

This is the **Foundation Separate** version. Higher Tier (★) questions have been removed. All remaining questions are Foundation-level.

Ecosystems and Adaptations (4.7.1)

Specification reference: 4.7.1

Q1. Explain the difference between abiotic and biotic factors. Give ONE example of each.

[3 marks]

Q2. Describe how a predator-prey relationship leads to cyclical changes in population size over time.

[3 marks]

Q3. Explain what is meant by an adaptation. Describe ONE structural, ONE behavioural and ONE physiological adaptation of an organism to its environment.

[3 marks]

Food Chains and Energy Transfer (4.7.2 and 4.7.4)

Specification reference: 4.7.2

Q4. Explain why food chains rarely have more than five trophic levels.

[3 marks]

Q5. A student claims that eating a plant-based diet is better for the environment than a meat-based diet. Evaluate this claim using your knowledge of energy transfer in food chains.

[4 marks]

The Carbon Cycle (4.7.2.2)

Specification reference: 4.7.2.2

Q6. Describe how carbon is cycled between the atmosphere and living organisms.

[4 marks]

Q7. Explain why burning fossil fuels is considered more damaging to the carbon cycle than burning wood from sustainably managed forests.

[3 marks]

Biodiversity and Human Impact (4.7.3)

Specification reference: 4.7.3

Q8. Describe THREE consequences of deforestation.

[3 marks]

Q9. Evaluate TWO different methods of conserving biodiversity.

[4 marks]

◆ SEPARATE SCIENCE

Q10. ◆ Explain the process of eutrophication and its effect on an aquatic ecosystem.

[3 marks]

Total: 33 marks

Ecosystems and Adaptations (4.7.1)

Q1 (3 marks)

Explain the difference between abiotic and biotic factors. Give ONE example of e...

- Abiotic: non-living physical/chemical factor affecting organisms [1]; example: temperature, light, pH, water, wind [1]
- Biotic: living factor affecting organisms [1]; example: food availability, predators, disease, competition [1] — 3 marks: definition of both + example of either

Q2 (3 marks)

Describe how a predator-prey relationship leads to cyclical changes in populatio...

- Prey population increases → more food for predators → predator population increases [1]
- More predators → more predation → prey population falls [1]
- Less prey → predators struggle for food → predator numbers fall → prey recovers → cycle repeats [1]

Q3 (3 marks)

Explain what is meant by an adaptation. Describe ONE structural, ONE behavioural...

- Adaptation: an inherited characteristic that increases an organism's chance of surviving and reproducing in its environment [1]
- Structural example: polar bear has thick fur to provide insulation in cold Arctic [1]
- Behavioural example: migration to warmer regions in winter to find food [1] — physiological: camel stores fat in hump for energy, not water

Food Chains and Energy Transfer (4.7.2 and 4.7.4)

Q4 (3 marks)

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

- Energy is lost at each trophic level through respiration (as heat), movement and waste [1]
- Only approximately 10% of energy transfers to the next trophic level [1]
- After 5 levels so little energy remains that another level cannot be supported [1]

Q5 (4 marks)

A student claims that eating a plant-based diet is better for the environment th...

- Claim is largely correct [1]
- Plants are producers — eating plants is eating at the first trophic level [1]
- Only ~10% of plant biomass transfers to the animal — so much more plant material is needed to produce the same mass of meat [1]
- Less land/energy needed to grow plant food directly than to raise livestock → smaller environmental footprint [1]

The Carbon Cycle (4.7.2.2)

Q6 (4 marks)

Describe how carbon is cycled between the atmosphere and living organisms.

- CO₂ is removed from the atmosphere by photosynthesis — fixed into organic molecules in plants [1]
- Carbon passes along food chain as organisms eat each other [1]
- Returned to atmosphere by respiration in all organisms [1]
- Returned by decomposition of dead organisms (decomposers respire releasing CO₂) and combustion [1]

Q7 (3 marks)

Explain why burning fossil fuels is considered more damaging to the carbon cycle...

- Fossil fuels contain carbon fixed millions of years ago — a net addition of carbon to the atmosphere [1]
- Burning fossil fuels releases this ancient carbon much faster than natural cycles can reabsorb it [1]

- Sustainably managed forests: new trees planted absorb CO₂ as they grow — approximately carbon neutral over time [1]
-

Biodiversity and Human Impact (4.7.3)

Q8 (3 marks)

Describe THREE consequences of deforestation.

- Habitat destruction → loss of biodiversity and species extinction [1]
- Release of stored carbon as CO₂ (through burning or decomposition) → contributes to global warming [1]
- Loss of tree roots → soil erosion and disruption of water cycle [1]

Q9 (4 marks)

Evaluate TWO different methods of conserving biodiversity.

- Nature reserves: protect habitats from development [1]; may be too small for viable populations / cannot prevent climate change [1]
- Captive breeding programmes: maintain populations of endangered species [1]; can reintroduce to wild but animals may lose natural behaviours / expensive [1] — accept any two methods evaluated with benefit + limitation

Q10 (3 marks) [◆ Sep]

◆ Explain the process of eutrophication and its effect on an aquatic ecosystem.

- Excess fertilisers (nitrates/phosphates) run off agricultural land into water bodies [1]
- Algae grow rapidly (algal bloom) on surface, blocking light to aquatic plants below — plants die [1]
- Bacteria decompose dead plants and use dissolved O₂ — fish and aquatic organisms suffocate [1]