AQA GCSE Biology

Paper 2: Homeostasis & Response, Inheritance, Variation & Evolution, Ecology

Higher Tier — Separate Science · Time: 1 hour 45 minutes · Total: 100 marks

Higher Tier — Separate Science

Name:	
Centre number:	**Candidate number:**

- Answer **ALL** questions.
- Use black ink or black ball-point pen.
- Write your answers in the spaces provided.
- The marks for questions are shown in brackets.
- Total marks: 100
- Questions marked ★ are Higher Tier only.

Question 1

(a) Which hormone is released by alpha cells in the pancreas when blood glucose falls?

[1 mark]

Tick **ONE** box.

- ☐ A. Insulin
- ☐ B. Glucagon
- ☐ C. Adrenaline
- ☐ D. Oestrogen

(b) Which of the following correctly describes natural selection?

[1 mark]

Tick **ONE** box.

- ☐ A. Organisms change their genes to adapt to the environment
- ☐ B. Organisms with advantageous mutations survive and reproduce more
- ☐ C. Organisms deliberately change to become better suited
- ☐ D. All organisms in a population become identical over time

(c) Which process in the nitrogen cycle converts nitrates back into nitrogen gas?

[1 mark]

Tick **ONE** box.

- ☐ A. Nitrogen fixation
- ☐ B. Nitrification
- ☐ C. Denitrification

☐ D. Decomposition

(d) A cross between two heterozygous parents (Aa × Aa) is expected to produce offspring in which ratio of dominant to recessive phenotype?

[1 mark]

Tick **ONE** box.

☐ A. 1:1

☐ B. 1:3

☐ C. 3:1

☐ D. 2:1

Total for Question 1 ☐

Question 2

The diagram below shows a reflex arc.

(a) Describe the sequence of events in a reflex arc when a person touches a hot surface. Name the types of neurone in the correct order.

[3 marks]

(b) Explain how a nerve impulse is transmitted across a synapse.

[3 marks]

★ Higher Tier

(c) ★ Explain why signals at a synapse can only travel in one direction.

[2 marks]

Total for Question 2

Question 3

Type 1 and Type 2 diabetes are both conditions affecting blood glucose control but have different causes and treatments.

(a) Describe how blood glucose concentration is restored to normal when it rises above the set point after a meal. Use the terms insulin, glycogen and negative feedback.

[4 marks]

(b) Compare Type 1 and Type 2 diabetes in terms of cause, mechanism and treatment.

[4 marks]

★ **Higher Tier**

(c) ★ Explain why blood glucose control is described as a negative feedback system. Use the role of glucagon in your answer.

[2 marks]

Total for Question 3

Question 4

Figure 2 shows the concentrations of four hormones during the menstrual cycle.

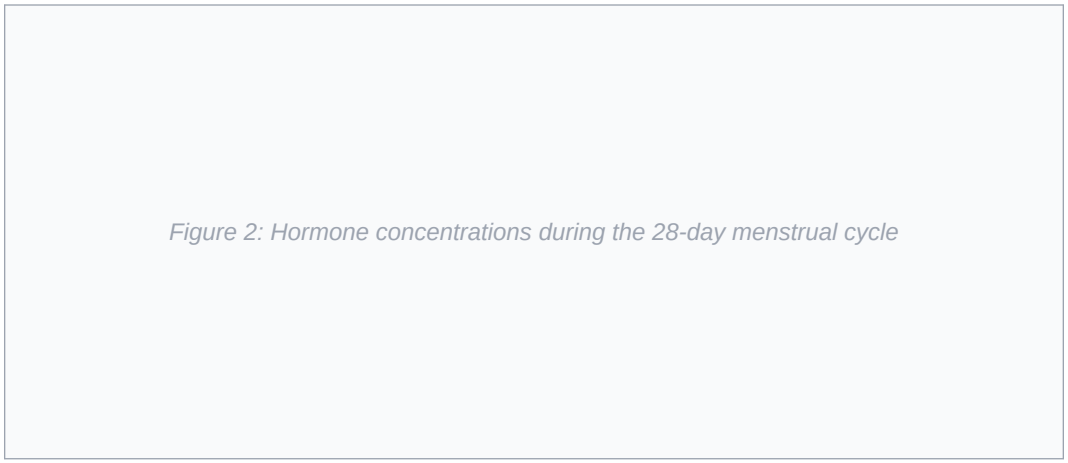

Figure 2: Hormone concentrations during the 28-day menstrual cycle

(a) Describe the roles of FSH, oestrogen, LH and progesterone in controlling the menstrual cycle.

[4 marks]

(b) Explain how the combined oral contraceptive pill prevents pregnancy.

[3 marks]

★ Higher Tier

(c) ★ Describe the process of IVF. Evaluate ONE advantage and ONE limitation.

[3 marks]

Total for Question 4

Question 5

This question is about inheritance in humans.

(a) Polydactyly (extra digits) is caused by a dominant allele (D). A person with polydactyly has the genotype Dd. Explain what this means for their children.

[2 marks]

(b) Describe the difference between mitosis and meiosis. Include the number and type of cells produced by each.

[3 marks]

(c) Explain how natural selection can lead to the development of antibiotic resistance in bacteria. Use the terms variation, mutation, survival and inheritance.

[4 marks]

★ Higher Tier

(d) ★ Describe how speciation can occur when two populations of the same species become geographically isolated.

[2 marks]

Total for Question 5

Question 6

Scientists are studying the impact of deforestation on biodiversity and the carbon cycle.

(a) Explain the effects of deforestation on the carbon cycle and on biodiversity.

[4 marks]

(b) Describe the process of eutrophication, explaining how it leads to the death of aquatic organisms.

[4 marks]

★ Higher Tier

(c) ★ Explain what is meant by a "positive feedback loop" in the context of global warming. Give ONE example.

[2 marks]

Total for Question 6

Question 7

A woodland ecosystem contains oak trees, caterpillars, blue tits (birds), and sparrowhawks.

(a) Write a food chain for this woodland ecosystem.

[1 mark]

(b) The biomass of oak trees in the woodland is 10,000 kg. The biomass of caterpillars is 1,000 kg. Explain why so much biomass is "lost" between the oak trees and caterpillars.

[3 marks]

(c) Explain the role of decomposers in the carbon cycle.

[3 marks]

★ Higher Tier

(d) ★ Describe the nitrogen cycle. Your answer should include the names of four types of bacteria and the role of each.

[4 marks]

Total for Question 7

Question 8

(a) Evaluate the use of genetic engineering to produce organisms with desirable traits. In your answer, consider the potential benefits and the ethical or environmental concerns. Use examples in your answer.

[6 marks]

Total for Question 8

END OF QUESTIONS · Total marks: 70