**GCSE Biology**

**Paper 1BI0/1F FOUNDATION**

Topics not assessed in this paper:

**• Topic 1 Key concepts in biology – microscopy (1.4–1.6) \*\*MAY STILL BE ON PAPER2\*\***

1.4 Demonstrate an understanding of number, size and scale, including the use of estimations and explain when they should be used

1.5 Demonstrate an understanding of the relationship between quantitative units in relation to cells, including:

a milli (10−3) b micro (10−6) c nano (10−9) d pico (10−12)

e calculations with numbers written in standard form

1.6 Core Practical: Investigate biological specimens using microscopes, including magnification calculations and labelled scientific drawings from observations

**• Topic 1 Key concepts in biology – osmosis (1.16–1.17) \*\*MAY STILL BE ON PAPER2\*\***

1.16 Core Practical: Investigate osmosis in potatoes 1c

1.17 Calculate percentage gain and loss of mass in osmosis

• **Topic 3 Genetics – proteins (3.7B–3.11B)**

3.7B Explain how the order of bases in a section of DNA decides the order of amino acids in the protein and that these fold to produce specifically shaped proteins such as enzymes

3.8B Describe the stages of protein synthesis, including transcription and translation:

a RNA polymerase binds to non-coding DNA located in front of a gene

b RNA polymerase produces a complementary mRNA strand from the coding DNA of the gene

c the attachment of the mRNA to the ribosome

d the coding by triplets of bases (codons) in the mRNA for specific amino acids

e the transfer of amino acids to the ribosome by tRNA

f the linking of amino acids to form polypeptides

3.9B Describe how genetic variants in the non-coding DNA of a gene can affect phenotype by influencing the binding of RNA polymerase and altering the quantity of protein produced

3.10B Describe how genetic variants in the coding DNA of a gene can affect phenotype by altering the sequence of amino acids and therefore the activity of the protein produced

3.11B Describe the work of Mendel in discovering the basis of genetics and recognise the difficulties of understanding inheritance before the mechanism was discovered

**• Topic 3 Genetics – inheritance (3.17B–3.23)**

3.17B Describe the inheritance of the ABO blood groups with reference to codominance and multiple alleles

3.18B Explain how sex-linked genetic disorders are inherited

3.19 State that most phenotypic features are the result of multiple genes rather than single gene inheritance

3.20 Describe the causes of variation that influence phenotype,including:

a genetic variation – different characteristics as a result of mutation and sexual reproduction

b environmental variation – different characteristics caused by an organism’s environment (acquired characteristics)

3.21 Discuss the outcomes of the Human Genome Project and its potential applications within medicine

3.22 State that there is usually extensive genetic variation within a population of a species and that these arise through mutations

3.23 State that most genetic mutations have no effect on the phenotype, some mutations have a small effect on thephenotype and, rarely, a single mutation will significantly affect the phenotype

• **Topic 4 Natural selection and genetic modification – genetic engineering (4.9B–4.14)**

4.9B Describe the process of tissue culture and its advantages in medical research and plant breeding programmes

4.10 Describe genetic engineering as a process which involves modifying the genome of an organism to introduce desirable characteristics

4.11 Describe the main stages of genetic engineering including the use of:

a restriction enzymes b ligase c sticky ends d vectors

4.12B Explain the advantages and disadvantages of genetic engineering to produce GM organisms including the modification of crop plants, including the introduction of genes for insect resistance from Bacillus thuringiensis into crop plants

4.13B Explain the advantages and disadvantages of agricultural solutions to the demands of a growing human population,including use of fertilisers and biological control

4.14 Evaluate the benefits and risks of genetic engineering and selective breeding in modern agriculture and medicine,including practical and ethical implications

**• Topic 5 Health, disease, and the development of medicines – plant defences (5.9B–5.10B)**

5.9B Describe how some plants defend themselves against attack from pests and pathogens by physical barriers, including the leaf cuticle and cell wall

5.10B Describe how plants defend themselves against attack from pests and pathogens by producing chemicals, some of which can be used to treat human diseases or relieve symptoms

**• Topic 5 Health, disease, and the development of medicines – microbial cultures (5.17B–5.20)**

5.17B Explain the aseptic techniques used in culturing microorganisms in the laboratory, including the use of an autoclave to prepare sterile growth medium and petri dishes, the use of sterile inoculating loops to transfer microorganisms and the need to keep petri dishes and culture vials covered

5.18B Core Practical: Investigate the effects of antiseptics, antibiotics or plant extracts on microbial cultures

