Biology Topic 7 AQA Exam Questions: Ecology and the Environment

Mark Scheme

Q1. Adaptations in habitats

(a) What is a habitat? (1 mark)

- The place where an organism **lives** (1)
  Alternative: "Environment where an organism lives" (1)

(b) Example of cactus adaptation. (2 marks)

- Thick stem to **store water** (1)

- Spines instead of leaves to **reduce water loss** (1)
  Accept: deep roots, waxy coating (1 each)

Q2. Species and extinction

(a) What is a species? (1 mark)

- A group of organisms that can **breed to produce fertile offspring** (1)

(b) What could happen if a species becomes extinct? (2 marks)

- **Food chains are affected** / predators may starve (1)

- **Biodiversity decreases** / ecosystem becomes unstable (1)
  Alternative: "Disruption of interdependence" (1)

Q3. Animal competition

(a) Name two resources animals compete for. (2 marks)

- **Food** (1)

- **Mates** or **territory** or **water** or **shelter** (1)
  Any two relevant and different resources

Q4. Interdependence in ecosystems

(a) What is interdependence? (2 marks)

- When organisms **depend on each other** (1)

- For things like **food, shelter, pollination, or seed dispersal** (1)

(b) Example from woodland. (2 marks)

- Bees pollinate flowers (1)

- Birds eat insects that live on trees (1)
  Accept: squirrels spreading seeds, fungi decomposing dead matter (1 each)

Q5. Abiotic factors

(a) What is an abiotic factor? (1 mark)

- A **non-living** part of the environment (1)

(b) One abiotic factor affecting plant growth. (1 mark)

- **Light** / temperature / water / soil pH / mineral levels (1)

Q6. Biotic factors

(a) Example of a biotic factor. (1 mark)

- **Predators**, prey, competitors, pathogens, humans (1)

(b) How prey decline affects predators. (2 marks)

- Less food available (1)

- Predator numbers may **decrease** or **move away** (1)

Q7. Quadrat sampling

(a) What is a quadrat used for? (1 mark)

- To estimate the **population size** of plants or slow-moving animals (1)

(b) Why place quadrats randomly? (2 marks)

- To get a **representative** sample (1)

- To avoid **bias** (1)

Q8. Transects

(a) What is a transect? (1 mark)

- A line used to **measure changes in species distribution** (1)

(b) Equipment used. (2 marks)

- **Tape measure** (1)

- **Quadrats** or clipboard, identification key, light meter (1)

Q9. Food chains

(a) Simple food chain (2 marks)

- Example: **Grass → Rabbit → Fox** (1 for correct order, 1 for correct organisms)
  Any realistic food chain with 3 organisms

Q10. Biomass in food chains

(a) What is biomass? (1 mark)

- The **mass of living material** in an organism or trophic level (1)

(b) Reason for biomass loss. (2 marks)

- Used in **respiration** or **movement** (1)

- Lost as **waste** (e.g. faeces/urine) or **not all parts eaten** (1)

Q11. The carbon cycle

(a) Process releasing CO_2. (1 mark)

- **Respiration** or **combustion** or **decay** (1)

(b) How plants take in carbon. (2 marks)

- Through **photosynthesis** (1)

- They take in **carbon dioxide from the air** (1)

Q12. Water cycle

(a) One process in the water cycle. (1 mark)

- **Evaporation**, condensation, precipitation, transpiration (1)

(b) How sea water reaches clouds. (2 marks)

- Water **evaporates** from the sea (1)

- Water **condenses** to form clouds (1)

Q13. Human impacts

(a) One way humans reduce biodiversity. (1 mark)

- **Deforestation**, pollution, hunting, overfishing (1)

(b) One way to increase biodiversity. (1 mark)

- **Protect habitats**, breeding programmes, reducing deforestation (1)

Q14. Deforestation

(a) One negative effect. (1 mark)

