**Year 7 Science curriculum map**

**Beths Grammar School**

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| **Beths Grammar School - HomeSubject** | **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**  (*Typically covered within 4 weeks, with 2 double lessons per fortnight*)   * 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: *total magnification* = *eyepiece* *magnification* ´ *objective* *magnification* * 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 *diffusion*. * 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** | **B1.2 – Structure and Function of Body Systems**  (*Typically covered within 4 weeks, with 2 double lessons per fortnight*)   * Levels of organisation * Gas exchange * Breathing * Skeleton * Joints * Muscles | * Define the terms *cell*, *tissue*, *organ*, *organ system* and *organism*. * 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 |
| **B1.3 – Reproduction**  (*Typically covered within 5 weeks, with 2 double lessons per fortnight*)   * 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** | **B2.3 – Adaptations and Inheritance**  (*Typically covered within 5 weeks, with 2 double lessons per fortnight*)   * 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** | **C1.1 – Particles and Their Behaviour**  *(Typically covered within 5 weeks, with 2 double lessons a fortnight)*   * 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** | **C1.2 & C1.3 – Elements, Atoms, Compounds and Reactions**  *(Typically covered within 6 weeks, with 2 double lessons a fortnight)*   * 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 |
| **C1.4 – Acids and Alkalis**  *(Typically covered within 4 weeks, with 2 double lessons a fortnight)*   * 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** | **P1.1 – Forces**  *(Typically covered within 4 weeks, with 2 double lessons a fortnight)*   * 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* ´ *acceleration* * Describe gravitational, magnetic and electrostatic forces and fields. * Recall and apply the equation: *weight* = *mass* ´ *gravitational field strength* | * P1.1 end-of-unit test * Year 7 end-of-year exam |
| **Physics** | **P1.2 & P1.3 – Sound and Light**  *(Typically covered within 6 weeks, with 2 double lessons a fortnight)*   * 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** | **P2.3 – Motion and Pressure**  *(Typically covered within 5 weeks, with 2 double lessons a fortnight)*   * 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 ´ perpendicular distance from pivot | * P2.3 end-of-unit test * Year 7 end-of-year exam |

*N.B. Due to timetabling, the time of year in which the above topics are taught will vary between classes.*