5.19B Calculate cross-sectional areas of bacterial cultures and clear agar jelly using πr2

5.20 Describe that the process of developing new medicines, including antibiotics, has many stages, including discovery, development, preclinical and clinical testing

**Paper 1BI0/2F FOUNDATION**

Topics not assessed in this paper:

**• Topic 1 Key concepts in biology – enzymes (1.7–1.12**) **\*\*MAY STILL BE ON PAPER1\*\***

1.7 Explain the mechanism of enzyme action including the active site and enzyme specificity

1.8 Explain how enzymes can be denatured due to changes in the shape of the active site

1.9 Explain the effects of temperature, substrate concentration and pH on enzyme activity

1.10 Core Practical: Investigate the effect of pH on enzyme activity 2c, 2f

1.11 Demonstrate an understanding of rate calculations for enzyme activity

1.12 Explain the importance of enzymes as biological catalysts in the synthesis of carbohydrates, proteins and lipids and their breakdown into sugars, amino acids and fatty acids and glycerol

**• Topic 6 Plant structures and their functions – plant hormones (6.14B–6.15B)**

6.14B Explain how plants are adapted to survive in extreme environments including the effect of leaf size and shape, the cuticle and stomata

6.15B Explain how plant hormones control and coordinate plant growth and development, including the role of auxins in phototropisms and gravitropisms

**• Topic 7 Animal coordination, control, and homeostasis – hormones (7.1–7.7)**

7.1 Describe where hormones are produced and how they are transported from endocrine glands to their target organs,including the pituitary gland, thyroid gland, pancreas, adrenal glands, ovaries and testes

7.2 Explain that adrenalin is produced by the adrenal glands to prepare the body for fight or flight, including:

a increased heart rate

b increased blood pressure

c increased blood flow to the muscles

d raised blood sugar levels by stimulating the liver to change glycogen into glucose

7.3 Explain how thyroxine controls metabolic rate as an example of negative feedback, including:

a low levels of thyroxine stimulates production of TRH in hypothalamus

b this causes release of TSH from the pituitary gland

c TSH acts on the thyroid to produce thyroxine

d when thyroxine levels are normal thyroxine inhibits

the release of TRH and the production of TSH

7.4 Describe the stages of the menstrual cycle, including the roles of the hormones oestrogen and progesterone, in the control of the menstrual cycle

7.5 Explain the interactions of oestrogen, progesterone, FSH and LH in the control of the menstrual cycle, including the repair and maintenance of the uterus wall, ovulation and menstruation

7.6 Explain how hormonal contraception influences the menstrual cycle and prevents pregnancy

7.7 Evaluate hormonal and barrier methods of contraception

**• Topic 7 Animal coordination, control, and homeostasis – diabetes (7.13–7.17)**

7.13 Explain how the hormone insulin controls blood glucose concentration

7.14 Explain how blood glucose concentration is regulated by glucagon

7.15 Explain the cause of type 1 diabetes and how it is controlled

7.16 Explain the cause of type 2 diabetes and how it is controlled

7.17 Evaluate the correlation between body mass and type 2

diabetes including waist:hip calculations and BMI, using the

BMI equation

**• Topic 8 Exchange and transport in animals – diffusion (8.3–8.5B)**

8.3 Explain how alveoli are adapted for gas exchange by diffusion between air in the lungs and blood in capillaries

8.4B Describe the factors affecting the rate of diffusion, including surface area, concentration gradient and diffusion distance

8.5B Calculate the rate of diffusion using Fick’s law

**• Topic 8 Exchange and transport in animals – respiration (8.10–8.12)**

8.10 Compare the process of aerobic respiration with the process of anaerobic respiration

8.11 Core Practical: Investigate the rate of respiration in living organisms

8.12 Calculate heart rate, stroke volume and cardiac output, using the equation

cardiac output = stroke volume × heart rate

**• Topic 9 Ecosystems and material cycles – communities (9.1–9.6)**

9.1 Describe the different levels of organisation from individual organisms, populations, communities, to the whole ecosystem

9.2 Explain how communities can be affected by abiotic and biotic factors, including:

a temperature, light, water, pollutants

b competition, predation

9.3 Describe the importance of interdependence in a community

9.4 Describe how the survival of some organisms is dependent on other species, including parasitism and mutualism

9.5 Core Practical: Investigate the relationship between organisms and their environment using field-work techniques, including quadrats and belt transects

9.6 Explain how to determine the number of organisms in a given area using raw data from field-work techniques, including quadrats and belt transects