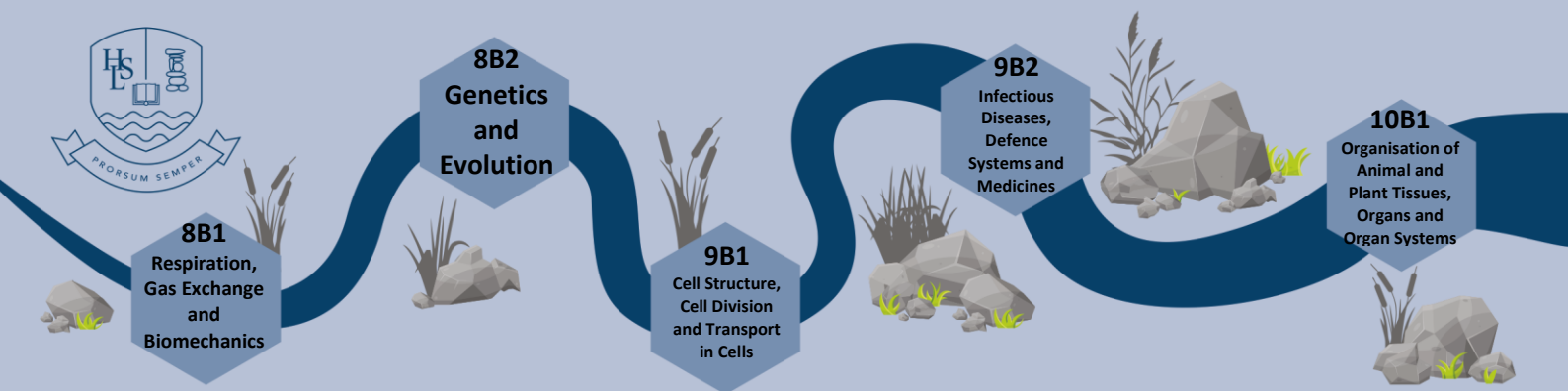
Science		Year 9		Autumn Term	
9B1 Biology Topic 1 – Cell Structure, Cell Division and Transport in Cells					
Topic Outline & Aims (Intent) 1. <u>Looking at Cells</u> : How can a microscope be used to view cells? 2. <u>Eukaryotic Cells</u> : What is the structure of eukaryotic cells? 3. <u>Prokaryotic Cells</u> : What is the structure of a bacterial cell? 4. <u>Specialised Cells and Organisation</u> : What are specialised cells? 5. <u>Unspecialised Cells</u> : What are the different types of unspecialised cells? 6. <u>Therapeutic Cloning</u> : Should therapeutic cloning be allowed?			7. <u>Mitosis and the Cell Cycle</u> : How can cells divide? 8. <u>Diffusion</u> : What affects diffusion? 9. <u>Surface Area to Volume Ratio</u> : What is the effect of surface area to volume ratio on organisms? 10. <u>Exchange Surfaces and Transport Systems</u> : Why do multicellular organisms need exchange surfaces and transport systems? 11. <u>Osmosis</u> : What is osmosis? 12. <u>Active Transport</u> : What is active transport?		
