OCR Gateway GCSE Biology A

Paper 2: Community-Level Systems, Similarities and Differences, Life on Earth (B4–B6)

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) What is the role of nitrogen-fixing bacteria in the nitrogen cycle?

[1 mark]

Tick **ONE** box.

- ☐ A. Convert nitrates into nitrogen gas
- ☐ B. Convert atmospheric nitrogen into ammonia or nitrates
- ☐ C. Convert ammonia into nitrates
- ☐ D. Break down dead organisms to release ammonia

(b) Two heterozygous tall pea plants (Tt × Tt) are crossed. What is the expected ratio of tall to short offspring?

[1 mark]

Tick **ONE** box.

- ☐ A. 1:1
- ☐ B. 1:3
- ☐ C. 3:1
- ☐ D. All tall

(c) Which of the following correctly describes a food chain?

[1 mark]

Tick **ONE** box.

- ☐ A. An arrow from a predator pointing to its prey
- ☐ B. An arrow showing the direction of energy transfer from prey to predator
- ☐ C. A diagram showing all feeding relationships in an ecosystem

☐ D. A diagram showing the mass of organisms at each trophic level

(d) Which process removes CO■ from the atmosphere?

[1 mark]

Tick **ONE** box.

☐ A. Respiration

☐ B. Combustion

☐ C. Decomposition

☐ D. Photosynthesis

Total for Question 1 ☐

Question 2

Scientists are investigating a woodland ecosystem. They have collected data on the biomass of organisms at different trophic levels.

Figure 1: Pyramid of biomass — woodland ecosystem

(a) Explain why a pyramid of biomass is always widest at the base.

[2 marks]

(b) Explain why food chains rarely have more than five trophic levels.

[3 marks]

★ Higher Tier

(c) ★ The biomass of primary producers in the woodland is 50,000 kg. Assuming 10% efficiency of energy transfer at each level, calculate the expected biomass of secondary consumers.

[2 marks]

Total for Question 2

Question 3

This question is about the carbon and nitrogen cycles.

(a) Describe the carbon cycle. In your answer, state which process removes CO■ from the atmosphere, and THREE processes that return CO■ to it.

[4 marks]

★ Higher Tier

(b) ★ Describe the nitrogen cycle. Your answer should include the names and roles of four types of bacteria.

[4 marks]

Total for Question 3

Question 4

Scientists are studying the effects of human activity on biodiversity.

(a) Explain how eutrophication can lead to the death of aquatic organisms. Start with the application of fertilisers to farmland.

[4 marks]

(b) Evaluate TWO methods used to conserve endangered species.

[4 marks]

★ Higher Tier

(c) ★ Explain why maintaining high biodiversity in an ecosystem is important for its stability.

[2 marks]

Total for Question 4

Question 5

This question is about genetics and inheritance.

(a) Polydactyly is caused by a dominant allele (D). A heterozygous person (Dd) has children with a person who does not have polydactyly. (a) State the genotype of the person without polydactyly. (b) Use a Punnett square to determine the probability that a child will have polydactyly.

[3 marks]

(b) Describe how antibiotic resistance develops in bacteria through natural selection. Use the terms variation, mutation, survival and inheritance.

[4 marks]

★ Higher Tier

(c) ★ Explain how geographic isolation can lead to the formation of a new species (speciation).

[3 marks]

Total for Question 5

Question 6

★ Higher Tier

(a) ★ Describe the process of genetic engineering. Include in your answer the names and functions of the enzymes used.

[4 marks]

(b) Give ONE example of how genetic engineering has been used to benefit humans. Evaluate ONE advantage and ONE concern associated with this use.

[3 marks]

Total for Question 6

Question 7

(a) "Human activity is the primary cause of current species extinction rates, which are far above the natural background rate." Evaluate this statement. Consider the evidence and any alternative explanations.

[6 marks]

Total for Question 7

END OF QUESTIONS · Total marks: 52