- **Loss of habitats** / reduced biodiversity / soil erosion (1)

(b) Link to global warming. (2 marks)

- Fewer trees means **less CO_2 removed** by photosynthesis (1)

- More CO_2 stays in the air, enhancing **greenhouse effect** (1)

Q15. Global warming

(a) One greenhouse gas. (1 mark)

- **Carbon dioxide**, methane, water vapour (1)

(b) One consequence. (2 marks)

- **Melting ice caps**, sea-level rise, extreme weather, habitat loss (1)

- Which can lead to **species extinction** or migration (1)

Q16. Conservation

(a) What is biodiversity? (1 mark)

- The variety of **different species** in an ecosystem (1)

(b) One method to conserve species. (1 mark)

- **Captive breeding**, protected areas, seed banks (1)

Q17. Pollution

(a) One type of pollution. (1 mark)

- **Land**, air, water, plastic pollution (1)

(b) One effect of land pollution. (2 marks)

- **Kills organisms** / reduces biodiversity (1)

- Chemicals can **enter food chains** or **contaminate soil** (1)

Q18. Indicator species

(a) One organism used. (1 mark)

- **Lichens**, mayfly larvae (1)

(b) Why useful. (2 marks)

- They respond to **pollution levels** (1)

- Presence/absence tells us about **air or water quality** (1)

Q19. Recycling

(a) One material recycled. (1 mark)

- **Paper**, glass, plastic, metal, food waste (1)

(b) One reason it's important. (2 marks)

- Reduces **waste sent to landfill** (1)

- Conserves **natural resources** / saves energy (1)

Q20. Decay

(a) Conditions that speed up decay. (2 marks)

- **Warm temperature** (1)

- **Moisture** or **oxygen** or **presence of microorganisms** (1)

(b) One group of organisms that cause decay. (1 mark)

- **Bacteria**, fungi, decomposers (1)

Q21. Quadrat Sampling

(a) Using a quadrat (3 marks)

- Place quadrats **randomly** using a random method (e.g. random coordinates or grid with number generator) (1)

- Use **same size** quadrat each time (1)

- Count the number of **daisies** in each quadrat and calculate **mean** (1)
  Allow: Take enough samples for reliable data (1)

(b) Why random placement? (2 marks)

- Avoid **bias** in the results (1)

- Ensures **representative** data of the whole field (1)

Q22. Food Web

(a) Producer (1 mark)

- **Grass** (1)

(b) Effect of grasshopper decrease (3 marks)

- Fewer grasshoppers = less food for **frogs** (1)

- Frog population would **decrease** (1)

- May cause **increase** in other prey (if frog switches food), or **snake numbers** fall due to less food (1)

Q23. Decay and the Carbon Cycle (3 marks)

- Microorganisms **break down** dead plant material (1)

- They **respire** (1)

- Release **carbon dioxide** into the atmosphere (1)

Q24. Abiotic factors and species distribution (3 marks)

- Change in **temperature**, light, or moisture can affect where species live (1)

- Organisms may not be **adapted** to new conditions (1)

- May lead to **migration**, population decrease, or new species appearing (1)

Q25. Predator–Prey Cycles (3 marks)

- As prey numbers **increase**, predators have more food and their numbers **increase** (1)

- Increased predators cause **prey population to fall** (1)

- Fewer prey means predators **also decrease**, allowing prey to rise again (1)

Q26. Importance of Biodiversity (2 marks)

- Ensures **ecosystem stability** (1)

- Provides **resources** (e.g. medicine, food) or maintains food webs (1)

Q27. Energy loss in food chains (3 marks)

- Lost in **respiration** (1)

- Lost as **heat**, movement, or excretion (1)

- Not all parts are **eaten or digested** (bones, hair, etc.) (1)

Q28. Biomass decreases (3 marks)

- Some biomass used for **respiration/energy** (1)

- Some is **not eaten** or not digestible (1)

