

AQA Biology GCSE – Student Progress Sheet

Unit 4.7 - Ecology



4.7.1. Adaptations, Interdependence and Competition

4.7.1.1. Communities

a	I know that an ecosystem is the interaction of a community of living organisms (biotic) with the non-living (abiotic) parts of their environment.			
b	I can describe different levels of organisation in an ecosystem from individual organisms to the whole ecosystem.			
c	I can explain how organisms are adapted to the conditions in which they live.			
d	I know that, to survive and reproduce, organisms require a supply of materials from their surroundings and from the other living organisms there.			
e	I know that plants in a community or habitat often compete with each other for light and space, and for water and mineral ions from the soil.			
f	I know that animals often compete with each other for food, mates and territory.			
g	I know that, within a community, each species depends on other species for food, shelter, pollination, seed dispersal etc. and that if one species is removed it can affect the whole community. This is called interdependence.			
h	I can describe the importance of interdependence and competition in a community.			
i	I know that a stable community is one where all the species and environmental factors are in balance so that population sizes remain fairly constant.			
j	I can extract and interpret information from charts, graphs and tables relating to the interaction of organisms within a community.			

4.7.1.2. Abiotic Factors

a	I know that the abiotic (non-living) factors which can affect a community are: <ul style="list-style-type: none"> • light intensity; • temperature; • moisture levels; • soil pH and mineral content; • wind intensity and direction; • carbon dioxide levels for plants; • oxygen levels for aquatic animals. 			
b	I can explain how a change in an abiotic factor would affect a given community given appropriate data or context.			
c	I can extract and interpret information from charts, graphs and tables relating to the effect of abiotic factors on organisms within a community.			

4.7.1.3. Biotic Factors

a	I know that the biotic (living) factors which can affect a community are: <ul style="list-style-type: none"> • availability of food; • new predators arriving; • new pathogens; • one species outcompeting another so the numbers are no longer sufficient to breed. 			
b	I can explain how a change in a biotic factor might affect a given community given appropriate data or context.			
c	I can extract and interpret information from charts, graphs and tables relating to the effect of biotic factors on organisms within a community.			

4.7.1.4. Adaptations

a	I know that organisms have features (adaptations) that enable them to survive in the conditions in which they normally live and that these adaptations may be structural, behavioural or functional.			
b	I can explain how organisms are adapted to live in their natural environment.			
c	I know that some organisms live in environments that are very extreme, such as at high temperature, pressure, or salt concentration and that these organisms are called extremophiles e.g. bacteria living in deep sea vents.			

4.7.2. Organisation of an Ecosystem**4.7.2.1. Levels of Organisation**

a	I can explain how photosynthetic organisms are the producers of biomass for life on Earth.			
b	I know that feeding relationships within a community can be represented by food chains.			
c	I know that all food chains begin with a producer which synthesises molecules. This is usually a green plant or alga which makes glucose by photosynthesis.			
d	I know that producers are eaten by primary consumers, which in turn may be eaten by secondary consumers and then tertiary consumers.			
e	I know that consumers that kill and eat other animals are predators, and those eaten are called prey.			
f	I can describe how, in a stable community, the numbers of predators and prey rise and fall in cycles.			
g	I can interpret graphs used to model predator-prey cycles.			
h	I can describe a range of experimental methods using transects and quadrats that are used by ecologists to determine the distribution and abundance of species in an ecosystem.			

4.7.2.2. How Materials Are Cycled

a	I know that many different materials cycle through the abiotic and biotic components of an ecosystem and that all materials in the living world are recycled to provide the building blocks for future organisms.			
b	I can explain the importance of the carbon and water cycles to living organisms.			
c	I can describe how the carbon cycle returns carbon from organisms to the atmosphere as carbon dioxide to be used by plants in photosynthesis.			
d	I can describe how the water cycle provides fresh water for plants and animals on land before draining into the seas and how water is continuously evaporated and precipitated.			
e	I can explain the role of microorganisms in cycling materials through an ecosystem by returning carbon to the atmosphere as carbon dioxide and mineral ions to the soil.			
f	I can interpret diagrams of the carbon cycle and the water cycle.			

