MARK SCHEME

OCR Gateway GCSE Biology A · Paper 2: Community-Level Systems, Similarities and Differences, Life on Earth (B4–B6)

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]

What does the arrow in a food chain represent?

• B. The direction in which energy is transferred [1]

(b) [1 mark]

Which of the following is a biotic factor?

• D. Predation [1]

(c) [1 mark]

Dominant alleles are:

• C. Expressed when only one copy is present [1]

(d) [1 mark]

Which organisms are responsible for decomposition in an ecosystem?

• C. Bacteria and fungi [1]

Total for question 1: 4

Question 2 [7 marks]

Figure 1 shows a food web from a grassland ecosystem.

(a) [2 marks]

Using Figure 1, write a food chain with four organisms. Use correct arrow notation.

• Any valid 4-organism food chain from the web e.g. grass → rabbit → fox → eagle [1] (arrows in correct direction) [1]

(b) [3 marks]

Explain why less energy is available at each higher level in a food chain.

• Energy is lost at each trophic level [1]

• Lost through respiration (released as heat) [1]

• Lost through movement and undigested material in faeces [1]

(c) [2 marks]

If the population of rabbits in Figure 1 is greatly reduced by disease, predict and explain the effe…

• Fox population would decrease as their food source has been reduced [1]

• Grass population would increase as fewer rabbits are grazing [1] — accept any two valid predictions with explanation

Total for question 2: 7

Question 3 [7 marks]

The carbon cycle shows how carbon moves between the atmosphere and living organisms.

(a) [3 marks]

State THREE processes that release CO■ into the atmosphere.

- Respiration [1]
- Decomposition/decay [1]
- Combustion/burning of fossil fuels [1]

(b) [2 marks]

State the name of the ONE process that removes CO■ from the atmosphere and name the organisms that c…

- Photosynthesis [1]
- Plants (and algae) [1]

(c) [2 marks]

Explain why burning fossil fuels increases atmospheric CO■ more than burning wood from a managed for…

- Fossil fuels contain ancient carbon that has been locked away for millions of years — releasing it is a net addition to the atmosphere [1]
- Managed forests: new trees absorb CO■ as they grow, approximately replacing what was released — roughly carbon neutral [1]

Total for question 3: 7

Question 4 [6 marks]

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

(a) [1 mark]

Define the term "recessive allele."

- An allele that is only expressed in the phenotype when two copies are present (homozygous recessive) [1]

(b) [3 marks]

Both parents of a child are carriers of cystic fibrosis (Ff). Draw a Punnett square to show the poss…

- Parental gametes (F and f) shown on each side of the Punnett square [1]
- Offspring: FF, Ff, Ff, ff [1]
- 25% / 1 in 4 probability of cystic fibrosis [1]

(c) [2 marks]

Explain why a carrier of cystic fibrosis does not show symptoms of the disease.

- A carrier is heterozygous (Ff) [1]
- The dominant normal allele (F) masks the effect of the recessive faulty allele (f) [1]

Total for question 4: 6

Question 5 [9 marks]

Human activities are threatening biodiversity worldwide.

(a) [2 marks]

State what is meant by "biodiversity."

- The variety of different species of organisms in an area [1]
- AND/OR the genetic variation within species [1] — award 1 mark for either, 2 for both

(b) [4 marks]

Describe FOUR ways in which deforestation affects the environment.

- Destruction of habitat → loss of biodiversity / extinction of species [1]
- Release of CO■ into atmosphere (from burning/decomposition of trees) → global warming [1]
- Soil erosion — tree roots no longer bind the soil [1]
- Disruption of water cycle / reduced rainfall in the area [1]

(c) [3 marks]

Describe TWO methods used to conserve biodiversity. Give ONE advantage of each.

• Nature reserves: protect habitat from development [1]; species can breed undisturbed / habitat preserved [1]

• Captive breeding: prevents extinction of species with very small populations [1]; can be reintroduced to wild [1] — accept any two with advantages

Total for question 5: 9

Question 6 [8 marks]

(a) [5 marks]

Describe how natural selection leads to changes in a population over time. Use the example of antibi…

• Variation exists in bacterial population due to random mutations [1]

• A mutation may give some bacteria resistance to an antibiotic [1]

• When antibiotic is used, non-resistant bacteria die but resistant ones survive [1]

• Resistant bacteria reproduce and pass on the resistance allele to offspring [1]

• Over generations, the resistant allele becomes more common in the population [1]

(b) [3 marks]

Give THREE pieces of evidence that scientists use to support the theory of evolution.

• Fossil record — shows gradual changes in species over millions of years [1]

• DNA comparisons — closely related species share more similar DNA [1]

• Antibiotic resistance — directly observed natural selection happening today [1]

Total for question 6: 8