- Biomass is lost as **waste or excretion** (1)

Q29. Deforestation and biodiversity (3 marks)

- Removes **habitats** (1)

- Causes loss of **food sources** and shelter (1)

- Leads to **species extinction or migration** (1)

Q30. Respiration and photosynthesis (3 marks)

- Plants remove CO_2 via **photosynthesis** (1)

- Animals/plants return CO_2 via **respiration** (1)

- Keeps **carbon levels balanced** in the atmosphere (1)

Q31. Microorganisms and material cycling

(a) Role of microbes (3 marks)

- Break down **dead organisms/waste** (1)

- In process of **decay or decomposition** (1)

- Release **minerals and CO_2** into environment (1)

(b) Importance for plant growth (2 marks)

- Release **mineral ions** into soil (e.g. nitrates) (1)

- Plants absorb ions for **growth and protein synthesis** (1)

Q32. Estimating populations (2 marks)

- **Quadrats** (1)

- **Transects** or **mark-release-recapture** (1)
  Accept: Random sampling (1)

Q33. Environmental change and extinction (3 marks)

- Changes (e.g. temperature, pollution, rainfall) can affect **habitats** (1)

- Species may not be able to **adapt quickly** (1)

- Leads to **failure to survive or reproduce** (1)

Q34. Maintaining biodiversity (3 marks)

- Example method: **Captive breeding**, seed banks, protected areas (1)

- Protects species from **extinction** (1)

- Helps **reintroduce** or increase population in wild (1)

Q35. Peat-free vs peat composts (4 marks)

- Peat-based compost involves **destroying peat bogs** (1)

- This releases **CO_2**, contributing to climate change (1)

- Peat-free alternatives protect **habitats and biodiversity** (1)

- May be **less effective** or **more expensive** than traditional compost (1)

Q36. Human population and ecosystems (3 marks)

- More people = more **resources** needed (1)

- Leads to **deforestation, land use, pollution** (1)

- Causes **loss of habitats** and **reduced biodiversity** (1)

Q37. Biological control

(a) What is it? (1 mark)

- Using **organisms** to control pest populations (1)

(b) Advantage and disadvantage (2 marks)

- Advantage: **No chemicals** / less pollution / specific to pest (1)

- Disadvantage: **Unpredictable effects** / may become invasive / may not work (1)

Q38. Land use and biodiversity (3 marks)

- Building and farming **remove habitats** (1)

- Leads to **loss of species** and disruption of food chains (1)

- Reduces overall **biodiversity** (1)

Q39. Plastic pollution in oceans (3 marks)

- Animals can become **entangled** (1)

- Can **ingest plastic**, causing injury or death (1)

- Plastics can **enter the food chain** (1)

Q40. Monitoring environmental change (3 marks)

- Use of **indicator species** like lichens, invertebrates (1)

- Use of **data logging equipment** (e.g. temperature, pH, CO_2 sensors) (1)

- Use of **satellite images or long-term studies** to track change (1)

Q41. Mark-Release-Recapture

(a) Method description (3 marks)

- **Capture** a sample of animals (1)

- **Mark** them in a harmless way and **release** them back into habitat (1)

- After some time, **recapture** another sample and count how many are marked (1)
  Alternative phrasing accepted: tag/paint for mark

(b) Assumption (1 mark)

- No significant **births, deaths, migration** between samples (1)
  Accept: Marking does not affect behaviour or likelihood of recapture

---

Q42. Species Reintroduction

(a) Benefits to ecosystem (2 marks)

- Restores **food chains/food webs** (1)

- Increases **biodiversity** / improves ecosystem balance (1)
  Allow: restores ecosystem services, pollination, seed dispersal

(b) Risks (2 marks)

- May become **invasive or overpopulate** (1)

- May introduce **new diseases** or compete with native species (1)

Q43. Light and Plant Distribution

(a) Measuring light intensity (1 mark)

- Use a **light meter** (1)

