

Introduction to Science at Key Stage 3:

Working safely in a laboratory

Identifying and applying knowledge of safety symbols

Using a Bunsen Burner

Identifying variables and planning investigations

Drawing and analysing graphs

Subject 	INTENT	IMPLEMENTATION	IMPACT
	Substantive Knowledge This is the specific, factual content for the topic, which should be connected into a careful sequence of learning.	Disciplinary Knowledge (Skills) This is the action taken within a particular topic in order to gain substantive knowledge.	Assessment opportunities What assessments will be used to measure student progress? Evidence of how well students have learned the intended content.
Biology	B1.1 – Cells <i>(Typically covered within 4 weeks, with 2 double lessons per fortnight)</i> - Plant and animal cells - Specialised cells - Observing cells - Unicellular organisms - Movement of substances	- Describe the structure and function of plant and animal cells (nucleus, mitochondrion, cell membrane, cytoplasm, chloroplast, vacuole and cell wall). - Describe and explain the adaptations of specialised cells (sperm, red blood, palisade and root hair cells). - Describe the parts and function of a microscope (stage, eyepiece lens, objective lenses, coarse focus, fine focus, light, slide, cover slip and stain). - Recall and apply the equation: <i>total magnification = eyepiece magnification × objective magnification</i> - Use a microscope to observe cells. - Mount and stain onion epidermal cells using iodine and cheek cells using methylene blue. - Produce biological drawings of prepared specimens. - Describe the structure and function of amoeba (pseudopod, food vacuole and contractile vacuole), euglena (flagellum, eyespot and contractile vacuole) and bacteria (no nucleus, cell wall and flagellum). - Define the term <i>diffusion</i>. - Describe the roles of diffusion (oxygen and glucose for respiration; water for photosynthesis and plant cell turgor). - Explain the factors affecting diffusion (temperature, surface area and distance).	- B1.1 end-of-unit test - Year 7 end-of-year exam

Biology	<u>B1.2 – Structure and Function of Body Systems</u> <i>(Typically covered within 4 weeks, with 2 double lessons per fortnight)</i> • Levels of organisation • Gas exchange • Breathing • Skeleton • Joints • Muscles	• Define the terms <i>cell</i>, <i>tissue</i>, <i>organ</i>, <i>organ system</i> and <i>organism</i>. • Describe the structure and function of different organ systems (circulatory, nervous, respiratory, skeletal and muscular systems). • Describe the processes of inhalation and exhalation, with reference to the ribcage, intercostal muscles, diaphragm, chest cavity and pressure differences. • Compare the composition of inhaled and exhaled air. • Use a bell jar as a model for the lungs. • Describe the structure and function of the skeleton (support, protection, movement and production of blood cells). • Describe the types of joints (hinge, ball-and-socket and fixed joints). • Describe the structure and function of a synovial joint (ligaments, tendons, cartilage and synovial fluid). • Explain the role of antagonistic muscle pairs.	• B1.2 end-of-unit test • Year 7 end-of-year exam
	<u>B1.3 – Reproduction</u> <i>(Typically covered within 5 weeks, with 2 double lessons per fortnight)</i> • Adolescence • Reproductive systems • Fertilisation and implantation • Development of a foetus • The menstrual cycle • Flowers and pollination • Fertilisation and germination • Seed dispersal	• Describe puberty in males and females and the roles of sex hormones (testosterone and oestrogen). • Describe the structure and function of the male reproductive system (testes, glands, sperm ducts, penis, urethra and sperm cell). • Describe the structure and function of the female reproductive system (ovaries, oviducts, uterus, cervix, vagina, urethra and egg cell). • Describe the stages of fertilisation and implantation (ovulation, cilia, ejaculation, fertilisation and implantation). • Describe and explain the structure and function of the uterus, placenta (large surface area and rich blood supply), umbilical cord, amniotic fluid and cervix. • Describe the stages of gestation and foetal development. • Describe the stages of the menstrual cycle. • Describe the different types of contraception (condom and pill). • Describe the structure and function of a flower (sepal, petal, stamen (anther and filament) and carpel (stigma, style and ovary)). • Describe the types of pollination (insect and wind pollination). • Dissect and identify the structures of a flower. • Produce biological drawings of the structures of a flower. • Describe the stages of fertilisation and germination in plants, including the roles of fruits and seeds. • Explain the requirements for germination (water, oxygen and warm temperature). • Describe the types of seed dispersal (wind, animal, water and explosive dispersal).	• B1.3 end-of-unit test • Year 7 end-of-year exam

Biology	<u>B2.3 – Adaptations and Inheritance</u> <i>(Typically covered within 5 weeks, with 2 double lessons per fortnight)</i> • Competition and adaptation • Variation • Inheritance • Natural selection • Extinction	• Describe competition in animals and plants. • Describe and explain how animals and plants are adapted to their environment. • Describe interdependence between organisms. • Analyse and explain predator-prey relationships. • Describe genetic, environmental, continuous and discontinuous variation. • Measure and analyse continuous and discontinuous data. • Draw graphs using continuous and discontinuous data. • Describe the structure and function of DNA, chromosomes and genes. • Describe the process of fertilisation in mammals. • Explain the principles of inheritance. • Outline the history of the discovery of DNA. • Explain the process of natural selection (survival, reproduction and genes being passed to offspring) and how this leads to evolution. • Explain how the fossil record provides evidence for evolution. • Describe the methods used to prevent extinction (seed banks, cryobanks and captive breeding).	• B2.3 end-of-unit test • Year 7 end-of-year exam
Chemistry	<u>C1.1 – Particles and Their Behaviour</u> <i>(Typically covered within 5 weeks, with 2 double lessons a fortnight)</i> • The particle model • States of matter • Melting, freezing and boiling • More changes of state • Diffusion	• Describe the properties of mixtures and substances. • Recall and apply the equation: $density = mass / volume$ • Use particle diagrams to describe and explain the different states of matter (solid, liquid and gas). • Explain the different changes of state (melting, freezing, boiling, evaporation, condensation and sublimation). • Use melting and boiling points to identify unknown substances. • Plan and investigate the melting points of substances. • Explain the factors affecting diffusion (temperature, particle size and state).	• C1.1 end-of-unit test • Year 7 end-of-year exam