Key Skills and Knowledge taught through this topic (Intent) ✓ Recall how to use a light microscope to view cells; Calculate magnification; Convert units of distance; Compare light microscopes and electron microscopes. ✓ Define eukaryotic cells; Identify the parts of an animal and a plant cell; Describe the functions of animal and plant organelles; Compare animal and plant cells. ✓ Use a light microscope to observe, draw and label a selection of plant and animal cells. ✓ Define prokaryotic cells; Compare prokaryotic and eukaryotic cells; Describe the structure and function of a bacterial cell; Estimate the size of sub-cellular structures. ✓ Define a specialised cell; Describe the structure and adaptations of specialised animal and plant cells; Describe the levels of cell organisation. ✓ Define cell differentiation; Name and locate unspecialised cells in animals and plants; Describe the function of unspecialised cells in animals compared to plants. ✓ Describe the process of therapeutic cloning; Evaluate the use of embryonic and adult stem cells in medical research and treatments.			✓ State why cells need to divide; Explain the stages of the cell cycle; Describe the process of mitosis; Calculate figures related to cell division through division and percentages. ✓ Describe the process of diffusion; Identify substances that move by diffusion; Explain the factors that affect the movement of molecules. ✓ Calculate and compare surface area to volume ratios; Explain the need for exchange surfaces and transport systems in multicellular organisms. ✓ Identify examples of exchange surfaces and transport systems in multicellular organisms; Describe the features of exchange surfaces in multicellular organisms. ✓ Describe the process of osmosis; Define a partially permeable membrane; Describe solutions according to water concentration; Describe the effect of water on animal and plant cells. ✓ Investigate the effect of a range of concentrations of salt or sugar solutions on the mass of plant tissue. ✓ Describe the process of active transport; Explain examples of active transport; Compare diffusion, osmosis and active transport.		
Prior Learning (Context) KS3: Science Programmes of Study ➤ Cells and organisation (page 5) ➤ Reproduction (page 6)		Future Learning (Context) KS4: Science Programmes of Study ➤ Transport Systems (pages 8) ➤ Health, disease & the development of medicines (page 8)		National Curriculum Links (Context) KS3: Science Programmes of Study ➤ Cells and organisation (page 5) KS4: Science Programmes of Study ➤ Cell Biology (pages 7-8)	
RRSA Links ARTICLE 1: Definition of the child. ARTICLE 12: Respect for the views of the child. ARTICLE 28: Right to education. ARTICLE 6: Life, survival and development. ARTICLE 13: Freedom of expression. ARTICLE 29: Goals of education.				Assessment of Learning (Impact) • Individual questioning, lesson and homework activities • Classwork in student folders with Review lesson • Practical activities carried out throughout topic • 9B1 Standard Homework 1 and 2 with Feedback lesson • 9B1 Topic Test with Revision and Feedback lessons	
British Values Links 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.					
Eco-Schools Links BIODIVERSITY: Maintaining a high level of plant, insect and animal life locally and globally.					
Reading / Enrichment Pig-Heart Boy – Malorie Blackman; The Incredible Human Journey – Alice Roberts Recommended Reading List.		Key Vocabulary (Literacy) Cells; Microscopy; Nucleus; Eukaryotic cells; Prokaryotic cells; Stem cells; Diffusion; Osmosis. <i>Complete topic glossary provided.</i>		Numeracy Opportunities Identifying magnification; Comparing size; Converting units; Calculating percentages; Rounding results.	
				Career Links Cell Biologist; Geneticist; Zoologist; Microbiologist; Embryologist; Doctor; Nurse; Teacher; Research Scientist.	



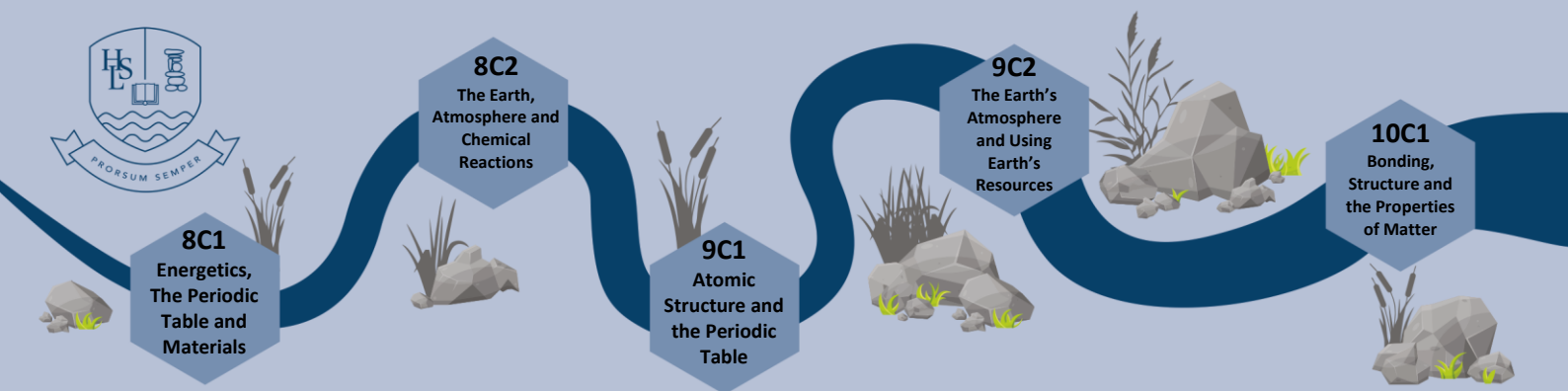
Science		Year 9		Autumn Term	
9C1 Chemistry Topic 1 – Atomic Structure and the Periodic Table					
