

Curriculum Summary - Biology (Year 11)

Autumn

B10: The human nervous system

In this chapter students will study the principles of homeostasis and will be able to give some examples and outline the control system involved. They will be able to link this work with studies on enzyme action in B3.2 *The human digestive system* and B3.4 *Catalysts and enzymes*. Students will recall details of the human nervous system and its structure and function. They will be able to link this with work on nerve cells in B1.4 *Specialisation in animal cells*. They will be able to describe a reflex arc, with detail of synaptic transmission. Students will appreciate that receptors detect a change in a stimulus and not the stimulus itself. They will also be able to describe an electrical impulse accurately.

B11: Hormonal control

In this chapter students will study the principles of hormonal control and the endocrine system. They will be able to identify the main parts of the endocrine system and recall the hormones they produce. Students will recall how blood-glucose concentration is controlled, including the role of insulin. Higher-tier students will also be able to explain the role of glucagon, and clearly distinguish between glucose, glycogen, and glucagon. All students will be aware of the causes and treatments of both type 1 and type 2 diabetes. They will be able to link this with work in B2.3 *Stem cells* and with the effect of lifestyle on type 2 diabetes in B7.4 *Diet, exercise, and disease*.

Higher-tier students will learn about the process of negative feedback, particularly as applied to the hormones adrenaline and thyroxine. All students will study hormones in human reproduction. They will recall the action of hormones in bringing about puberty. They will be aware of the role of oestrogen in the menstrual cycle in females, and of testosterone in males.

Higher-tier students will have a more detailed understanding of how hormones interact to control the menstrual cycle. Students will be able to understand how hormones are used in the control of fertility as applied to contraception, and for higher-tier students, to infertility treatments.

B13: Reproduction

This chapter on reproduction includes some content for students studying GCSE Biology only, as well as some higher-tier content. All students will be able to outline asexual and sexual reproduction, and will be aware of the importance of meiosis, fertilisation, and variation in sexual reproduction. They will be able to link this with work on chromosomes and mitosis and the cell cycle in B2 *Cell division*.

All students will study DNA and its role in inheritance. They will be aware of the genetic code and genomes, including how the data produced by genome research can be used. *AQA GCSE Biology* students will be able to outline DNA structure, with higher-tier students recalling the detailed structure of DNA and studying protein synthesis, including how the genetic code is used to assemble amino acids into proteins.

All students will study inheritance and will be able to use genetic terms and set out a genetic cross with the use of a Punnett square. They will be able to predict ratios of different phenotypes and apply this to sex determination and family trees. Students will be able to describe the inheritance of genetic disorders as applied to polydactyly and cystic fibrosis. They will be aware of developments in genetic engineering with the aim of curing genetic disorders.

Finally, students will be able to discuss screening for genetic disorders and the implications of using this technology.

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Spring

B14: Variation

All students will be able to discuss the causes of variation in terms of genetic, environmental, or a combination of both. They will be able to link environmental variation with the effect of alcohol on a fetus in B7.5 *Alcohol and other carcinogens*.

Students will learn about evolution by natural selection. Students will understand the role of mutation in variation, understand the theory of evolution by survival of the fittest and natural selection, and be able to give examples. They will also be able to link this with previous studies on sexual reproduction and meiosis in B12.2 *Cell division in sexual reproduction*.

Students will study the process of selective breeding. They will understand this as an example of artificial selection and be aware of its limitations. In studying genetic engineering, all students will understand what is meant by the term and be able to give examples of its use and consider the potential benefits and problems. They will be able to link this with work on diabetes treatment using human insulin in B11.3 *Treating diabetes*, and with the treatment of cystic fibrosis in B12.6 *Inherited disorders*. Higher-tier students will be able to recall the steps involved in the process of genetic engineering.

B15: Genetics and evolution

All students will be aware of evidence for evolution, including the fossil record and reasons for extinction. They will be able to describe antibiotic resistant bacteria and their fast evolution, in particular the problem of MRSA. They will be able to link this with work in B6 *Preventing and treating disease* on antibiotics and the discovery and development of drugs.

Finally, all students will understand how living organisms are classified. They will be able to recall the natural system designed by Linnaeus and be able to give the rules of the binomial system of naming living things. They will be familiar with the three-domain system developed in the light of recent technological advances. They should link this with B1.3 *Eukaryotic and prokaryotic cells*.

B16: Adaptations, interdependence and competition

In this chapter students will study communities, environments, adaptations, and competition. There are several ecological terms including community, population, habitat, ecosystem, abiotic factor, and biotic factor, and students will be able to recall the precise meaning of each.

Students will understand the importance of communities including the interdependence of all the species present and be able to give real examples to illustrate interdependence. In studying organisms in their environments, students will be able to recall the effects of abiotic and biotic factors on populations. They will link this with the importance of temperature and pH on the action of enzymes in the B3 topic *Organisation and the digestive system*. Students will measure the distribution of organisms with quadrats and transects and carry out a practical to investigate the population size of a common species in a habitat.

Students will study competition in animals and plants and will recall what factors they compete for and how they compete, and how they become successful in their environments. Students will understand how organisms are adapted to survive in many different conditions. They will be able to give examples of the ways in which animals and plants are adapted to their environments. In studying animals in cold climates students will be able to make the link to surface area to volume ratio in their work on diffusion in B1 *Cells and organisation*.

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Summer

B17: Organising an ecosystem

In this chapter students will study how feeding relationships are represented in food chains. They will understand the importance of photosynthesis in feeding relationships, linking with work in B8 *Photosynthesis*. They will be able to recall the main feeding relationships within a community and understand how the numbers of predators and prey are inter-related, including interpreting predator–prey population graphs.

Students will learn about mineral cycling and the microbes involved. They will understand how materials are recycled through the abiotic and biotic components of an ecosystem, and the importance of decay. They will be able to link this with the main chemicals that make up cells in B1.2 *Animal and plant cells*, respiration in B9 *Respiration*, and transpiration in B4.8 *Evaporation and transpiration*.

Students will study the water cycle and should recall the main stages of condensation, precipitation, evaporation, transpiration, and respiration. They will understand what the carbon cycle is and recall the processes that remove carbon dioxide from the atmosphere and return it again. They will also understand the role of microbes in the carbon cycle as carrying out respiration to release carbon dioxide.

B18: Biodiversity and ecosystems

In this chapter students will study biodiversity and ecosystems, starting with the reasons for and the effects of the human population explosion. Students will understand the effect of different types of pollution including land, water, and air pollution.

Students will be able to outline the processes of deforestation and peat destruction. They will be able to link this with how materials are cycled in B16.3 *The carbon cycle*. Students should understand what is meant by the greenhouse effect, global warming, and its predicted effects. Students should be able to distinguish greenhouse gases from those that cause acid rain.

On the topic of maintaining biodiversity, all students should understand how waste, deforestation, and global warming affect biodiversity, and be able to give examples of some of the actions being taken to stop the reduction in biodiversity. GCSE Biology students have studied trophic levels, how biomass is transferred from one trophic level to the next, pyramids of biomass, and the efficiency of this energy transfer. They have also studied some of the factors that affect global food security. They should be able to outline ways of improving the efficiency of food production, discuss the ethics of factory farming, and understand the concept of sustainable food production with a focus on fisheries.