



Year 10: Biology

Unit 1	Unit 2	Unit 3	Unit 4
B2 – Organisation Purpose: To understand how cells form systems in humans (digestive, respiratory, circulatory) and plants, and explore the underlying principles of health and disease. Knowledge and Understanding - Students describe the levels of organisation and the structure/function of the human digestive, circulatory (heart, blood, vessels), and respiratory systems. - They describe enzymes (action, lock & key, factors affecting rate) and the role of bile in digestion. - They describe the causes and evaluate treatments for common diseases (coronary heart disease, cancer) and the nature of risk factors. - They describe the structure and function of plant transport tissues (xylem, phloem, stomata) and how they relate to the leaf organ.	B3 – Infection & Response Purpose: To explore pathogens (cause/spread of disease) in animals/plants, the function of the human immune system, and medical interventions (vaccines, drugs, monoclonal antibodies). Knowledge and Understanding - Students explain what pathogens are, how they are spread, and how they cause damage, citing specific examples of viral, bacterial, protist, and fungal diseases. - They describe the body's defences, the role of the immune system (white blood cells), and how vaccination works (population level). - They describe how drugs are sourced and tested, and the use/limitations of antibiotics and painkillers. - They describe signs, ion deficiencies, and defence mechanisms against plant diseases.	B4 – Bioenergetics Purpose: To investigate the essential energy processes of photosynthesis (energy capture) and respiration (energy release) and their critical role in life. Knowledge and Understanding - Students describe photosynthesis (equation, endothermic, glucose use) and identify its limiting factors (light, CO₂, temperature). - They describe aerobic and anaerobic respiration (products, O₂ need, equations, fermentation). - They explain the physiological changes during exercise and the concepts of metabolism and the importance of synthesis/breakdown of organic molecules. Skills Developed - Conducting practical investigation into light intensity effects on photosynthesis (RP6). - Explaining how limiting factors affect rate (including graphical	B7 - Ecology Purpose: To explore species interactions, the recycling of energy and materials, and the impact of human activity on biodiversity and environmental sustainability. Knowledge and Understanding - Students recall what an ecosystem is, explaining interdependence, stable communities, and how abiotic/biotic factors affect them. - They describe competition, adaptations, and extremophiles. - They describe the carbon and water cycles. - They explain how human activities (population growth, pollution, deforestation) impact the environment, leading to loss of biodiversity and global warming. Bio ONLY: Students describe trophic levels, decomposers, factors affecting decay, and concepts of food security and improving food production efficiency.



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Skills Developed

- Performing practicals for food tests and enzyme pH effects (RP4, RP5).
- Explaining heart function, calculating blood flow rate, and evaluating disease treatments.
- Explaining the function and adaptation of plant transport systems and how transpiration rate is affected by environmental factors.

Skills Developed

- Explaining methods to reduce disease spread.
- **HT ONLY:** Describing the production, uses (diagnosis, research, treatment), and evaluating the advantages/disadvantages of monoclonal antibodies.

interpretation).

- Explaining the physiological response to exercise, including oxygen debt.
- **HT ONLY:** Explaining interacting limiting factors and their importance in greenhouse economics; explaining the fate of lactic acid.

Skills Developed

- Explaining competition and interpreting food chains and predator-prey cycles.
- Using quadrats and transects to measure population size (RP9).
- Evaluating the environmental impact of human activities and conservation programmes.
- **Bio ONLY:** Constructing pyramids of biomass, calculating energy transfer efficiency, and evaluating methods for improving food production and conserving fish stocks.

HT: Higher Tier

Assessment: All Units will be assessed using formative assessment in lessons along with midpoint and end of topic summative assessments.