Topic Outline & Aims (Intent) 1. Atoms, Elements and Compounds 2. Naming Compounds and Chemical Reactions 3. Equations and Formula 4. Balancing Chemical Equations and the Law of Conservation of Mass 5. Separating Mixtures – Filtration and Crystallisation 6. Separating Mixtures – Distillation and Chromatography 7. Development of the Model of the Atom			8. Atomic Structure 9. Electronic Structure 10. Isotopes 11. Development of the Periodic Table 12. Why substances react and Group 0 13. Group 7 Properties and Reactions 14. Group 1 Properties and Reactions 15. Transition Metals and Intermolecular Forces		
Key Skills and Knowledge taught through this topic (Intent) ✓ Define atoms, elements and compounds; State how atoms are represented in the periodic table; State where elements are shown; Describe how compounds are formed and represented. ✓ Name compounds of elements from given formulae or symbol equations; Write word equations for chemical reactions. ✓ Write formulae and balanced chemical equations for reactions. ✓ Explain why mixtures are easily separated but compounds are not; Describe how to separate a mixture using chromatography, filtration, crystallisation, simple distillation and fractional distillation with examples. ✓ Describe Rutherford and Marsden’s scattering experiment; Describe differences between plum pudding & nuclear atomic models; Describe how Bohr adapted the nuclear model; State that Chadwick’s work proved the existence of the nucleus. ✓ State the relative electrical charges of atomic particles; Define atomic number and mass number; Describe the structure of an atom; State the relative masses of protons, neutrons and electrons.			✓ Explain electron arrangements in terms of shells / energy levels; Represent electron arrangements by numbers or a diagram. ✓ Explain what an isotope is. ✓ Describe the steps in the development of the periodic table; Describe how elements were classified before the discovery of protons, neutrons and electrons; Explain how Mendeleev overcame problems of early periodic tables; Explain why order based on atomic weights was not always correct. ✓ Explain the differences between metals and non-metals on the basis of their characteristic physical and chemical properties; Explain how atomic structure of metals and non-metals relates to position in periodic table; Explain how reactions of elements are related to atomic number. ✓ Describe and explain the properties of Group 0; Predict properties of Group 0 from given trends down the group. ✓ Describe and explain the properties of Group 1; Predict properties of Group 1 from given trends down the group. ✓ Describe and explain the properties of Group 7; Predict properties of Group 7 from given trends down the group.		
Prior Learning (Context) KS3: Science Programmes of Study ➤ Particle model (page 13) ➤ Atoms, elements and compounds (page 8) ➤ Pure and impure substances (page 8)		Future Learning (Context) KS4: Science Programmes of Study ➤ Earth and atmospheric science (page 13) ➤ Chemical and allied industries (page 13) ➤ Chemical changes (page 12) ➤ Rate and extent of chemical change (page 13)		National Curriculum Links (Context) KS3: Science Programmes of Study ➤ Atoms, elements and compounds (page 8) ➤ Chemical reactions (page 8) ➤ The Periodic Table (page 9) ➤ Particle model (page 13) KS4: Science Programmes of Study ➤ Atomic structure and the Periodic Table (page 11) ➤ Atomic structure (page 16)	
RRSA Links ARTICLE 12: Respect for the views of the child. ARTICLE 13: Freedom of expression. ARTICLE 28: Right to education. ARTICLE 29: Goals of education.				Assessment of Learning (Impact) • Individual questioning, lesson and homework activities • Classwork in student folders with Review lesson • Practical activities carried out throughout topic • 9C1 Standard Homework 1 and 2 with Feedback lesson • 9C1 Topic Test with Revision and Feedback lessons	
British Values Links 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.					
