

Combined Science (TRILOGY) GCSE Biology

Success Criteria: Ecosystems



Adaptations, interdependence and competition

<i>I can...</i>	
Define an ecosystem as the interaction of a community of living organisms (biotic) with the non-living (abiotic) parts of their environment.	
Understand that to survive and reproduce, organisms require a supply of materials from their surroundings and from the other living organisms there.	
Describe how organisms compete with other organisms. Plants compete with each other for light and space, and for water and mineral ions from the soil. Animals often compete with each other for food, mates and territory.	
Suggest abiotic (non-living) factors which can affect a population, such as: <i>light intensity, temperature, moisture levels, soil pH and mineral content, wind intensity and direction, carbon dioxide levels for plants and oxygen levels for aquatic animals.</i>	
Suggest biotic (living) factors which can affect a population, such as: <i>availability of food, new predators arriving, new pathogens and one species outcompeting another so the numbers are no longer sufficient to breed.</i>	
Explain how a change in an abiotic factor would affect a given community when provided with appropriate data or context.	
Appreciate that within a community each species depends on other species for food, shelter, pollination, seed dispersal etc. If one species is removed it can affect the whole community. This is called interdependence.	
Define a 'stable community' as one where all the species and environmental factors are in balance so that population sizes remain fairly constant.	
Explain how organisms have features (adaptations) that enable them to survive in the conditions in which they normally live.	
Identify adaptations as structural, behavioural or functional.	
Define an 'extremophile' as an organism adapted to life in a very extreme environment such as at high temperature, pressure, or salt concentration. E.g. Bacteria living in deep sea vents	

Organisation of an ecosystem

<i>I can...</i>	
Recognise photosynthetic organisms (e.g. plants) as the producers of biomass for life on Earth.	
Use food chains to represent feeding relationships within a community. All food chains begin with a producer (usually a green plant or alga) which synthesises biomolecules (e.g. glucose by photosynthesis).	
Explain how the arrows of a food chain represent the energy	
Describe how producers are eaten by primary consumers (herbivores), which in turn may be eaten by secondary consumers (carnivores) and then tertiary consumers (carnivores).	
Identify consumers that kill and eat other animals are predators, and those eaten are prey.	
Describe how, in a stable community, the numbers of predators and prey rise and fall in cycles.	
State that atoms on Earth are finite and that all materials in the living world are recycled through the abiotic and biotic components of an ecosystem to provide the building blocks for future organisms.	
Describe how water is cycled through the ecosystem by continuously evaporation/transpiration into vapour and condensation/precipitated.	
Explain the importance of the water cycle providing fresh water for plants and animals on land before draining into the seas.	
State that carbon atoms form the base of all biological molecules (carbs, fats, proteins) that make up cells.	
Describe how carbon atoms are cycled through an ecosystem between the atmosphere (carbon in CO ₂ in air) and living things <ul style="list-style-type: none">• producers (plants) take in CO₂ during <u>photosynthesis</u> and produce glucose and other biomolecules• Consumers take in carbon in biomolecules from food, and use for growth (=becomes part of consumer biomass) or uses for energy (=carbon released back into atmosphere as CO₂ following <u>respiration</u>)• Humans burn (= <u>combustion</u>) biomass (eg. trees) or fossil fuels to release energy (also releases carbon as CO₂ into atmosphere).	
Identify some types of microorganisms (bacteria and fungi) as decomposers that secrete extracellular enzymes to breakdown dead/waste material and absorb the small soluble products by diffusion (= decay/decomposition)	
Explain the role of microorganisms in cycling materials through an ecosystem such as by returning carbon to the atmosphere as CO ₂ (when they respire) and mineral ions to the soil.	

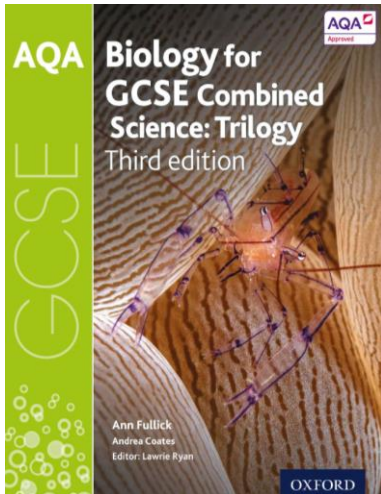
I can...	
Describe how to determine the abundance (number of) and distribution ('spreadoutness') of species in an ecosystem using sampling methods – quantitative data.	
Understand the terms mean, mode and median in relation to abundance of organisms	
State that a quadrat is a frame (wood/metal/plastic) that is used to make out a set area for sampling. A common size of quadrat used is a square with 0.5m sides, therefore creating a 0.25m ² sample area.	
<p>Describe how to estimate the abundance of an organism in a large area using random sampling.</p> <ul style="list-style-type: none"> • use measuring tapes to create a 'grid' of the entire area • use a random number generator to determine positions to place the quadrat (without bias) • Count the number of the organism within the quadrat (or the percentage cover) • Repeat with several different quadrat positions • Calculate the mean number from all the quadrats • Scale up from the size of one quadrat to the size of the whole area. 	
<p>Describe how to investigate the change in distribution of an organism in a along a distance by sampling along a transect line.</p> <ul style="list-style-type: none"> • Create the transect by laying a measuring tape along the distance. • place the quadrat at the start position (e.g 0m) • Count the number of the organism within the quadrat (or the percentage cover) • Move the quadrat further along the transect (e.g 2m) • Repeat at multiple positions along the transect (e.g 4m, 6m, 8m, 10m) 	
Required practical activity 9: measure the population size of a common species in a habitat. Use sampling techniques to investigate the effect of a factor on the distribution of this species.	

- 4.7.1 Adaptations, interdependence and competition
- 4.7.2 Organisation of an ecosystem

Additional support:



Access the appropriate textbook on kerboodle.com, create your own revision notes of the key points of the topic and attempt the summary questions.



Combined science GCSE textbook

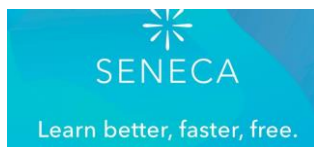
Adaptations, interdependence and competition

pages 206-220

Organising an ecosystem

pages 224-228

Utilise online revision resources to support your class notes, such as...



Attempt past paper questions using www.physicsandmathstutor.com and self-mark your answers using the official exam mark schemes.



Extension work/extra challenge:

Ask your teacher for extension tasks:

- Keystone Species