

Science Department - Year 9

 Shirley High Curriculum Map	Year 9: "Competent" = Learners are now able to apply their classroom science to the wider world and how their learning links with possible career options. Challenge pupils to: Communicate with the correct scientific keywords.					
	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
	Theme/Topic/Skill:	Theme/Topic/Skill:	Theme/Topic/Skill:	Theme/Topic/Skill:	Theme/Topic/Skill:	Theme/Topic/Skill:
	Introductory Science, Pathogens	Atomic model/ Structure & Bonding	Chemical reactions	Chemical reactions / Cell transport / Chemical calculations	Climate change 1	Climate change 2
Why Now?	With the ramifications of the global pandemic still visible, it was vital that we took time to embed an accurate and scientific understanding of pathogens and the way vaccines work. Learners will also discover the impact that Antonie van Leeuwenhoek, Ignaz Semmelweis, Koch, Pasture, Fleming have had.	Having learnt two years of the how science works, learners will now showcase their understanding by developing their investigative skills. This then links to how scientist used the scientific method to develop our modern understanding of the particle model.	Learners will investigate several important reactions that build on from information from Yr7 & Yr8.	Historically at SHS we have found that student struggle with cell transport and so we have moved it from AUT1 to SPR2 where students will have adapted to the increased demands of Yr9. This same reasoning was used to add chemical calculations to this unit since the career link will be pharmacy and pharmacology.	Learners will be introduced to the climate change. This is likely the biggest single factor that will effect most aspects of their adult life. By spending this half-term detailing human interaction with the environment we hope to expose our learners to the vastness of our biosphere. And help them build an appreciation of conservation for the natural world.	A continuation of the ideas from the summer 1 half-term. This half-term now focuses on how the energy from natural resources are used to power our modern lives.
Fundamental Concepts	(1) How to plan a scientific investigation (2)How to use microscopes (3) Germ theory	(1) The structure and bonding of different materials give rise to different properties (2) The history and structure of the atom	(1) Salts are made by reacting acids with bases	(1) Cells absorb nutrients via three main processes (2) The mole is the standard unit of chemical calculations	(1) Non-renewable resources are being depleted (2) The greenhouse effect (3) Climate change is reducing biodiversity	(1) Electrical circuits can be series or parallel (2) Power line transmit AC
Students will...	Introductory Science: 1. Describe the different types of inferences 2. Identify the different types of variables 3. Plot an accurate graph 4. Analyse the data in a graph Pathology: 1. Evaluate the career of a microbiologist to a pathologist 2. Calculate the real size of a sample 3. Describe the differences between plant and animal cells 4. Describe the differences between prokaryotic cells and eukaryotic cells 5. Identify the structure and function of nerve, muscle and red blood cells 6. Identify the structure and function of palisade, root hair cells, xylem and phloem. 7. Label the different parts of a light microscope 8. Safely perform the cheek cell experiment 9. State the germ theory of disease 10. Describe the discovery made by van Leeuwenhoek 11. Describe the differences between viruses and bacterial pathogens 12. Describe the symptoms of gonorrhoea 13. Describe the symptoms of rose black spot 14. Describe the discovery made by Semmelweis 15. Explain how antibody production fights pathogens 16. Explain how vaccines work 17. Describe the discovery made by Koch & Pasture 18. Explain the difference between antibiotics and painkillers 19. Describe the discovery made by Alexander Fleming 20. Describe the discovery made by Alice Ball 21. Describe the different phases of drug trials 22. Describe how HeLa cells have advanced scientific discovery	Pathology: 1. Describe how a thermistor detect changes in temperature 2. Describe some techniques for seeing inside the human body 3. Describe some advantages of producing products through genetic engineering 4. Describe what is meant by a clone Structure & Bonding: 1. Evaluate the career of a particle scientists to a pharmacist 2. Explain the plum pudding model of the atom 3. Describe how Rutherford discovered the nucleus 4. Name different compounds 5. Explain why some elements have decimal RAMs 6. Balance chemical equations 7. Explain how ions are formed 8. Describe the formation of ionic bonds 9. Explain why ionic compounds are usually solid at room temperature 10. Describe the formation of covalent bonds 11. Explain why simple covalent molecules are usually gases and liquids at room temperature 12. Explain why graphite conducts electricity 13. Explain why metals are good thermal conductors	Structure & Bonding: 1. Describe how the solar system is formed 2. Describe the life cycle of stars Chemical reactions: 1. Draw electronic diagrams of group 1 elements 2. Draw electronic diagrams of group 7 elements 3. List elements in order of reactivity 4. Explain why some displacement reactions cannot occur 5. Define a salt 6. Describe how salts can be made from insoluble bases 7. Describe how metal carbonates react with acids 8. Explain the link between hydrogen ion concentrations and pH 9. Explain the difference between a strong and a weak acid 10. Explain the social and political factors that led to the formation of NASA 11. Describe the contributions that Katherine Johnson made to NASA 12. Describe some uses of satellites	Chemical reactions: 1. Describe the process of electrolysis 2. Define a redox reaction 3. Describe how aluminium is extracted by electrolysis 4. Explain the effects of water on electrolysis 5. Plan a method to extract copper via electrolysis 6. Describe the contributions that Marie Maynard Daly made to human digestion Cell transport & Chemical calculations: 1. Describe diffusion 2. Describe osmosis 3. Describe active transport 4. Explain why diffusion becomes ineffective as the volume increases 5. Plan an investigation to work out the concentration inside potato cells 6. Calculate RFM 7. Calculate moles 8. Calculate reacting masses 9. Calculate balanced equations from masses 10. Calculate concentration	Climate change 1: 1. Evaluate the differences between a career as a sustainability consultant and a seasonal ecologist 2. Describe the energy demands for the different energy sources 3. Describe how electricity is generated from wind and water 4. Describe how electricity is generated from the Sun and Earth 5. Evaluate the use of different non-renewable energy resources 6. Describe how best to use electricity supplies to meet variations in demands 7. Describe the early Earth's atmosphere 8. Describe the composition of the atmosphere 9. Describe the greenhouse effect 10. Explain the effects of climate change 11. Describe the effects of atmospheric pollutants 12. Describe what is meant by a stable community 13. Describe the effects of biotic and abiotic factors 14. Describe how to measure distribution of organisms 15. Describe biodiversity 16. State how human activities can lead to pollution 17. Describe how acid rain is formed 18. Describe deforestation 19. Describe different methods humans can use to maintain biodiversity 20. Describe the contributions that Marie Curie made to science 21. Describe the contributions that Jane Goodall made to science	Climate change 2: 1. Describe how electric circuits work 2. Describe potential difference 3. Describe the characteristic potential difference current graph for different components 4. Describe series circuits 5. Describe parallel circuits 6. Describe alternating current 7. Describe the arrangement of a three-pin plug 8. Calculate the power in a circuit 9. Describe the energy transfer that occurs as a charge flows through a resistor 10. Calculate the efficiency of a device 11. Describe the contributions Faraday made to science 12. Describe the war of currents
Language for Life (Key terms/Vocabulary)	Dependent variable, Independent variable, Control variable, Accuracy, Precision, Resolution, Hypothesis, Resolving power, Light microscope, Nucleus, Cytoplasm, Cell membrane, Mitochondria, Ribosomes, Algae, Cell wall, Chloroplast, Eukaryotes, Prokaryotes, Pathogen, Bacteria, Viruses	Atom, Proton, Neutron, Electron, Ion, Isotopes, Energy level, Covalent, Ionic, Giant structure, Giant lattice, Intermolecular forces, Metal, Alloy	Atom, Proton, Neutron, Electron, Ion, Isotopes, Alkali metals, Halogens, Energy level, Periodic table, Group, Period, Reactivity series, Salt, Acid, Base, Neutralization	Electrolysis, Anode, Cathode, Cation, Anion, Brine, Diffusion, Osmosis, Isotonic, Hypertonic, Hypotonic, Active transport, Exchange materials, RFM, Moles, Reacting Masses, Concentration	Biofuel, Renewable, Non-renewable, Nuclear, Fossil fuels, National grid, Geothermal energy, Acid rain, Current, Potential difference, Ammeter, Voltmeter, Series, parallel, Resistance, Diode, Bulb, Resistor, Earth wire, Three-pin plug, Fuse, Eutrophication, Smog, Deforestation, Biodiversity, Global warming, Greenhouse effect,	
Extended writing Opportunities	Pathology Ex Writing Task	Atomic theory Ex Writing Task	Chemical reactions Ex Writing Task	Cell transport Ex Writing Task	Climate Ex Writing Task	Biodiversity Ex Writing Task
Maths Across the Curriculum	Calculate magnification, Use standard form and scientific prefixes for measurements	To recognise and use expressions in standard form	To use ratios, fractions and percentages	To make order of magnitude calculations	To use an appropriate number of significant figures	To construct and interpret frequency tables and diagrams

