

Year 10- GCSE Biology

Starting study of KS4 Science in year 10, Biology revisits topics covered during KS3 and focusses on adding greater depth of detail to these ideas, linking them together and layering in the “working scientifically” content previously introduced in the experimental procedure topics of year 7 and 8. For example, photosynthesis was previously covered in year 8 and is now taken to a new level of detail by linking with cell biology (covered in year 9), and introducing new areas of study such as how to affect and measure the rate of photosynthesis. Similarly, we first introduced the concepts of diet and health in year 7, brought it into more detail in year 9 in the “Healthy lifestyle” topic. In KS4, we link these ideas to cell biology, multicellular organisms and the body’s defences against disease.

Topics covered from “KS4 Programme of Study”

Transport systems

- the need for transport systems in multicellular organisms, including plants
- the relationship between the structure and functions of the human circulatory system.

Health, disease and the development of medicines

- the relationship between health and disease
- communicable diseases including sexually transmitted infections in humans (including HIV/AIDs)
- non-communicable diseases
- bacteria, viruses and fungi as pathogens in animals and plants
- body defences against pathogens and the role of the immune system against disease
- reducing and preventing the spread of infectious diseases in animals and plants
- the process of discovery and development of new medicines
- the impact of lifestyle factors on the incidence of non-communicable diseases.

Photosynthesis

- photosynthesis as the key process for food production and therefore biomass for life
- the process of photosynthesis
- factors affecting the rate of photosynthesis.

Year 10- GCSE Chemistry

Starting study of KS4 Science in year 10, Chemistry revisits topics covered during KS3 and focusses on adding greater depth of detail to these ideas, linking them together and layering in the “working scientifically” content previously introduced in the experimental procedure topics of year 7 and 8. For example, Energy and chemical changes were first introduced in year 7 and during year 10 these are linked closely with the fundamentals of chemistry covered in year 9. During year 10, we add further levels of detail, such as calculating energy changes using bond energies, which would not have been possible in year 7 without the knowledge obtained in year 9 regarding chemical equations and bonding.

Topics covered from “KS4 Programme of Study”

Chemical changes

- determination of empirical formulae from the ratio of atoms of different kinds
- balanced chemical equations, ionic equations and state symbols
- identification of common gases
- the chemistry of acids; reactions with some metals and carbonates
- pH as a measure of hydrogen ion concentration and its numerical scale
- electrolysis of molten ionic liquids and aqueous ionic solutions
- reduction and oxidation in terms of loss or gain of oxygen.

Energy changes in chemistry

- Measurement of energy changes in chemical reactions (qualitative)
- Bond breaking, bond making, activation energy and reaction profiles (qualitative).

Rate and extent of chemical change

- factors that influence the rate of reaction: varying temperature or concentration, changing the surface area of a solid reactant or by adding a catalyst

Year 10- GCSE Physics

Starting study of KS4 Science in year 10, Physics revisits topics covered during KS3 and focusses on adding greater depth of detail to these ideas, linking them together and layering in the “working scientifically” content previously introduced in the experimental procedure topics of year 7 and 8. For example, the use of electricity and circuitry has been covered several times during KS3, most significantly in the “working in a lab” topic and in the year 8 physics content. Now in year 10, we introduce the concepts with greater emphasis on the mathematical techniques associated with the content, and then link it to its household applications.

Topics covered from “KS4 Programme of Study”

Energy

- renewable and non-renewable energy sources used on Earth, changes in how these are used.

Electricity

- measuring resistance using p.d. and current measurements
- exploring current, resistance and voltage relationships for different circuit elements; including their graphical representations
- quantity of charge flowing as the product of current and time
- drawing circuit diagrams; exploring equivalent resistance for resistors in series
- the domestic a.c. supply; live, neutral and earth mains wires, safety measures
- power transfer related to p.d. and current, or current and resistance.

The structure of matter

- relating models of arrangements and motions of the molecules in solid, liquid and gas phases to their densities
- melting, evaporation, and sublimation as reversible changes
- calculating energy changes involved on heating, using specific heat capacity; and those involved in changes of state, using specific latent heat

- links between pressure and temperature of a gas at constant volume, related to the motion of its particles (qualitative).

Atomic structure

- the nuclear model and its development in the light of changing evidence
- masses and sizes of nuclei, atoms and small molecules
- differences in numbers of protons, and neutrons related to masses and identities of nuclei, isotope characteristics and equations to represent changes
- ionisation; absorption or emission of radiation related to changes in electron orbits
- radioactive nuclei: emission of alpha or beta particles, neutrons, or gamma- rays, related to changes in the nuclear mass and/or charge
- radioactive materials, half-life, irradiation, contamination and their associated hazardous effects, waste disposal
- nuclear fission, nuclear fusion and our Sun's energy

Forces

- forces and fields: electrostatic, magnetic, gravity
- forces as vectors
- calculating work done as force x distance; elastic and inelastic stretching
- pressure in fluids acts in all directions: variation in Earth's atmosphere with height, with depth for liquids, up-thrust force (qualitative).