Eco-Schools Links ENERGY: Reducing energy use and investigating greener energy source. WATER: Valuing and preserving our most important natural resource.					
Reading / Enrichment The Disappearing Spoon – Sam Kean The Elements: A Visual Exploration of Every Known Atom in the Universe – Theodore Gray The Periodic Table – Primo Levi Recommended Reading List.		Key Vocabulary (Literacy) Compound; Electron; Element; Group; Isotopes; Ions; Cation; Anion; Neutron; Nucleus; Proton; Pure; Reactivity; Relative Atomic Mass; Mixture; Solution; Subatomic Particles; Separation Technique. <i>Complete topic glossary provided.</i>			
				Career Links Chemist; Materials Scientist; Pharmacologist; Physicist; Chemical Engineer; Teacher; Environmental Scientist; Nuclear Scientist; Laboratory Technician; Quality Control Analyst.	



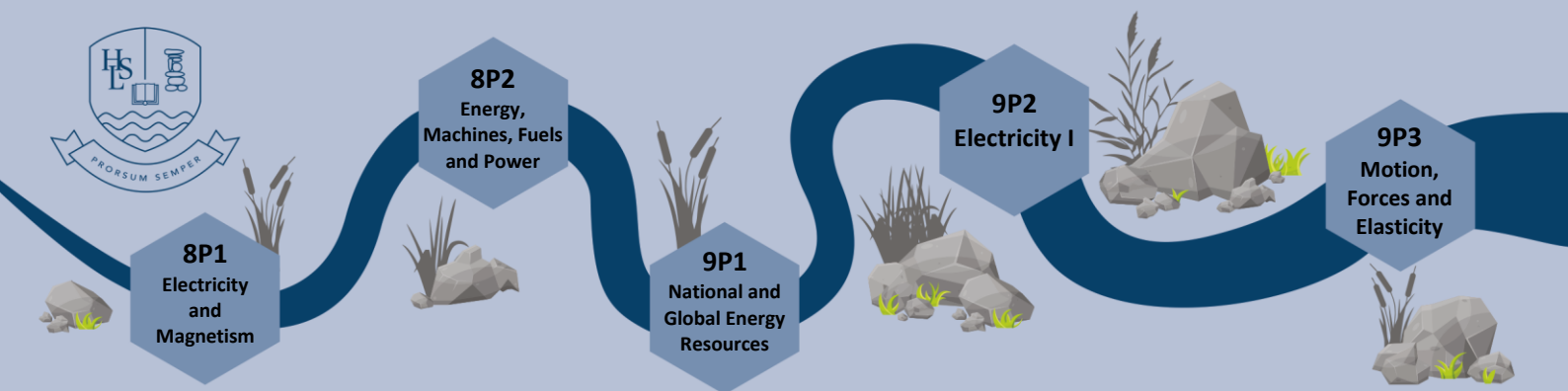
Science		Year 9		Autumn Term	
9P1 Biology Topic 1 – National and Global Energy Resources					
Topic Outline & Aims (Intent) 1. <u>How do we get energy from our environment?</u> 2. <u>How much energy do we need?</u>			3. <u>How do different energy resources compare?</u> 4. <u>Is nuclear energy the answer?</u>		
Key Skills and Knowledge taught through this topic (Intent) ✓ Describe energy resources; Describe how electricity is generated; Evaluate different energy resources. ✓ Identify if energy resources are renewable or non-renewable; Compare ways that different energy resources are used; Convert between units.			✓ Consider the environmental issues that may arise from the use of different energy resources; Use the command words in an exam question to decide how to answer it. ✓ Recall the difference between hazard and risk; Consider the various environmental, ethical, personal, social and economic issues and risks that may arise from the use of nuclear energy.		
