WFA Long Term Plan

WESTON FAVELL ACADEMY

Long-term planning (LTPs) - Planning how the key concepts, knowledge, skills identified in the Progression map will be delivered termly per year group
Ensuring that end points & NC/spec are covered
Identifying what assessments are planned and when
Allowing for whole academy intent priorities to be planned for

	Autumn 1	**Autumn 1**
Unit title:	Atoms in and around us	Understanding the atom
Unit length:	11 lessons	7 lessons
Key concepts:	When balancing an equation, the formula of the substance must not change. The differences between compounds and mixtures, and how mixtures can be separated using techniques such as filtration, crystallisation, distillation, and chromatography. The development of the atomic model and the evidence that lead to each new stage in its development. Draw electronic structures up to element 20.	The development of the periodic table, including the work of Dalton, Newlands, and Mendeleev, linking to the development of scientific models from Atomic structure. How each stage in the development of the periodic table was facilitated by new evidence becoming available. The importance of an inherent pattern to the elements and how this guided Mendeleev's thinking. H the electronic structure of the elements.
Knowledge/ Skills:	Key How to interpret chemical formulae and extend knowledge of the law of the conservation of mass, leading balancing chemical equations. Core Mixtures can be separated using techniques that must be matched to the physical properties of the mixture and its components Atoms are made up of subatomic particles Our understanding of atom structure has changed since the ancient Greeks and the evidence we have used Powerful Links to particles, radiation, and pressure etc in Physics Links to Biology	Key Our understanding of the atom, its structure and the design of the periodic table have changed over time and why Core The development of scientific models from Atomic structure. Electron configurations / electronic structures linked to Atomic structure, and the arrangement of the periodic table and the chemical properties of Group 0, Group 1, and Group 7 elements. The trends in properties and reactivity Powerful Links to particles, radiation, and pressure etc in Physics Links to Biology
End points covered:	The understanding thar matter is organised into different categories based upon structure, how the different elements are arranged and that and these give rise to distinctive properties.	
NC/Spec coverage:	3.5.4 1.1.1, 1.1.2, 1.1.3, 1.1.4, 1.1.5, 1.1.6, 2.2.2, 3.1.1, 3.1.3	3.5.3, 2.1, 2.4, 2.12, 2.13 1.2.1, 1.2.2, 1.2.3, 1.2.4, 1.2.5, 1.2.6, 1.3.1, 1.3.2
Cross-curricular links:	Physics and biology	
Assessments:		
Other academy intent priorities		

WESTON FAVELL ACADEMY

Curriculum Careers - Gatsby 4	Industrial chemist Forensic Science Teaching Pharmacy/medicine	
Culturally rich – broadening horizons	Opportunities to; • discuss changing ideas over time and cooperation between scientists • discuss role of scientists from different cultures and beliefs	Opportunities to: Link properties of elements, mixtures and compounds to their components and their positions on the periodic table Discuss changing ideas over time and link to the cross curricular nature of science

	Autumn 2	**Autumn 2**
Unit title:	The chemistry of life	How life changed the world
Unit length:	10 lessons	7 lessons
Key concepts:	**Knowledge:** The word equation for photosynthesis, and also the symbol equation (H) That photosynthesis is an endothermic reaction. The factors that affect the rate of photosynthesis including limiting factors. The need for nitrate ions as well as glucose to make proteins, and how glucose can be used to make lipids. Link to the food tests The use of greenhouses and study how the conditions can be monitored and manipulated to achieve the highest rate of photosynthesis. Higher-tier students should have an appreciation of the economics of increasing the rate of photosynthesis – they should be aware that using a greenhouse is expensive, and weigh it up against the profit gained in increased biomass. Explain graphs of photosynthesis rate involving two or three factors and decide which the limiting factor is. Use inverse proportion – the inverse square law and light intensity in the context of photosynthesis Data interpretation	**Knowledge:** The origins of the atmosphere and how it has evolved over time. How the general composition of the atmosphere has changed and how the atmosphere is currently being affect by human activity. Able to: • given appropriate information, interpret evidence and evaluate different theories about the Earth's early atmosphere. • describe the main changes in the atmosphere over time and some of the likely causes of these changes • describe and explain the formation of deposits of limestone, coal, crude oil, and natural gas. • describe the greenhouse effect in terms of the interaction of short and long wavelength radiation with matter.
Knowledge/ Skills:	Key Photosynthesis is the core reaction providing chemical energy stores for all living things Respiration is the base reaction for releasing energy from glucose Core	Key The Earth is very old and has changed over time, some of these changes are because of the development and evolution of living things Humans have a wider impact than all other species Core

