MARK SCHEME

AQA GCSE Biology · Paper 2: Homeostasis & Response, Inheritance, Variation & Evolution, Ecology

Foundation Tier — Separate Science · Total: 100 marks

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This mark scheme is designed for use by examiners. Alternative correct answers should be accepted. Marks in brackets [1] indicate one mark. Points separated by / indicate alternatives. Underlined words are essential. ★ indicates Higher Tier only marks.

Question 1 [4 marks]

(a) [1 mark]

Which hormone lowers blood glucose concentration after a meal?

• C. Insulin [1]

(b) [1 mark]

Which of the following correctly describes osmosis?

• C. Movement of water from high to low water potential through a partially permeable membrane [1]

(c) [1 mark]

What is the role of decomposers in the carbon cycle?

• B. They break down dead organisms, releasing CO■ [1]

(d) [1 mark]

Which of the following is a recessive genetic disorder?

• B. Cystic fibrosis [1]

Total for question 1: 4

Question 2 [7 marks]

The nervous system allows the body to respond to changes in the environment.

(a) [3 marks]

Name the THREE types of neurone in a reflex arc and state the function of each.

• Sensory neurone: carries impulse from receptor to CNS [1]

• Relay neurone: carries impulse within the CNS/spinal cord [1]

• Motor neurone: carries impulse from CNS to effector [1]

(b) [2 marks]

A reflex action is faster than a voluntary action. Explain why.

• Reflex arc does not involve the brain / signal travels through spinal cord only [1]

• Shorter neural pathway / fewer synapses → faster response time [1]

(c) [2 marks]

State the role of a synapse in the nervous system.

• A synapse is a gap between two neurones where the signal crosses [1]

• Chemical neurotransmitters carry the signal across the synaptic cleft from one neurone to the next [1]

Total for question 2: 7

Question 3 [7 marks]

The pancreas controls blood glucose concentration through the release of hormones.

(a) [4 marks]

Describe what happens in the body after blood glucose concentration rises following a meal. Name the…

- Beta cells in the pancreas detect the rise in blood glucose [1]
- Insulin is released into the blood [1]
- Insulin causes cells to take up glucose from the blood [1]
- Liver converts excess glucose to glycogen for storage → blood glucose falls [1]

(b) [3 marks]

Compare Type 1 and Type 2 diabetes. Give TWO differences.

- Type 1: no insulin produced (beta cells destroyed) vs Type 2: insulin produced but cells resistant to it [1]
- Type 1 treated with insulin injections vs Type 2 managed with diet and exercise [1]
- Type 1 is autoimmune in cause vs Type 2 is linked to lifestyle/obesity [1] — any two differences

Total for question 3: 7

Question 4 [6 marks]

Cystic fibrosis is an inherited disorder caused by a recessive allele (f).

(a) [1 mark]

What does the term "recessive allele" mean?

- An allele that is only expressed (shown) when two copies are present (homozygous recessive, ff) [1]

(b) [3 marks]

Two carrier parents (Ff × Ff) have a child. Draw a Punnett square and calculate the probability that…

- Parental gametes shown (F and f for each parent) [1]
- Punnett square: FF, Ff, Ff, ff all correct [1]
- 25% / 1 in 4 probability of cystic fibrosis (ff) [1]

(c) [2 marks]

A carrier of cystic fibrosis does not show any symptoms. Explain why.

- Carriers are heterozygous (Ff) [1]
- The dominant normal allele (F) masks the recessive cystic fibrosis allele (f) [1]

Total for question 4: 6

Question 5 [7 marks]

Evolution is the change in inherited characteristics of a population over many generations.

(a) [5 marks]

Describe how natural selection leads to a population becoming better adapted to its environment over…

- Variation exists in the population due to mutations [1]
- Some individuals have characteristics that make them better suited to the environment [1]
- Better-adapted individuals are more likely to survive and reproduce [1]
- They pass on the beneficial alleles to their offspring (inheritance) [1]
- Over many generations, the frequency of beneficial alleles increases in the population [1]

(b) [2 marks]

Give TWO types of evidence that scientists use to support the theory of evolution.

- Fossil record (shows gradual change in species over time) [1]
- DNA evidence (related species have similar DNA sequences) [1] — accept antibiotic resistance / comparative anatomy

Total for question 5: 7

Question 6 [10 marks]

A woodland ecosystem contains plants, rabbits and foxes.

(a) [1 mark]

Write a food chain for the woodland ecosystem. Use the organisms listed above.

• Plants → rabbits → foxes [1] (arrows in correct direction)

(b) [3 marks]

The fox population in the woodland increases. Predict and explain what will happen to the rabbit pop…

• Rabbit population will decrease [1]

• More foxes → more predation of rabbits [1]

• Eventually fox population may also decrease as food (rabbit) becomes scarce [1]

(c) [3 marks]

Explain the role of decomposers in a woodland ecosystem.

• Decomposers (bacteria and fungi) break down dead organisms and waste [1]

• They release carbon dioxide back into the atmosphere through respiration [1]

• They release mineral ions back into the soil, which can be taken up by plants [1]

(d) [3 marks]

State THREE consequences of deforestation for the environment.

• Habitat destruction → loss of biodiversity / extinction of species [1]

• Release of CO■ into atmosphere → contributes to global warming / climate change [1]

• Soil erosion / disruption of water cycle / reduced rainfall [1]

Total for question 6: 10

Question 7 [6 marks]

(a) [6 marks]

Describe how the body maintains a constant core temperature. Include in your answer what happens whe…

• Hypothalamus detects changes in blood temperature and coordinates responses [1]

• Too hot: sweat glands produce sweat — evaporation removes heat from body [1]

• Too hot: vasodilation — blood vessels near skin surface widen — more heat lost by radiation [1]

• Too hot: hairs lie flat — less insulating air layer — more heat lost [1]

• Too cold: shivering — rapid muscle contractions generate heat [1]

• Too cold: vasoconstriction — blood vessels near skin narrow — less heat lost by radiation [1]

Total for question 7: 6