Prior Learning (Context) KS3: Science Programmes of Study ➤ Changes in systems (page 10) ➤ Energy changes and transfers (page 10) ➤ Calculation of fuel uses & costs in the domestic context (page 9)		Future Learning (Context) KS4: Science Programmes of Study ➤ Electricity (pages 15) ➤ Atomic structure (page 16)		National Curriculum Links (Context) KS3: Science Programmes of Study ➤ Calculation of fuel uses & costs in the domestic context (page 9) ➤ Scientific attitudes (page 4) KS4: Science Programmes of Study ➤ Energy (page 14)	
RRSA Links ARTICLE 1: Definition of the child. ARTICLE 6: Life, survival and development. ARTICLE 12: Respect for the views of the child. ARTICLE 13: Freedom of expression. ARTICLE 24: Health, Water, Food, Environment ARTICLE 28: Right to education. ARTICLE 29: Goals of education.				Assessment of Learning (Impact) • Individual questioning, lesson and homework activities • Classwork in student folders • 9P1 Standard Homework 1 with Feedback provided	
British Values Links 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.					
Eco-Schools Links ENERGY: Reducing energy use and investigating greener energy sources. WASTE: Refusing, reducing, reusing, repairing, recycling.					
Reading / Enrichment How the World Really Works: A Scientist’s Guide to Our Past, Present and Future – Vaclav Smil Charged: A History of Batteries and Lessons for a Clean Energy Future – James Morton Turner Power Up: An Engineer's Adventures into Sustainable Energy – Yasmin Ali Recommended Reading List.		Key Vocabulary (Literacy) Energy; Joules; Energy resource; Fossil fuel; Nuclear fuel; Biofuel; Hydroelectricity; Geothermal; Renewable; Turbine; Generator. <i>Complete topic glossary provided.</i>		Numeracy Opportunities Comparing size; Converting units; Calculating averages, costs and percentages; Rounding results;	
Career Links Geologist; Gas Engineer; Environmental Policy Advisor; Environmental Chemist; Teacher; Welder; Turbine Technician; Electrician; Particle Physicist; Water Treatment Specialist; Management Consultant; Solicitor; Research Scientist.					



Science		Year 9		Spring Term	
9B2 Biology Topic 2 – Infectious Diseases, Defence Systems and Medicines					
Topic Outline & Aims (Intent) 1. <u>Communicable Diseases</u> : What causes communicable diseases? 2. <u>Viral, Bacterial and Fungal Diseases</u> : What are examples of viral, bacterial and fungal diseases? 3. <u>Protist Diseases and Transmission Data</u> : What are examples of protist diseases? 4. <u>Protecting the Body</u> : How does the body protect itself from pathogens?			5. <u>The Immune System</u> : How can the immune system destroy pathogens? 6. <u>Vaccination</u> : How do vaccinations work? 7. <u>Vaccine Impact</u> : Why are vaccines important? 8. <u>Antibiotics and Painkillers</u> : How are antibiotics and painkillers used to treat diseases? 9. <u>Drug Discovery and Development</u> : How are drugs discovered and developed?		
Key Skills and Knowledge taught through this topic (Intent) ✓ Define and identify pathogens; Describe how communicable diseases can be spread; Explain how the spread of communicable diseases caused by pathogens can be reduced or prevented. ✓ Name seven communicable diseases and describe their symptoms and methods of transmission and prevention. ✓ Calculate figures related to the spread of communicable diseases. ✓ Describe the non-specific defence systems of the human body against pathogens.			✓ Explain how the immune system can destroy pathogens. ✓ Define vaccination; Describe how a vaccination works; Explain herd immunity. ✓ Evaluate the effectiveness of vaccines in preventing infectious diseases. ✓ Recall the definition of a drug; Describe the effect of painkillers and antibiotics in treating disease; Explain what causes antibiotic resistance and how to prevent it. ✓ Describe how drugs are discovered; Describe and explain the process of drug development.		