	The fate of glucose – its use in respiration, and also how it can be assimilated into starch and cellulose, linked to Animal and plant cells, Osmosis and Respiration as equations and processes The adaptations of leaves to achieve maximum efficiency in photosynthesis, linked to Cell structure and transport and Organisation in animals and plants and how humans manipulate these to maximise crop yields Powerful Human and physical geography Chemistry and biology Energy stores in physics	Earth structure and the volcanic activity theory of the origin of the atmosphere, Interpret evidence concerning other theories, and be able to evaluate them The history of the atmosphere and the timescales involved. Powerful Link to human and physical geography Links to EM waves, energy changes, photosynthesis and respiration etc
End points covered:	Understanding that all particles carry an abstract quantity labelled as energy that can be stored in different stores, which can be transferred between stores or between systems but is always conserved. In some forms energy cannot be observed and has the potential to do work; in others it causes movement of particles or whole systems. Understanding of core concepts of "the cell" Understanding of how organisms interact with each other and with their environment	Appreciate that the evolution of the Earth's atmosphere has been and remains an ongoing due to a number of processes which provide resources we use today
NC/Spec coverage:	3.9.4, 2.1, 2.4, 2.9, 2.10, 2.12, 2.13 3.9.3, 2.2, 2.9, 2.10, 2.12 4.1.1, 4.1.2, 4.1.3	3.7.3, 2.1, 2.5 3.7.1, 2.3, 2.4, 2.10, 2.11, 2.12, 2.13 9.1.1, 9.1.2, 9.1.3, 9.1.4, 9.2.1, 9.2.2, 9.2.3, 9.2.4
Cross-curricular links:	Human and physical geography All sciences	Human and physical geography Biology Chemistry Physics
Assessments:		
Other academy intent priorities		
Curriculum Careers - Gatsby 4	Farmer Ecologist Conservationist	Conservationist, evolutionary biologist, zoologist, geographer, geologist, ecologist, forester, farmer, horticulturist
Culturally rich – broadening horizons	Opportunities to: • Link to farming conditions in other countries and cultures • discuss changing ideas over time and cooperation between scientists	Opportunities to: Use data to make decisions Investigate current issues using the underling science Discuss environments in different parts of the world

	Spring 1	**Spring 1**
Unit title:	How life changed the world	How humans change the world
Unit length:	3 lessons (cont'd)	10 lessons
Key concepts:	**Knowledge:** The origins of the atmosphere and how it has evolved over time.	**Knowledge:** Resources are finite and as such need to be used sustainably Able to:

