Combined Science (Biology)

**Paper 1SC0/1BF Biology Foundation Paper 1**

**Topics not assessed in this paper:**

• **Topic 1 Key concepts in biology – microscopy (1.4–1.6) \*\*TOPICS MAY BE ON PAPER 2\***

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) \*\*TOPICS MAY BE ON PAPER 2\***

1.16 Core Practical: Investigate osmosis in potatoes 1c

1.17 Calculate percentage gain and loss of mass in osmosis

**• Topic 3 Genetics – inheritance (3.19–3.23)**

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 the phenotype and, rarely, a single mutation will significantly affect the phenotype

**• Topic 4 Natural selection and genetic modification – genetic engineering (4.10–4.14)**

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

4.14 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 – new medicines (5.20)**

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

**Paper 1SC0/2BF Biology Foundation Paper 2**

**Topics not assessed in this paper:**

**• Topic 1 Key concepts in biology – enzymes (1.7–1.12) \*\*TOPICS MAY 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 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 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 – 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