

B7 Ecology

Biology Paper 2 | AQA Combined Science Trilogy | Key ideas to remember

Communities

1 Communities and adaptations

Population: one species in an area.

Community: different populations.

Ecosystem: community interacting with its non-living environment.

Interdependence: species rely on others for food, shelter, pollination or seed dispersal.

Competition: plants - light, space, water, mineral ions; animals - food, mates, territory.

Abiotic: light, temperature, moisture, soil pH/minerals, wind, CO₂, dissolved oxygen.

Biotic: food, predators, pathogens, competition.

Adaptations: structural (fur), behavioural (nocturnal), functional (concentrated urine). Extremophiles tolerate extreme conditions.

4 Carbon, water and microorganisms

Carbon: photosynthesis takes CO₂ into plants; feeding transfers carbon to consumers. Respiration by plants, animals and microorganisms returns CO₂. Combustion releases CO₂ too.

Decomposers: bacteria and fungi break down dead material and waste. Respiration returns CO₂; mineral ions return to soil for root uptake.

Evaporation

Condensation

Precipitation

Runoff to seas

Transpiration also moves water from plants to air. The cycle replenishes freshwater on land.

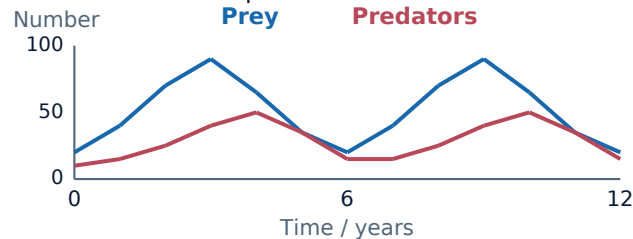
Sampling a habitat

2 Food chains and population cycles

Producers make biomass by photosynthesis.

Grass → grasshopper → frog → hawk

Producer → primary → secondary → tertiary consumer. Arrows point from food to eater.



More prey → more food → predators rise later → prey fall → food shortage → predators fall. Other factors affect real populations.

5 Human impacts on ecosystems

Rising resource use creates more waste.

Pollution: water - sewage, fertilisers, toxic chemicals; air - smoke, acidic gases; land - landfill, toxic chemicals.

Land use: building, farming, quarrying and waste disposal replace habitats.

Peat: extraction destroys habitat; decay or burning releases stored carbon as CO₂.

Tropical deforestation: cattle, rice fields and biofuel crops. Fewer trees means less photosynthesis; burning/decay releases CO₂.

Global warming: increased CO₂ and methane strengthen the greenhouse effect. Species ranges and breeding/migration timing change; habitat loss increases extinction risk.

Cycling materials

3 Required practical 7: sampling

Quadrats: choose random coordinates; identify and count the target species; use the same area and boundary rule; repeat widely.

Density = total count ÷ total sampled area.

Estimate = density × habitat area.

Example: five 1 m² counts: 2, 4, 4, 6, 9.

Mean = $25 \div 5 = 5$ plants/m².

Median = 4; mode = 4.

For 200 m²: $5 \times 200 = 1000$ plants.

Transect: sample at fixed intervals across a gradient; measure the abiotic factor too. Repeat transects. Correlation alone cannot prove a cause. Check hazards; minimise disturbance.

Cover: covered cells ÷ total cells × 100%.

6 Maintaining biodiversity

Biodiversity: variety of species. It reduces dependence on one species, supporting stability. Count species, not just total organisms.

Conservation measures:

- Breed endangered species.
- Protect and restore rare habitats.
- Restore field margins and hedgerows.
- Reduce deforestation and CO₂ emissions.
- Recycle resources; reduce landfill.

Evaluate: consider benefits, cost, land, food and jobs. A threatened species may need priority. Use repeated surveys and a comparison site to check success.

Graph check: labels, units, equal numerical intervals, pattern and evidence limits.