

Year 10 Biology Learning Outcomes

Unit 4: Bioenergetics

Unit 4.1: Photosynthesis

- Describe photosynthesis as an endothermic reaction in which energy is transferred from the environment to the chloroplasts by light.
- Explain the effects of temperature, light intensity, carbon dioxide concentration and the amount of chlorophyll on the rate of photosynthesis.
- Investigate the effect of light intensity on the rate of photosynthesis using an aquatic organism such as pondweed.
- Describe all the ways plants use the glucose made in photosynthesis.
- Use data to relate limiting factors to the cost effectiveness of adding heat, light or carbon dioxide to greenhouses.

Unit 4.2: Respiration

- Describe cellular respiration as an exothermic reaction which is continuously occurring in living cells.
- Investigate the effect of exercise on the body.
- Compare anaerobic respiration in humans with that in plants and yeast.
- Explain metabolism – the sum of all reactions in a cell or the body.

Unit 5: Homeostasis & Response

Unit 5.1: Nervous System

- Explain that homeostasis is the regulation of the internal conditions of a cell or organism.
- Plan and carry out an investigation into the effect of a factor on human reaction time.
- Explain how the structure of the nervous system is adapted to its functions.
- Explain how the various structures in a reflex arc relate to their function and understand why reflex actions are important.
- Identify cerebral cortex, cerebellum and medulla and describe their functions.
- Relate the structures of the eye to their functions.
- Explain focusing in the eye (accommodation) and common defects of the eye.

Unit 5.2: Hormonal Control

- Describe the principles of hormonal coordination and control by the human endocrine system.
- Identify positions of 6 key organs and glands.
- Explain how insulin controls blood glucose (sugar) levels in the body.
- Explain what diabetes is and how diabetes can be treated.

- Explain the roles of thyroxine and adrenaline in the body.
- Describe the roles of hormones in human reproduction, including the menstrual cycle.
- Explain the interactions of FSH, oestrogen, LH and progesterone, in the control of the menstrual cycle, by extracting and interpreting data.
- Evaluate the different hormonal and non-hormonal methods of contraception.
- Explain the use of hormones in modern reproductive technologies to treat infertility.
- Describe the effects of some plant hormones and the different ways people use them to control plant growth.
- Investigate the effect of light or gravity on the growth of newly germinated seedlings.

Unit 5.3: Homeostasis

- Explain how vasodilation and vasoconstriction lower or raise body temperature
- Explain the effect on cells of osmotic changes in body fluids.
- Describe the function of kidneys in maintaining the water balance of the body
- Describe the basic principles of dialysis.
- Use economic, social, and ethical arguments to evaluate treating kidney failure by dialysis or kidney transplant.

Unit 6: Reproduction, Variation & Evolution

Unit 6.1: Reproduction

- Describe the differences in asexual and sexual reproduction in terms of number of gametes involved, variation and chromosome number.
- Understand that meiosis leads to non-identical cells being formed while mitosis leads to identical cells being formed.
- Suggest and explain the advantages and disadvantages of organisms using both asexual and sexual reproduction.
- Discuss the benefits of studying the human genome and describe the structure of DNA.
- Relate the structure of DNA to its function.
- Explain how DNA controls protein synthesis.
- Evaluate the impact of mutations on gene expression.
- Complete a Punnett square diagram and extract and interpret information from genetic crosses and family trees.
- Evaluate how polydactyly and cystic fibrosis disorders are inherited.
- Evaluate embryo screening for genetic diseases.

Unit 6.2: Variation and Evolution

- Describe simply how the genome and its interaction with the environment influence the development of the phenotype of an organism.
- Describe how the inherited characteristics of a population over time through a process of natural selection may result in the change of a species.
- Explain how selective breeding happens and the impact of selective breeding of food plants and domesticated animals.
- Describe the process of genetic engineering to give a desired characteristic.
- Explain the potential benefits and risks of genetic engineering in agriculture and in medicine and that some people have objections.

- Explain how animals and plants can be cloned.
- Describe the process involved in adult cell cloning and the benefits and risks associated with it.
- Explain the potential benefits and risks of cloning in agriculture and in medicine and why people have ethical objections to cloning.

Unit 6.3: Genetics and Variation

- Describe the development of our understanding of genetics including the work of Mendel and understand why the importance of Mendel's discovery was not recognised until after his death.
- Appreciate that the theory of evolution by natural selection developed over time and from information gathered by many scientists.
- Explain Darwin's theory of evolution and explain why it was not accepted straight away.
- Describe the steps which give rise to new species, linking this to Darwin and Wallace's theories.
- Explain how fossils are formed and what we can learn from them.
- Describe factors which may contribute to the extinction of a species.
- Explain how bacteria become antibiotic resistant and what we can do to reduce the spread of antibiotic resistant bacteria.
- Describe the Linnaean system of classification and describe the impact of developments in biology on classification systems.