(b) Effect of light (2 marks)

- Light is needed for **photosynthesis** (1)

- Less light = **less energy** for growth (1)

(c) Sampling method (1 mark)

- **Transect** or **line transect** (1)

Q44. Peat-Free Compost

(a) Environmentally friendly because… (2 marks)

- Prevents **destruction of peat bogs** (1)

- Reduces **carbon emissions** / protects **biodiversity** in peat bogs (1)

(b) Disadvantage (1 mark)

- May be **less effective** at retaining nutrients/moisture or more expensive (1)

Q45. Methane and Climate

(a) Methane and climate change (3 marks)

- Methane is a **greenhouse gas** (1)

- Traps **infrared radiation** / heat (1)

- Leads to **global warming** or rising temperatures (1)

(b) Reducing emissions (1 mark)

- Change cattle diet / **reduce livestock numbers** / **capture methane** (1)

Q46. Predator–Prey Graph

(a) Why predator numbers fall (2 marks)

- Less prey = **less food** (1)

- Predators **starve or reproduce less** (1)

(b) How prey recover (2 marks)

- Fewer predators = **reduced predation** (1)

- Prey **reproduce and increase** in number (1)

Q47. Nitrogen Cycle

(a) Nitrogen-fixing organism (1 mark)

- **Bacteria** (e.g. Rhizobium) (1)
  Accept: lightning for natural method

(b) Decomposers' role (2 marks)

- Break down **dead organisms and waste** (1)

- Release **ammonia** or nutrients into the soil (1)

Q48. Mimicry Adaptation

(a) Term (1 mark)

- **Mimicry** (1)

(b) How it helps (2 marks)

- Predators **avoid the mimic** (1)

- Increases chance of **survival/reproduction** (1)

Q49. Lichens and Pollution

(a) Why lichens are indicators (2 marks)

- Sensitive to **sulfur dioxide** or **air quality** (1)

- Different species indicate **levels of pollution** (1)

(b) Other factor affecting lichen (1 mark)

- **Light**, humidity, temperature, or **tree bark type** (1)

Q50. Mycorrhizal Fungi

(a) Mutualistic relationship (3 marks)

- Fungi **attach to roots** of plants (1)

- Fungi help **absorb water and minerals** (1)

- Plant provides **sugars/carbohydrates** to fungi (1)

(b) Helps in poor soil (2 marks)

- Fungi increase **surface area** for absorption (1)

- Allow access to **limited nutrients** like phosphate (1)

Q51. Climate & Migration

(a) Migration explanation (2 marks)

- Climate change alters **temperature/rainfall** (1)

- Species move to **more suitable conditions** (e.g. cooler areas) (1)

(b) If species can't migrate (1 mark)

- Risk of **extinction** or **population decline** (1)

Q52. Biological Control

(a) Definition (2 marks)

- Using **another organism** (1)

- To reduce **pest population naturally** (1)

(b) Risk (1 mark)

- May become **invasive**, harm **non-target species** (1)

Q53. Genetic Diversity

(a) Why it's important (3 marks)

- Increases chance of **survival/adaptation** to change (1)

- Reduces risk of **disease wiping out population** (1)

- Maintains **healthy breeding** (avoids inbreeding) (1)

(b) How zoos help (1 mark)

- Use **breeding programs** to ensure genetic variation (1)

Q54. CO_2 Levels

(a) Natural + human sources (2 marks)

- Natural: **respiration / volcanic activity** (1)

- Human: **burning fossil fuels / deforestation** (1)

(b) Reducing CO_2 (1 mark)

- **Plant more trees** / use **renewable energy** / reduce car use (1)

Q55. Models in Ecology

(a) Limitation (1 mark)

- May be **oversimplified** or based on **incomplete data** (1)

(b) Why useful (2 marks)

- Help **predict future trends** (1)

- Allow testing of **hypotheses** or planning conservation (1)