

Subject	Science	Year Group	9				
	Gateway	B1	C1	P1	B2	C2	P2
Scheme title	Gateway to Science	Cell Biology	Atomic structure and the periodic table	Energy	Photosynthesis	Structure bonding and the properties of matter	Electricity
Purpose of scheme	Pupils revisit and learn the practical skills required to access the key stage 4 curriculum. They will partake in practicals which have a specific focus and build upon learnt skills to design and carry out a practical investigation.	Pupils will begin learning about prokaryotic and eukaryotic cells. They will recap plant and animal cells (parts and functions) from year 7 and compare these to a bacterial cell. They will also look at the different types of microscopes, when they are used and advantages and disadvantages of each. They will also use a microscope to calculate the real size of a cell. Pupils will then learn how cells divide by mitosis. They will begin to learn about the types of stem cells, their uses and advantages and disadvantages of these. Finally pupils will look at how cells are involved in aerobic and anaerobic respiration. Triple pupils will also look at how microorganisms are grown aseptically and how we test the effectiveness of disinfectants.	Pupils will learn about the structured organisation of elements within the periodic table and the physical and chemical properties of elements in different groups. Students will learn about the historical development of the periodic table and atomic structure and how new scientific discoveries lead to the modern periodic table.	Pupils will learn about the concept of energy, with an emphasis on the law of conservation of energy and how energy can be both stored and transferred. Pupils will learn how energy can be generated and how to measure the efficiency of energy output in everyday appliances.	In the topic of B2 pupils learn the word and symbol equations for photosynthesis, describe how to increase its rate and the limiting factors. Pupils also learn about how water and minerals are transported through a plant and how gases are exchanged so that photosynthesis can take place. They will also learn how this process can be maximised for food production.	Pupils will learn how the structure and bonding of matter affect their physical and chemical properties.	Pupils will learn about electricity and how it can be manipulated through circuits, with emphasis on adjusting resistance, voltage, wire length and circuit type (series and parallel). Pupils will also learn about how energy can be used safely in the home and how work is done in everyday appliances.
Knowledge in sequence	This unit of work allows students to build on prior practical knowledge and apply it to different investigations. This is at the start of Yr 9 so that the students are fully prepared for the practical elements of key stage 4 and allow us as teachers to address any misconceptions or errors before moving on to GCSE.	Pupils build on their knowledge of plant and animal cells from year 7. They will also build on their knowledge of aerobic respiration. They will look at how cells have evolved over time and also how they divide. They will also look at the importance of stem cells. All of this knowledge underpins the remaining biology topics.	In C1 students build upon their knowledge of atoms, elements and the periodic table from Y8 Matter. This knowledge underpins the rest of the Chemistry topics.	Students build upon their knowledge from the year 7 and 8 energy topics. In year 7, students develop an early understanding of energy stores and using energy in the home. In year 8, students develop an understanding of energy, with a specific reference to thermal energy. This knowledge is fundamental for many of the later physics topics (especially with reference to energy transfer and work done). The knowledge from this topic is essential for the P2 (electricity), P3 (states of matter) and P5 (forces) topics.	Pupils build on their knowledge from year 8 topic: plant nutrition and growth. They will then need to use the diffusion, osmosis and active transport again in B3 and they will revisit plant minerals in B4.	Pupils build upon their knowledge of the periodic table and electronic structure from C1 to explain how elements bond together and how this bonding causes their varying properties.	Pupils build upon their knowledge of voltage, current, resistance and circuits from year 7. Pupils will also develop their understanding of series and parallel circuits from year 7/8. Pupils will use their existing understanding of energy and work done and apply it to concepts involving electrical appliances. An understanding of electricity will be needed for the P7 topic on electromagnets and motors.
Skills	Planning an investigation, variables, using and manipulating equipment, writing a conclusion and evaluating ethical and moral views when using science. Interpreting data + graphs and making models.	Planning an investigation, variables, using and manipulating equipment, writing a conclusion and evaluating ethical and moral views when using science. Interpreting data + graphs and making models.	Safe use of equipment, testing a prediction.	Calculations, rearranging equations, critical thinking, evaluation.	Planning an investigation, variables, using and manipulating equipment, writing a conclusion. Interpreting data + graphs.	Drawing a graph, visualising and representing 2D and 3D forms.	Calculations, re-arranging equations, drawing and interpreting graphs, practical skills, variables, diagram drawing.
Key words	Independent variable. Dependent variable. Control variables. Fair test. Accuracy. Validity. Repeatability. Reproducibility. Graph. Conclusion. Evaluation. Analysis. Human error. Zero error. Systematic error.	Prokaryote, Eukaryote, chromosome, mitosis, cell differentiation, stem cell, fermentation, anaerobic respiration, aerobic respiration, therapeutic cloning	Element, mixture, compound, ion, isotope	Work done, system, energy store, energy transfer, kinetic, thermal, gravitational, elastic, potential, efficiency, useful energy, power.	Photosynthesis, chlorophyll, chloroplast, limiting factor, temperature, xylem, phloem, transpiration, translocation, diffusion, osmosis, active transport.	Small molecule, giant covalent structure, ionic, metallic, delocalised, electrostatic attraction, intermolecular forces	Potential difference, current, resistance, series, parallel, I-V characteristics, charge flow, national grid, energy transfer, work done, power.
End point	Students are able to design and carry out a practical using new knowledge. They are able to select appropriate equipment, identify variables and collect accurate data. They will acquire the skills needed to access KS4 practicals and be able to apply these skills to different investigations.	Pupils able to explain the difference between plant, animal and bacterial cells. They will be able to describe the advantages and disadvantages of the different types of microscopes and use the magnification calculation. They should be able to explain the stages involved in the cell cycle and mitosis. They should be able to evaluate the use of stem cells and compare aerobic to anaerobic respiration.	Pupils are able to use and navigate the periodic and describe the properties of some elements based upon their position. Students should be able to describe the development of the periodic table and models of the atom.	Pupils are able to identify the energy stores in a system and ways in which these energy stores can be depleted and transferred to other energy stores. Students will be able to calculate the efficiency of an everyday object/appliance. Students will be able to calculate the energy gained/depleted/stored/released using the equations for thermal energy, kinetic energy, gravitational potential energy and elastic potential energy. Students will be able to define work done and power and describe how work is being done for the different pathways of energy transfer.	Pupils should be able to explain what photosynthesis is, why it is needed and explain the limiting factors of photosynthesis. They should be able to carry out a practical to investigate the effect of light intensity on its rate of photosynthesis. They should be able to explain how and where diffusion, osmosis and active transport occurs in plants. They should also be able to explain how the different parts of the plant are adapted to do photosynthesis, transpiration and translocation.	Pupils are able to identify the type of bonding in a structure and then describe and explain the properties of the structure linking the properties to the bonding. Students should be able to describe the structure and properties of alloys.	Pupils are able to construct circuit diagrams and produce the circuits in a practical setting. Students are able to calculate potential difference, current, resistance, charge flow, work done and power with reference to electrical appliances. Students are able to explain the difference between series and parallel circuits and to identify the components of a plug. Pupils will also be able to describe how electricity is safely provided to homes via the national grid. From a practical perspective, students will be able to investigate the IV characteristics of electrical components and determine how the length of a wire affects the resistance in a circuit.
Assessment Methods	Formative assessment and EOTT.	Formative assessments: exam style questions and EOTT	Formative assessment and EOTT.	Formative assessment and EOTT.	Formative assessment, exam questions and EOTT.	Formative assessment and EOTT.	Formative assessment and EOTT.