	How the general composition of the atmosphere has changed and how the atmosphere is currently being affect by human activity. Able to: • given appropriate information, interpret evidence and evaluate different theories about the Earth's early atmosphere. • describe the main changes in the atmosphere over time and some of the likely causes of these changes • describe and explain the formation of deposits of limestone, coal, crude oil, and natural gas. • describe the greenhouse effect in terms of the interaction of short and long wavelength radiation with matter.	• state examples of natural products that are supplemented or replaced by agricultural and synthetic products • distinguish between finite and renewable resources given appropriate information • extract and interpret information about resources from charts, graphs, and tables • use orders of magnitude to evaluate the significance of data. • distinguish between potable water and pure water • describe the differences in treatment of ground water and salty water.
Knowledge/ Skills:	Key The Earth is very old and has changed over time, some of these changes are because of the development and evolution of living things Humans have a wider impact than all other species Core Earth structure and the volcanic activity theory of the origin of the atmosphere, Interpret evidence concerning other theories, and be able to evaluate them The history of the atmosphere and the timescales involved. Powerful Link to human and physical geography Links to EM waves, energy changes, photosynthesis and respiration etc	Key The difference between finite and renewable resources. That renewable resources are not an infinite supply but are replaceable at a rate similar to the rate they are used up, whereas finite resources are used up faster than they can be replenished. Core The need to reuse and recycle, evaluate ways of reducing the use of finite resources, and carry out life cycle assessments on products. The different ways that water is treated, both to create potable water and to remove waste products so it is safe to release into the environment. H, the extraction of copper, as well as understanding alternative biological methods used to extract copper – phytoextraction and bioleaching.
End points covered:	Appreciate that the evolution of the Earth's atmosphere has been and remains an ongoing due to a number of processes which provide resources we use today	
NC/Spec coverage:	3.7.3, 2.1, 2.5 3.7.1, 2.3, 2.4, 2.10, 2.11, 2.12, 2.13 9.1.1, 9.1.2, 9.1.3, 9.1.4, 9.2.1, 9.2.2, 9.2.3, 9.2.4	3.7.4, 2.1, 2.4, 2.13 8.2.1, 8.2.2, 8.2.3, 8.2.4, 10.1.1, 10.1.2
Cross-curricular links:	Human and physical geography Biology Chemistry Physics	
Assessments:		
Other academy intent priorities		
Curriculum Careers - Gatsby 4	Conservationist, evolutionary biologist, zoologist, geographer, geologist, ecologist, forester, farmer, horticulturist	

Culturally rich – broadening horizons	Opportunities to: Use data to make decisions Investigate current issues using the underling science Discuss environments in different parts of the world
	Spring 2
Unit title:	When charges move
Unit length:	14 lessons
Key concepts:	**Knowledge:** The structure of an atom in terms of charged particles and the process of charging by friction resulting in ions and the transfer of electrons. Electric field surrounding charged objects causing attractive or repulsive electrostatic forces between them. Direct and alternating currents in terms of current direction How an oscilloscope can b used to analyse changes in the potential difference causing the current and to measure the peak voltage, period and frequency of a low voltage sinusoidal a.c. signal. The UK mains supply and the wires used within it, the National Grid and the high voltages associated with it. The importance of efficiency within mains powered electrical devices linking this concept back to energy transfer by a current and to the simplified system of energy efficiency ratings used when considering the purchase of an appliance.
Knowledge/ Skills:	Key Link atom structure to charge Draw and interpret circuit diagrams. Recall and/or apply equations. • explain that, for some resistors, the value of R remains constant but that in others it can change as the current changes. • explain the design and use of a circuit to measure the resistance of a component by measuring the current through, and potential difference across, the component • draw an appropriate circuit diagram using correct circuit symbols. Core Electric circuits and the components used to construct them using the concept of current as the rate of charge flow through components due to a potential difference between points in the circuit. Resistance as a cause of a heating effect and corresponding energy transfer. The factors affecting the resistance of a wire and the corresponding current-potential difference graphs. Analysis of the current-potential difference graphs will show ohmic and non-ohmic behaviours for wires, filaments, and diodes and a range of series and parallel circuits describing the path of current at junctions, the potential difference across branches and components, and the effect on resistance of series and parallel branches. Mains circuits, including the function of the neutral and earth wires, applied to three pin plugs and a simple ring-main. The choice of materials used for construction of mains circuits such as wires, cables and plugs and the need for a fuse to prevent overheating and insulation for protection from short circuits. Powerful Links to DT, IT and aspects of bonding etc in chemistry
End points covered:	Understanding of how all interactions in the Universe are reliant on forces being exchanged between two or more bodies, and that these force interactions are inextricable from the corresponding energy and momentum conservation within systems.
NC/Spec coverage:	3.2.1, 3.2.2, 2.1, 2.3, 2.9, 2.10, 2.12, 2.13, 2.32,