Prior Learning (Context) KS3: Science Programmes of Study ➤ Cells and organisation (page 5) ➤ Reproduction (page 6) ➤ Relationships in an ecosystem (page 7)		Future Learning (Context) KS4: Science Programmes of Study ➤ Transport Systems (pages 8) ➤ Photosynthesis and Ecosystems (page 9) ➤ Evolution, inheritance and variation (pages 9-10)		National Curriculum Links (Context) KS3: Science Programmes of Study ➤ Health (page 6) KS4: Science Programmes of Study ➤ Health, disease & the development of medicines (page 8)	
RRSA Links ARTICLE 1: Definition of the child. ARTICLE 12: Respect for the views of the child. ARTICLE 24: Health, Water, Food, Environment ARTICLE 28: Right to education. ARTICLE 6: Life, survival and development. ARTICLE 13: Freedom of expression. ARTICLE 33: Protection from harmful drugs. ARTICLE 29: Goals of education.				Assessment of Learning (Impact) • Individual questioning, lesson and homework activities • Classwork in student folders with Review lesson • Practical activities carried out throughout topic • 9B2 Standard Homework 1 and 2 with Feedback lesson • 9B2 Topic Test with Revision and Feedback lessons	
British Values Links 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.					
Eco-Schools Links HEALTHY LIVING: Addressing your, and our planet’s health.					
Reading / Enrichment Patient Zero – Lydia Kang & Nate Pedersen Immune – Philipp Dettmer Vaccination Investigation – Tara Haele VIRAL – Ann Bausum Recommended Reading List.		Key Vocabulary (Literacy) Pathogen; Virus; Bacterium; Toxin; Measles; HIV; Salmonella; Gonorrhoea; Malaria; Antibodies; White blood cells; Vaccination; Antibiotic; Preclinical testing; Clinical trials; Double-blind trial. <i>Complete topic glossary provided.</i>			



Science		Year 9		Spring Term	
9C2 Chemistry Topic 2 – The Earth’s Atmosphere and Using Earth’s Resources					
Topic Outline & Aims (Intent) 1. The Atmosphere 2. The Changing Atmosphere 3. Greenhouse Gases 4. Climate Change 5. Carbon Footprint 6. Atmospheric Pollutants			7. Renewable and Finite Resources 8. Metals 9. Water 10. Purification and Analysis of Water 11. Wastewater Treatment 12. Reduce, Reuse and Recycle 13. Life Cycle Assessments		
Key Skills and Knowledge taught through this topic (Intent) ✓ Describe the proportions of gases in the atmosphere ✓ State the likely composition of the Earth’s early atmosphere; Explain how the atmosphere has changed over time (including volcanoes and oceans); Describe and explain how the proportion of oxygen has increased in the atmosphere from 2.7 billion years ago. ✓ Explain how carbon dioxide has increased in the atmosphere; Describe the formation of limestone, coal, crude oil and natural gas; Explain the greenhouse effect; State two human activities that increase the amount of CO2 and methane; Evaluate evidence on climate change including use of peer review and uncertainties in the evidence; Describe four potential effects of climate change. ✓ Define carbon footprint; Describe how to reduce carbon footprint and why it may be hard to do so. ✓ State which gases and other substances are released when a fuel burns; Predict the products of combustion of a fuel; State the properties of carbon monoxide; State the issues caused by sulfur dioxide and nitrogen oxides; State the issues caused by particulates.			✓ I can give examples of Earth’s resources and state what they might be used for; Describe the difference between natural and finite resources. ✓ Describe how metals can be recycled; Explain why new ways of extracting copper from low-grade ores have been developed; Explain what phytomining is; Explain what bioleaching is; Evaluate alternative biological methods of metal extraction. ✓ Explain what potable water is and how differs from pure water; Describe where the fresh water in the UK comes from. ✓ Explain how fresh water is turned into potable water, including sterilisation; Explain what desalination is; Describe the differences of getting pure water from waste, salt and ground water. ✓ Explain what sewage, industrial and agricultural wastewater are; Describe how sewage, industrial and agricultural wastewater are treated. ✓ Define sustainable development; Explain why reducing the use of resources is important; State how products can be reused. ✓ Describe what a life cycle assessment is; Explain problems with LCAs; Compare LCAs for plastic and paper shopping bags.		