Links to careers/ aspirations	Microbiologist Pathologist	Particle scientist	Mineral Surveyor Development engineer - Composite	Pharmacy	Sustainability consultant Seasonal ecologist	Sustainability consultant Seasonal ecologist
Cultural Capital	To demonstrate examples of physical oracy skills. This is the first oracy focused lesson. Here we tackle various ethical issues due our advancing scientific knowledge. The ethical issue in this lesson is: "Should scientists allow people to add animal DNA to their genes?"	To demonstrate examples of linguistic oracy skills. This is the second oracy focused lesson. Here we tackle various ethical issues due our advancing scientific knowledge. The ethical issue in this lesson is: "Should scientists use the data Nazi human experiments?"	To demonstrate examples of cognitive oracy skills. This is the third oracy focused lesson. Here we tackle various ethical issues due our advancing scientific knowledge. The ethical issue in this lesson is: "Should we allow animal testing?"	To demonstrate examples of social/emotional oracy skills. This is the fourth oracy focused lesson. Here we tackle various ethical issues due our advancing scientific knowledge. The ethical issue in this lesson is: "Should we give robots the right to kill?"	This is the fifth oracy focused lesson. Here we tackle various ethical issues due our advancing scientific knowledge. The ethical issue in this lesson is: "Should we impose population control?"	
Practical Application of Skills	Using a light microscope, Viewing human cheek cells	Draw the heat curve of a substance	Electrolysis		Using solar cells	Investigating current Investigating potential difference