	2.1.1, 2.1.2, 2.1.3, 2.1.4, 2.3.1, 2.3.2, 2.4.1, 2.4.2
Cross-curricular links:	Biology, chemistry, photography, DT, IT
Assessments:	
Other academy intent priorities	
Curriculum Careers - Gatsby 4	Electrician, plumber, physicist, inventor, car mechanic, lab technician, IT technician
Culturally rich – broadening horizons	Opportunities to discuss use of fields in devices, safet concerns over pylons/mobile phones and relate to evidence
	Summer 1
Unit title:	Using fields
Unit length:	7 lessons
Key concepts:	The magnetic fields around permanent magnets and the concept of induced magnetism in some materials. The magnetic field produced by a current and the factors that affect the direction and strength of this field. The field shape of a solenoid to that produced by a simple bar magnet.
Knowledge/ Skills:	Key Current is the rate of flow of charge Electrostatic and magnetic fields can be generated and both can exert non-contact forces within their field of influence The compass is used to plot a magnetic field and the shape of the Earth's field. Core Able to describe: • the attraction and repulsion between unlike and like poles for permanent magnets • the difference between permanent and induced magnets. • describe how to plot the magnetic field pattern of a magnet using a compass • draw the magnetic field pattern of a bar magnet showing how strength and direction change from one point to another • explain how the behaviour of a magnetic compass is related to evidence that the core of the Earth must be magnetic Able to interpret ; • diagrams of electromagnetic devices to explain how they work. H students, a current carrying wire placed in a magnetic field would experience the motor effect How the motor effect could be used to create an electric motor. The force produced on a motor is linked mathematically to the magnetic flux density of the magnetic field. Powerful Links to DT, IT and aspects of bonding etc in chemistry

End points covered:	Understanding of how all interactions in the Universe are reliant on forces being exchanged between two or more bodies, and that these force interactions are inextricable from the corresponding energy and momentum conservation within systems.
NC/Spec coverage:	3.2.3, 3.2.4, 2.3, 2.12 7.1.1, 7.1.2, 7.2.1, 7.2.2, 7.2.3, 5.1.2
Cross-curricular links:	Biology, chemistry, photography, DT, IT
Assessments:	
Other academy intent priorities	
Curriculum Careers - Gatsby 4	Electrician, plumber, physicist, inventor, car mechanic, lab technician, IT technician
Culturally rich – broadening horizons	Opportunities to discuss use f fields in devices, safet concerns over pylons/mobile phones and relate to evidence

	Summer 2	**Summer 2**
Unit title:	Cell structure and transport	Cell division
Unit length:	12 lessons	4 lessons
Key concepts:	The use and differences between microscopes The cells of plants, animals and of bacteria are different to each other Different organelles and structures have different roles Substances travel across membranes in different ways	Cells divide for growth and repair – mitosis Cells divide by meiosis to produce gametes
Knowledge/ Skills:	Key Magnifications can be calculated The organelles and structures of any cell have specific functions including for specialised cells Cells replicate by mitosis are diploid Gametes are made through meiosis and are haploid Core Cells are adapted to particular functions, including the absorption and removal of products	Key Cells need to be replaced to grow or repair damage, this needs nutrition and energy Core Stem cells are undifferentiated The ethical implications of the use of embryos Powerful Links to reproduction in biology

	Osmosis is the movement of water molecules from High to low concentration through a semi permeable membrane The role and characteristics of stem cells in animals and plants Powerful Links to other aspects of science, e.g later in Biology, Health and social care and child development	
End points covered:	Understanding of core concepts of "the cell"	Understanding of core concepts of "the cell"
NC/Spec coverage:	1.1.1, 1.1.2, 1.1.3, 1.1.5, 1.3.1, 1.3.2, 1.3.3 2.3.2	1.1.4, 1.2.1, 1.2.2, 1.2.3
Cross-curricular links:	Links to Physical Geography Links to Sport Science	Links to Child development and Biology - inheritance, variation and evolution
Assessments:		
Other academy intent priorities		
Curriculum Careers - Gatsby 4	Teacher Biologist Microbiologist Medicine	IVF nurse Livestock farmer Teacher Nurseryman
Culturally rich – broadening horizons	Opportunities to; • discuss changing ideas over time and cooperation between scientists • discuss the effects of disparities in medical care across the globe	Opportunities to: • discuss changing ideas over time and cooperation between scientists • discussions of topics such as the production of gametes. IVF, reproductive ethics etc