4.7.2.3. Decomposition (Biology Only)

a	I can explain how temperature, water and availability of oxygen affect the rate of decay of biological material.			
b	I know that gardeners and farmers try to provide optimum conditions for rapid decay of waste biological material and that the compost produced is used as a natural fertiliser for growing garden plants or crops.			
c	I know that anaerobic decay produces methane gas and that biogas generators can be used to produce methane gas as a fuel.			
d	I can calculate rate changes in the decay of biological material.			
e	I can describe an experiment to investigate the effect of temperature on the rate of decay of fresh milk by measuring pH change.			

4.7.2.4. Impact of Environmental Change (Biology Only) (HT Only)

a	I know that environmental changes affect the distribution of species in an ecosystem and that these changes include: temperature, availability of water and composition of atmospheric gases.			
b	I know that environmental changes may be seasonal, geographic or caused by human interaction.			
c	I can evaluate the impact of environmental changes on the distribution of species in an ecosystem given appropriate information.			

4.7.3. Biodiversity and the Effect of Human Interaction on Ecosystems**4.7.3.1. Biodiversity**

a	I know that biodiversity is the variety of all the different species of organisms on earth, or within an ecosystem.			
b	I can describe how a great biodiversity ensures the stability of ecosystems by reducing the dependence of one species on another for food, shelter and the maintenance of the physical environment.			
c	I can explain how the future of the human species on Earth relies on us maintaining a good level of biodiversity.			
d	I can explain how many human activities (waste, deforestation, global warming) are reducing biodiversity and how only recently have measures been taken to try to stop this reduction.			

4.7.3.2. Waste Management

a	I can explain how the rapid growth in the human population and an increase in the standard of living mean that increasingly more resources are used and more waste is produced.			
b	I know that if waste and chemical materials are not properly handled, more pollution is caused.			
c	I know that pollution can occur: <ul style="list-style-type: none"> • in water, from sewage, fertiliser or toxic chemicals; • in air, from smoke and acidic gases; • on land, from landfill and from toxic chemicals. 			
d	I can describe how pollution kills plants and animals which then leads to a reduction in biodiversity.			

4.7.3.3. Land Use

a	I can describe how humans reduce the amount of land available for other animals and plants by building, quarrying, farming and dumping waste.			
b	I can explain how the destruction of peat bogs, and other areas of peat to produce garden compost, reduces the area of this habitat and thus the variety of different plant, animal and microorganism species that live there (biodiversity).			
c	I know that the decay or burning of the peat releases carbon dioxide into the atmosphere.			
d	I can discuss the conflict between the need for cheap available compost to increase food production and the need to conserve peat bogs and peatlands as habitats for biodiversity and to reduce carbon dioxide emissions.			

4.7.3.4. Deforestation

a	I know that large-scale deforestation in tropical areas has occurred to: <ul style="list-style-type: none"> • provide land for cattle and rice fields; • grow crops for biofuels. 			
b	I can discuss the environmental implications of deforestation.			

4.7.3.5. Global Warming

a	I know that levels of carbon dioxide and methane in the atmosphere are increasing, and that they contribute to 'global warming'.			
b	I can describe some of the biological consequences of global warming.			
c	I know that the scientific consensus about global warming and climate change is based on systematic reviews of thousands of peer reviewed publications.			
d	I can explain why evidence is uncertain or incomplete in a complex context, such as climate change.			

4.7.3.6. Maintaining Biodiversity

a	I can describe both positive and negative human interactions in an ecosystem and explain their impact on biodiversity.			
b	<p>I know that scientists and concerned citizens have put in place programmes to reduce the negative effects of humans on ecosystems and biodiversity and that these include:</p> <ul style="list-style-type: none"> • breeding programmes for endangered species; • protection and regeneration of rare habitats; • reintroduction of field margins and hedgerows in agricultural areas where farmers grow only one type of crop; • reduction of deforestation and carbon dioxide emissions by some governments; • recycling resources rather than dumping waste in landfill. 			
c	I can evaluate methods that can be used to tackle problems caused by human impacts on the environment.			
d	I can discuss the conflicting pressures on maintaining biodiversity (given appropriate information).			

