

Year 9 Science Overview

Unit	Learning Objectives/Outcomes
Plants for food	<ul style="list-style-type: none"> • Explain the importance of insect pollination in food security • Explain how bioaccumulation works and the effects this has on organisms and their environment
Earth and human impact	<ul style="list-style-type: none"> • Explain how to extract a metal from a metal oxide (e.g. copper from copper oxide) • Explain why recycling some materials is particularly important • Explain the greenhouse effect • Explain methods to reduce carbon emissions
Energy resources	<ul style="list-style-type: none"> • Compare and contrast types of energy in a range of situations • Classify objects as being a store of energy, or not a store of energy • Classify energy transfers in terms of energy not being lost, only transferred from one form to another • Calculate the useful energy and the amount wasted, given values of input and output energy • Explain why height affects the size of GPE and EPE • Apply knowledge of energy transfers to make a prediction about height and effect on GPE and EPE • Analyse and compare results from investigation and information from food labels • Explain the difference between renewable and non-renewable energy resources • Apply scientific ideas to suggest solutions to the problem of sustainable electricity generation • Explain the advantages and disadvantages of different renewable energy sources
Genetics	<ul style="list-style-type: none"> • Heredity as the process by which genetic information is transmitted from one generation to the next. • A simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model. • Differences between species • Variation between individuals within a species being continuous or discontinuous to include measurement and graphical representation • The variation between species and individuals of the same species means some organisms compete more successfully which can drive natural selection • Changes in the environment may lead to individuals within a species and entire species less well adapted to compete successfully and reproduce which in turn leads to extinction • The importance of maintaining biodiversity and the use of gene banks to preserve hereditary material
Energetics	<ul style="list-style-type: none"> • Energy changes on changes of state (qualitative) • Exothermic and endothermic chemical reactions (qualitative).

Light	<ul style="list-style-type: none"> • The similarities and differences between light waves and waves in matter • Light waves travelling through a vacuum; speed of light • The transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface • use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eye • light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras • colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection.
Evolution	<ul style="list-style-type: none"> • The variation between species and individuals of the same species means some organisms compete more successfully which can drive natural selection • Changes in the environment may lead to individuals within a species and entire species less well adapted to compete successfully and reproduce which in turn leads to extinction • The importance of maintaining biodiversity and the use of gene banks to preserve hereditary material
Atmosphere	<ul style="list-style-type: none"> • The gases in the atmosphere • Composition of the atmosphere • The effect of global warming • Changes in levels of carbon dioxide and how carbon is recycled in the environment • The impact of human activity on the carbon cycle.
Sound	<ul style="list-style-type: none"> • frequencies of sound waves, measured in hertz (Hz); echoes, reflection and absorption of sound • sound needs a medium to travel, the speed of sound in air, in water, in solids • sound produced by vibrations of objects, in loud speakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal • auditory range of humans and animals.
Cells (structure)	<ul style="list-style-type: none"> • Plant and animal cells (parts and functions) • Bacterial cells • Specialised cells • Cell division (mitosis) • Microscopy and magnification • Culturing microorganisms (BIOL ONLY)

Cells (Transport / cell division)	<ul style="list-style-type: none"> • Chromosomes • Cell division- mitosis and meiosis • Stem cells • Transport in plants • Diffusion • Osmosis • Active transport
Organisation (Animals)	<ul style="list-style-type: none"> • Digestive system • Process of digestion • Role of enzymes in digestion • Role of bile in digestion • Heart and blood vessels • The blood • Heart disease
Periodic tables	<ul style="list-style-type: none"> • The varying physical and chemical properties of different elements. • The Periodic Table periods and groups: metals and non-metals. • The properties of metals and non-metals. • The principles underpinning the Mendeleev Periodic Table. • How patterns in reactions can be predicted with reference to the Periodic Table.
Fundamentals	<ul style="list-style-type: none"> • Elements, mixtures & compounds • Word equations, chemical symbols and formula, balanced symbol equations
Separation techniques	<ul style="list-style-type: none"> • Mixtures • Techniques to include filtration, crystallisation, simple distillation, fractional distillation, chromatography
Changes of State	<ul style="list-style-type: none"> • State symbols • States and particle models • Changes of state in terms of energy and forces • Predict state of a substance from data
Atomic structure	<ul style="list-style-type: none"> • Subatomic particles, charges and mass • Calculating subatomic particles • Electron arrangements • Size of atoms • Development of atomic theory (Dalton, Thomson, Rutherford, Bohr, Chadwick) • Details of plum pudding model and alpha scattering experiment
Bonding & structures (Ionic, covalent, metals)	<ul style="list-style-type: none"> • Why bonding occurs, ion formation, ionic bonding, properties of ionic substances • Covalent bonding, dot and cross diagrams, properties of simple covalent molecules • Metallic bonding, properties of metals

Energy	<ul style="list-style-type: none">• Energy when systems change / Energy transfers• Work done by forces and when current flows• Calculating kinetic energy / elastic potential energy / gravitational potential energy / thermal energy changes• Specific heat capacity• Power• Reducing wasted energy• Thermal conductivity• Energy efficiency• Energy resources- Renewable and non-renewable energy
Electricity	<ul style="list-style-type: none">• Current, potential difference and resistance• Electrical charge and current• Resistors• Series and parallel circuits• Domestic uses and electrical safety• Mains electricity