Prior Learning (Context) KS3: Science Programmes of Study ➤ Atoms, elements and compounds (page 8) ➤ Chemical reactions (page 8) ➤ The Periodic Table (page 9) ➤ Particle model (page 13)		Future Learning (Context) KS4: Science Programmes of Study ➤ Chemical and allied industries (page 13) ➤ Chemical changes (page 12) ➤ Rate and extent of chemical change (page 13)		National Curriculum Links (Context) KS3: Science Programmes of Study ➤ Chemical reactions (page 8) ➤ Earth and atmosphere (page 9) KS4: Science Programmes of Study ➤ Atomic structure and the Periodic Table (page 11) ➤ Earth and atmospheric science (page 13) ➤ Atomic structure (page 16)	
RRSA Links ARTICLE 6: Life, survival and development. ARTICLE 13: Freedom of expression. ARTICLE 28: Right to education.			Assessment of Learning (Impact) • Individual questioning, lesson and homework activities • Classwork in student folders with Review lesson • Practical activities carried out throughout topic • 9C2 Standard Homework 1 and 2 with Feedback lesson • 9C2 Topic Test with Revision and Feedback lessons		
British Values Links 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.					
Eco-Schools Links ENERGY: Reducing energy use and investigating greener energy source. LITTER: Reducing litter, which harms wildlife and costs millions to clear each year. WASTE: Refusing, reducing, reusing, repairing, recycling. WATER: Valuing and preserving our most important natural resource.					
Reading / Enrichment Stuff Matters: Exploring the Marvelous Materials That Shape Our Man-Made World – Mark Miodownik Uncle Tungsten: Memories of a Chemical Boyhood – Oliver Sacks Recommended Reading List.		Key Vocabulary (Literacy) Fossil fuels; Global climate change; Global dimming; Greenhouse effect Greenhouse gases; Particulates; Photosynthesis; Pollutants; Bioleaching; Desalination; Displacement; Electrolysis. <i>Complete topic glossary provided.</i>		Numeracy Opportunities Making measurements; Comparing size; Converting units; Using and rearranging equations; Calculating averages and percentages; Rounding results; Drawing and analysing figures.	
				Career Links Atmospheric Scientist; Meteorologist; Geologist; Environmental Consultant; Climate Change Analyst; Air Quality Specialist; Renewable Energy Specialist; Conservation Scientist.	



Science	Year 9	Summer Term	
9P3 Physics Topic 3 – Motion, Forces and Elasticity			
Topic Outline & Aims (Intent) 1. <u>Speed</u> : How is speed calculated? 2. <u>Distance-Time Graphs</u> : How is speed represented on a graph? 3. <u>Scalars and Vectors</u> : What are scalars and vectors? 4. <u>Velocity-Time Graphs</u> : How is velocity represented on a graph? 5. <u>Acceleration</u> : What is acceleration? 6. <u>Types of Forces</u> : What are forces?	7. <u>Free Body Diagrams</u> : What are free body diagrams? 8. <u>Resultant Forces I</u> : What are resultant forces? 9. <u>Resultant Forces II</u> : How are resultant forces calculated? 10. <u>Terminal Velocity</u> : What is terminal velocity? 11. <u>Force Pairs</u> : What are force pairs? 12. <u>Elastic Behaviour</u> : How can the elasticity of a spring be investigated?		