4.7.4. Trophic Levels in an Ecosystem (Biology Only)**4.7.4.1. Trophic Levels (Biology Only)**

a	I can describe the differences between the trophic levels of organisms within an ecosystem.			
b	<p>I know that trophic levels can be represented by numbers, starting at level 1 with plants and algae and that further trophic levels are numbered subsequently according to how far the organism is along the food chain:</p> <p>Level 1: Plants and algae make their own food and are called producers.</p> <p>Level 2: Herbivores eat plants/algae and are called primary consumers.</p> <p>Level 3: Carnivores that eat herbivores are called secondary consumers.</p> <p>Level 4: Carnivores that eat other carnivores are called tertiary consumers.</p>			
c	I know that apex predators are carnivores with no predators.			
d	I know that decomposers break down dead plant and animal matter by secreting enzymes into the environment and that small soluble food molecules then diffuse into the microorganism.			

4.7.4.2. Pyramids of Biomass (Biology Only)

a	I know that pyramids of biomass can be constructed to represent the relative amount of biomass in each level of a food chain, with trophic level 1 at the bottom of the pyramid.			
b	I can construct accurate pyramids of biomass from appropriate data.			

4.7.4.3. Transfer of Biomass (Biology Only)

a	I can describe pyramids of biomass.			
b	I know that only approximately 10% of the biomass from each trophic level is transferred to the level above it and I can explain how this affects the number of organisms at each trophic level.			
c	I can explain how biomass is lost between the different trophic levels: <ul style="list-style-type: none"> • not all the ingested material is absorbed, some is egested as faeces; • some absorbed material is lost as waste, such as carbon dioxide and water in respiration (large amounts of glucose are used in respiration) and water and urea in urine. 			
d	I know that producers are mostly plants and algae which transfer about 1% of the incident energy from light for photosynthesis.			
e	I can calculate the efficiency of biomass transfers between trophic levels by percentages or fractions of mass.			

4.7.5. Food Production (Biology Only)**4.7.5.1. Factors Affecting Food Security (Biology Only)**

a	I know that food security means having enough food to feed a population.			
b	I can describe some of the biological factors affecting levels of food security, including; <ul style="list-style-type: none"> • the increasing birth rate has threatened food security in some countries; • changing diets in developed countries means scarce food resources are transported around the world; • new pests and pathogens that affect farming; • environmental changes that affect food production, such as widespread famine occurring in some countries if rains fail; • the cost of agricultural inputs; • conflicts that have arisen in some parts of the world which affect the availability of water or food. 			
c	I know that sustainable farming methods must be found to feed all people on Earth.			
d	I can interpret population and food production statistics to evaluate food security.			

4.7.5.2. Farming Techniques (Biology Only)

a	I know that the efficiency of food production can be improved by restricting energy transfer from food animals to the environment and that this can be done by limiting their movement and by controlling the temperature of their surroundings.			
b	I know that some animals are fed high protein foods to increase growth.			
c	I can describe the ethical objections that people may have to some modern intensive farming methods.			
d	I can evaluate the advantages and disadvantages of modern farming techniques.			

4.7.5.3. Sustainable Fisheries (Biology Only)

a	I know that fish stocks in the oceans are declining.			
b	I know that it is important to maintain fish stocks at a level where breeding continues or certain species may disappear altogether in some areas.			
c	I know that control of net size and the introduction of fishing quotas play important roles in conservation of fish stocks at a sustainable level.			
d	I can describe how the application of different fishing techniques promotes recovery of fish stocks.			

4.7.5.4. Role of Biotechnology (Biology Only)

a	I can explain how modern biotechnology techniques enable large quantities of microorganisms to be cultured for food: <ul style="list-style-type: none"> The fungus <i>Fusarium</i> is useful for producing mycoprotein, a protein-rich food suitable for vegetarians. The fungus is grown on glucose syrup, in aerobic conditions, and the biomass is harvested and purified. 			
b	I can explain how GM crops could provide more food or food with an improved nutritional value, such as golden rice.			
c	I can describe how a genetically modified bacterium produces human insulin which can be harvested, purified and used to treat people with diabetes.			