**GCSE Biology**

**Paper 1 HIGHER**

Topics not assessed in this paper:

**• Topic 1 Key concepts in biology – transport into and out of cells (1.13B–1.17) \*\*MAY STILL BE ON PAPER 2\***

1.13B Core Practical: Investigate the use of chemical reagents to identify starch, reducing sugars, proteins and fats

1.14B Explain how the energy contained in food can be measured using calorimetry

1.15 Explain how substances are transported into and out of cells, including by diffusion, osmosis and active transport

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–3.10B)**

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

**• Topic 3 Genetics – genetic disorders and mutations (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 1c

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 of plants**

**(4.12B–4.14)**

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 – defence against disease (5.9B–5.15B)**

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

5.11B Describe different ways plant diseases can be detected and identified, in the lab and in the field including the elimination of possible environmental causes, distribution analysis of affected plants, observation of visible symptoms and diagnostic testing to identify pathogens

5.12 Describe how the physical barriers and chemical defences of the human body provide protection from pathogens, including:

a physical barriers, including mucus, cilia and skin

b chemical defence, including lysozymes and hydrochloric acid

5.13 Explain the role of the specific immune system of the human body in defence against disease, including:

a exposure to pathogen

b the antigens trigger an immune response which causes the

production of antibodies

c the antigens also trigger production of memory

lymphocytes

d the role of memory lymphocytes in the secondary response

to the antigen

5.14 Explain the body’s response to immunisation using an inactive form of a pathogen

5.15B Discuss the advantages and disadvantages of immunisation, including the concept of herd immunity

**• Topic 5 Health, disease, and the development of medicines – monoclonal antibodies (5.21B–5.23)**

5.21B Describe the production of monoclonal antibodies, including:

a use of lymphocytes which produce desired antibodies but do not divide

b production of hybridoma cells

c hybridoma cells produce antibodies as they divide

5.22B Explain the use of monoclonal antibodies, including:

a in pregnancy testing

b in diagnosis including locating the position of blood clots and cancer cells and in treatment of diseases including cancer

c the advantages of using monoclonal antibodies to target specific cells compared to drug and

radiotherapy treatments

5.23 Describe that many non-communicable human diseases are caused by the interaction of a number of factors, including cardiovascular diseases, many forms of cancer, some lung and liver diseases and diseases influenced by nutrition

**GCSE Biology Paper 2 HIGHER**

**Topics not assessed in this paper:**

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

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

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 1 Key concepts in biology – transport into and out of cells (1.14B–1.17) ) \*\*MAY STILL BE ON PAPER 1**

1.14B Explain how the energy contained in food can be measured using calorimetry

1.15 Explain how substances are transported into and out of cells, including by diffusion, osmosis and active transport

1.16 Core Practical: Investigate osmosis in potatoes 1c

1.17 Calculate percentage gain and loss of mass in osmosis

**• Topic 6 Plant structures and their functions – limiting factors on photosynthesis (6.3–6.6)**

6.3 Explain the effect of temperature, light intensity and carbon dioxide concentration as limiting factors on the rate of photosynthesis

6.4 Explain the interactions of temperature, light intensity and carbon dioxide concentration in limiting the rate of photosynthesis

6.5 Core Practical: Investigate the effect of light intensity on the rate of photosynthesis

6.6 Explain how the rate of photosynthesis is directly proportional to light intensity and inversely proportional to the distance from a light source, including the use of the inverse square law calculation

**• Topic 9 Ecosystems and material cycles – communities (9.1–9.3)**

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