Year 10: Chemistry				
Unit 1	Unit 2	Unit 3	Unit 4	Unit 5
C2 – Bonding, Structure & Properties of Matter Purpose: Use bonding and structure theories to explain the physical and chemical properties of materials, including molecular, giant, and novel structures. Knowledge and Understanding - Students describe ionic, covalent, and metallic bonds (electron transfer/sharing, electrostatic forces). - They describe the structure and limitations of diagrams for ionic compounds and covalently bonded substances (small molecules, polymers, giant structures). - They relate the properties of substances (melting/boiling points, conductivity) to their	C3 – Quantitative Chemistry Purpose: Use quantitative analysis to determine chemical formulae, reaction equations, purity, and yield by applying concepts of mass conservation and the mole. Knowledge and Understanding - Students state the principle of conservation of mass and use relative formula mass (M_r) to prove it in balanced equations. - They explain observed mass changes in non-enclosed systems. HT ONLY: They define and use the mole (mol) and Avogadro's constant, and calculate the masses of reactants and products. - They explain the effect of a limiting reactant. Chem ONLY: They define and calculate percentage	C4 – Chemical Changes Purpose: Understand the principles governing chemical changes (including redox, acids/bases, and electrolysis) to predict products and extract resources. Knowledge and Understanding - Students describe reactions of metals with oxygen/acids/water and use the reactivity series to predict displacement reactions and methods of metal extraction. - They define oxidation and reduction (O_2 transfer). - They explain how acids are neutralised (alkalis/bases/carbonates) and list the products (salts). - They describe the pH scale, defining acids and alkalis in terms of ions (H^+ and OH^-).	C5 – Energy Changes Purpose: Understand the principles governing chemical changes (including redox, acids/bases, and electrolysis) to predict products and extract resources. Knowledge and Understanding - Students describe reactions of metals with oxygen/acids/water and use the reactivity series to predict displacement reactions and methods of metal extraction. - They define oxidation and reduction (transfer). - They explain how acids are neutralised (alkalis/bases/carbonates) and list the products (salts). - They describe the scale, defining acids and alkalis in terms of ions - They describe electrolysis	C6 – Rate and Extent of Chemical Change Purpose: Determine the rate and yield of chemical reactions by investigating how different variables (concentration, temperature, catalyst) affect the reaction speed and the position of equilibrium. Knowledge and Understanding - Students describe how concentration, pressure, surface area, and temperature affect reaction rate. - They use collision theory to explain these changes, including the role of activation energy. - They describe the function of a catalyst and interpret reaction profiles for catalysed reactions. - They explain what a reversible reaction and a state of dynamic



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structure (ionic, simple molecular, metallic lattice, alloys, giant covalent). - They explain the structure and uses of carbon allotropes (diamond, graphite, graphene, fullerenes). Chem ONLY: They compare nanoparticle dimensions and discuss their applications based on large surface area to volume ratio. Skills Developed - Representing ionic and covalent bonding using dot and cross diagrams. - Working out the empirical formula of ionic compounds.	yield and atom economy and explain the choice of a reaction pathway. Skills Developed - Calculating the relative formula mass (M_r) of compounds. HT ONLY: Calculating the number of moles and the mass of solute in a given volume of solution. Chem & HT ONLY: Calculating solution concentration (mol/dm^3 and g/dm^3), performing titrations, and calculating the volume of gas at RTP.	- They describe electrolysis (electrolytes, electrodes) of molten ionic compounds and aqueous solutions. Skills Developed HT ONLY: Describing oxidation and reduction in terms of electron transfer and writing ionic equations for redox reactions. - Describing the preparation of a pure, dry salt (RP8). HT ONLY: Explaining the effect of concentration and strength on pH and writing half equations for electrode reactions.	(electrolytes, electrodes) of molten ionic compounds and aqueous solutions. Skills Developed - Recalling and describing reactions of common metals (to). HT ONLY: Describing oxidation and reduction in terms of electron transfer and writing ionic equations for redox reactions. - Describing the preparation of a pure, dry salt (RP8).	equilibrium are. - They recall that if a reaction is endothermic in one direction, it is exothermic in the reverse. Skills Developed - Calculating the rate of reaction and drawing/interpreting rate graphs. - Investigating how changes in concentration affect reaction rates (RP5). HT ONLY: Calculating the gradient of a tangent on a rate graph.
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HT: Higher Tier

Assessment: All Units will be assessed using formative assessment in lessons along with midpoint and end of topic summative assessments.