Chemistry	<u>C1.2 & C1.3 – Elements, Atoms, Compounds and Reactions</u> <i>(Typically covered within 6 weeks, with 2 double lessons a fortnight)</i> • Elements and atoms • Compounds • Chemical formulae • Word and symbol equations • Burning fuels • Thermal decomposition • Conservation of mass • Exothermic and endothermic reactions	• Use the Periodic table to identify elements and their properties. • Describe the structure of the atom (protons, neutrons and electrons). • Describe the properties of elements, molecules and compounds. • State the names and formulae of simple compounds. • Describe chemical reactions and physical changes. • Describe the role of catalysts in chemical reactions. • Write and balance simple chemical equations. • Describe the combustion and oxidation of fossil and hydrogen fuels. • Plan and investigate the burning of fuels. • Describe decomposition and thermal decomposition. • Analyse the thermal decomposition rates of different carbonates using limewater. • Explain the law of conservation of mass. • Calculate the masses of reactants and products in chemical reactions. • Describe exothermic and endothermic changes.	• C1.2 & C1.3 end-of-unit test • Year 7 end-of-year exam
	<u>C1.4 – Acids and Alkalis</u> <i>(Typically covered within 4 weeks, with 2 double lessons a fortnight)</i> • Acids and alkalis • Indicators and pH • Neutralisation • Making salts	• Describe acids and alkalis in terms of H^+, OH^-, concentrated and dilute. • Describe the methods used to measure pH (universal indicator, litmus paper and pH probes). • Use the pH scale to determine the pH of an acid or alkali. • Describe bases and their role in neutralisation reactions. • Describe the uses of neutralisation. • Describe the reactions between acids and metals, and acids and bases, to make salts. • Write and balance simple chemical equations. • Plan and investigate the making of salts.	• C1.4 end-of-unit test • Year 7 end-of-year exam

Physics	<u>P1.1 – Forces</u> <i>(Typically covered within 4 weeks, with 2 double lessons a fortnight)</i> • Forces • Squashing and stretching • Drag forces and friction • Balanced and unbalanced forces • Forces at a distance	• Describe contact and non-contact forces. • Identify and describe interaction pairs. • Draw force diagrams. • State Hooke's law and the elastic limit. • Plan and investigate Hooke's law. • Describe air and water resistance, and friction. • Describe how to reduce the effect of drag forces (lubrication and streamlining). • Calculate resultant forces. • Recall and apply the equation: $force = mass \times acceleration$ • Describe gravitational, magnetic and electrostatic forces and fields. • Recall and apply the equation: $weight = mass \times gravitational\ field\ strength$	• P1.1 end-of-unit test • Year 7 end-of-year exam
Physics	<u>P1.2 & P1.3 – Sound and Light</u> <i>(Typically covered within 6 weeks, with 2 double lessons a fortnight)</i> • Waves • Sound and energy transfer • Loudness and pitch • Detecting sound • Echoes and ultrasound • Light • Reflection • Refraction • The eye and the camera • Colour	• Describe the features of transverse and longitudinal waves (wavelength, amplitude and frequency). • Describe how waves interact (reflection and superposition). • Describe sound waves in terms of loudness and pitch. • Explain how the speed of sound waves is affected when travelling through different mediums. • Describe the structure and function of the ear (pinna, auditory canal, eardrum, ossicles, cochlea and auditory nerve). • Describe the structure and function of a microphone. • Analyse the audible range of different organisms. • Explain how sound waves produce echoes. • Describe the uses of ultrasound scanning. • State the light waves do not require a medium to travel through. • Describe reflection, specular reflection, diffuse scattering and refraction. • Explain how convex and concave lenses can be used to refract light. • Draw ray diagrams. • Calculate angles of incidence, reflection and refraction. • Describe the structure and function of the eye (cornea, lens, pupil, iris, retina, photoreceptors, optic nerve and brain) • Explain how pinhole and digital cameras work. • Describe primary and secondary colours and the use of filters.	• P1.2 & P1.3 end-of-unit test • Year 7 end-of-year exam

Physics	<u>P2.3 – Motion and Pressure</u> <i>(Typically covered within 5 weeks, with 2 double lessons a fortnight)</i> • Speed • Motion graphs • Pressure in solids, liquids and gases • Turning forces	• Describe instantaneous and average speed, and relative motion. • Recall and apply the equation: $speed = distance / time$ • Plan and investigate speed, distance and time. • Draw and analyse distance-time graphs. • Explain the factors affecting gas pressure (temperature, volume and number of particles) • Explain how depth effects liquid pressure. • Explain how liquid pressure causes object to float and sink. • Recall and apply the equation: $pressure = force / area$ • Explain the principle of moments. • Recall and apply the equation: $moment = force \times perpendicular\ distance\ from\ pivot$	• P2.3 end-of-unit test • Year 7 end-of-year exam
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N.B. Due to timetabling, the time of year in which the above topics are taught will vary between classes.