Key Skills and Knowledge taught through this topic (Intent) ✓ Define speed; Calculate speed; Rearrange the speed equation to calculate distance or time. ✓ Describe the relative motion of objects; Interpret distance-time graphs; Represent speed on a distance-time graph. ✓ Define scalar and vector quantities; Recall quantities as scalar or vector; Categorise measurements as scalar or vector. ✓ Interpret velocity-time graphs; Use velocity-time graphs to calculate acceleration and distance travelled. ✓ Define acceleration; Recall the equation to calculate acceleration; Apply the equation to calculate acceleration. ✓ Define forces; Describe the effect of forces on objects; Describe examples of different forces; Explain the relationship between mass and weight.	✓ Describe how to draw free body diagrams of forces; Draw free body diagrams for given examples. ✓ Define Newton’s laws of Motion; Interpret the motion of objects based on the forces acting on them. ✓ Calculate resultant forces in a variety of simple situations; State the motion caused by the resultant force; Calculate the resultant force in complex situations. ✓ Define terminal velocity; Describe the changing motion of an accelerating object; Draw force diagrams to explain this motion. ✓ Define Newton’s 3rd Law of Motion (N3L); Describe how N3L relates to everyday situations; Explain why friction is necessary for movement. ✓ Define elastic and inelastic deformation; Investigate the elastic deformation of a spring (Hooke’s Law).		
Prior Learning (Context) <u>KS2: Science Programmes of Study</u> ➤ Describing motion (page 10) ➤ Forces (page 10) ➤ Balanced forces (page 11) ➤ Forces and motion (page 11) ➤ Pressure in fluids (page 11)	Future Learning (Context) <u>KS4: Science Programmes of Study</u> ➤ Forces (page 15) ➤ Forces and motion (page 15)	National Curriculum Links (Context) <u>KS3: Science Programmes of Study</u> ➤ Describing motion (page 10) ➤ Forces (page 10) ➤ Balanced forces (page 11) ➤ Forces and motion (page 11) <u>KS4: Science Programmes of Study</u> ➤ Forces (page 15) ➤ Forces and motion (page 15)	
RRSA Links ARTICLE 12: Respect for the views of the child. ARTICLE 13: Freedom of expression. ARTICLE 24: Health, water, food, environment. ARTICLE 28: Right to education. ARTICLE 29: Goals of education. ARTICLE 31: Rest, play, culture, arts.		Assessment of Learning (Impact) <ul style="list-style-type: none">Individual questioning, lesson and homework activitiesClasswork in student folders with Review lessonPractical activities carried out throughout topic9P3 Standard Homework 1 and 2 with Feedback lesson9P3 Topic Test with Revision and Feedback lessons	
British Values Links 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.			
Eco-Schools Links TRANSPORT: Promoting and encouraging sustainable transport.			
Reading / Enrichment The Speed of Starlight: How Physics, Light and Sound Work – Colin Stuart What’s It Like in Space?: Stories from Astronauts Who’ve Been There – Ariel Waldman The Ocean Of Truth: The Story Of Sir Isaac Newton – Joyce McPherson <u>Recommended Reading List.</u>	Key Vocabulary (Literacy) Speed; Velocity; Acceleration; Force; Scalar; Vector; Mass; Weight; Displacement; Resultant force; Air Resistance; Balanced force; Contact force; Equilibrium; Friction; Joule, Newton; Pressure; Streamlined; Tension; Unbalanced force; Upthrust. <i>Complete topic glossary provided.</i>	Numeracy Opportunities Making measurements; Comparing size; Converting units; Using and rearranging equations; Calculating averages, resultant forces and percentages; Rounding results; Drawing and analysing accurate scientific diagrams, results tables, and scatter graphs.	Career Links Motor Vehicle Technician; Test and Analysis Engineer; Statistical Mechanic; Accelerator Operator; Thermal Hydraulic Tester; Systems Engineer; Astronaut; Teacher; Physicist; Sports Therapist; Research Scientist.