Year 10: Physics		
Unit 1	Unit 2	Unit 3
P2 – Electricity Purpose: To explore electric charge, the fundamental concepts of circuits (DC / AC), and power transmission {National Grid}, including the microstructure of materials, safety, and static electricity. Knowledge and Understanding - Students define current (flow of charge), potential difference {p.d.}, resistance ($V = IR$) - They describe the I-V characteristics, ohmic conductors, lamps, diodes, thermistors, LDRs. - They explain that in series, current is constant and resistance adds ($R_{\text{total}} = R_1 + R_2$); in parallel, p.d. is constant and total resistance decreases. - They explain the difference between direct (DC) and alternating current {AC}, identifying UK mains (~ 230 V) and three-core cable functions. - They explain power ($P = VI$ and $P = I^2R$) relates to energy transfer and appliance ratings. - They describe the National Grid and explain its efficiency (reducing current by increasing p.d.). PHY: benefits of producing static electricity, the forces between charged objects, and the concept of an electric field and its strength.	P3 – Particle Model of Matter Purpose: To apply the particle model to explain the behaviour and properties of solids, liquids, and gases, focusing on density, internal energy, heat transfer, and gas pressure. Knowledge and Understanding - Students use the particle model to explain the properties and density of different states of matter. - They recall the names of processes for state change and explain that change of state is reversible. - They state that internal energy is the total kinetic and potential energy of particles in a system. - They distinguish between specific heat capacity (energy for temperature change, $\Delta E = mc\Delta\theta$) and specific latent heat (energy for state change, $E = mL$). - They explain that gas molecules are random motion and that their collisions with the container walls cause pressure. HT ONLY: They explain the process of sublimation and why doing work on a gas causes an increase in internal energy and temperature.	P4 – Atomic Structure Purpose: To understand the structure of the atom, the nature of radioactivity (half-life, hazards), and the applications of ionising radiation in various fields. Knowledge and Understanding - Students describe the basic structure of an atom (protons, neutrons, electrons) and define isotopes and ions. - They describe how the atomic model has changed over time (Rutherford scattering, Chadwick). - They define radioactive activity (Bq) and half-life. - They describe and compare the penetration and ionising power of alpha, beta, and gamma radiation. - They compare the hazards of contamination and irradiation and outline suitable precautions. - They describe nuclear fission and nuclear fusion (PHY ONLY). PHY ONLY: They state the causes of background radiation (natural and man-made) and relate the hazard of a source to its half-life. Skills Developed - Completing balanced nuclear equations (atomic and mass numbers). HT ONLY: Determining half-life and calculating net decline.



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Skills Developed

- Drawing and interpreting circuit diagrams (symbols).
- Calculating charge ($Q = It$) and applying Ohm's law ($V = IR$).
- Investigating factors affecting resistance {I-V characteristics) RP3 and RP4.
- Calculating power ($P = VI$, $P = I^2R$) and electrical energy transferred ($E = P/t$, $E=QV$).
- Solving problems for circuits including resistors in series.

Skills Developed

- Calculation: Using the density equation ($\rho = m / V$)
- Calculation: Calculating the energy required for a temperature change ($\Delta E = mc\Delta\theta$) and the energy for a state change (specific latent heat, $E = mL$).
- Practical: Investigating the density of regular and irregular objects (RP5)

- **PHY ONLY:** Describing and evaluating the uses of nuclear radiation in medicine and evaluating associated risks.

HT: Higher Tier

Assessment: All Units will be assessed using formative assessment in lessons along with midpoint and end of topic summative assessments.