1.24 Biodiversity, Cycles and Human Impact: 30-minute Pack

AQA 8464 · Calculator allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

Biodiversity Under Pressure

Original text written for Revision Library.

Biodiversity, the variety of species and the genes within them found in an ecosystem, both depends on and helps to maintain stable natural cycles such as the carbon and water cycles. As the human population grows and standards of living rise, increasing amounts of land are used for building, farming, quarrying and waste disposal, leaving less space for other organisms. One example is the loss of peat bogs: these waterlogged habitats take thousands of years to form, store large amounts of carbon, and support specialised plants and animals, yet many have been drained and dug up so the peat can be sold as garden compost. Similar pressures, including large-scale deforestation, pollution of land, air and water, and the effects of global warming, are reducing biodiversity in ecosystems around the world. Conservation organisations use a range of strategies, from captive breeding programmes to the protection and restoration of habitats, to try to maintain and increase biodiversity. This worksheet covers the carbon and water cycles, the effects of waste, land use, deforestation and global warming on biodiversity, the required practical investigating the effect of temperature on the rate of decomposition, and strategies used to conserve biodiversity.

1 Land is a limited resource, and how it is used affects the organisms that can live on it.

(a) State three ways in which land is used by humans that can reduce the amount of land available for other organisms. **(3)**

(b) Using the information above about peat bogs, give one reason why draining and digging up peat bogs for use in garden compost reduces biodiversity. **(1)**

(Total for Question 1 is 4 marks)

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2 Conservation organisations use a range of methods to try to maintain and increase biodiversity.

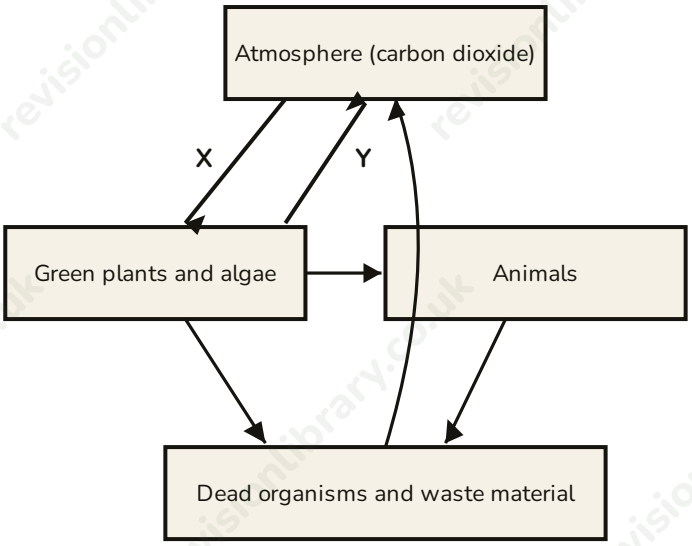
(a) State two methods used to help maintain biodiversity. **(2)**

(b) Choose one method from part (a) and explain how it helps to increase biodiversity. **(2)**

(Total for Question 2 is 4 marks)

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3 Carbon is constantly cycled between the atmosphere, living organisms and the environment.



(a) In a simplified carbon cycle diagram, arrow X points from 'Atmosphere (carbon dioxide)' to 'Green plants and algae', and arrow Y points from 'Green plants and algae' back to 'Atmosphere (carbon dioxide)'. Name the processes represented by arrow X and arrow Y. **(2)**

(b) Write the balanced symbol equation for photosynthesis, including state symbols. **(2)**

(c) Explain how decomposition of dead organisms and waste material returns carbon to the atmosphere. **(2)**

(Total for Question 3 is 6 marks)

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4 The water cycle provides a continuous supply of fresh water to ecosystems.

(a) Describe the processes of evaporation and condensation in the water cycle, and how they lead to precipitation (rain). **(3)**

(b) Explain why the water cycle is important for the survival of plants and animals in an ecosystem. **(1)**

(c) Higher Tier only. One method of producing fresh water in areas with limited rainfall is desalination of seawater. Suggest one reason why desalination is not widely used to provide fresh water on a large scale. **(1)**

(Total for Question 4 is 5 marks)

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5 Using the information above, a peat bog originally covered an area of 850 hectares. Over the last 10 years, 289 hectares of the bog have been drained and dug up for use in garden compost.

(a) Calculate the percentage of the peat bog that has been lost over the last 10 years. **(2)**

(b) The area lost continues to fall at the same percentage rate (of whatever area remains) for a further 10 years. Calculate the area of peat bog, in hectares, that would remain after this further 10 years. Give your answer to the nearest hectare. **(3)**

(Total for Question 5 is 5 marks)

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Mark scheme · 1.24 Biodiversity, Cycles and Human Impact: 30-minute Pack

Question 1

(a) building (housing, roads or other construction) **B1**

(a) quarrying (extracting stone or minerals) **B1**

(a) farming (growing crops or grazing livestock) or dumping/landfill of waste (accept either) **B1**

(a) Answer: Any three of: building (housing and roads), quarrying, farming (crops or livestock), and dumping or landfill of waste.

(b) draining/removing the peat destroys the waterlogged habitat that many specialised plants and animals depend on, so those species lose their habitat and can no longer survive there (oe) **B1**

(b) Answer: It destroys the waterlogged peat bog habitat that many specialised plants and animals depend on, so those species lose their habitat and are lost from the area.

Question 2

(a) any one of: breeding programmes for endangered species; protection and regeneration of rare habitats; reducing deforestation and monoculture farming; reintroducing hedgerows/field margins; creating buffer zones around rivers, lakes and wetlands **B1**

(a) a second, different method from the list above **B1**

(a) Answer: Any two of: breeding programmes for endangered species, protection and regeneration of rare habitats, reducing deforestation and monoculture farming, reintroducing hedgerows and field margins, and creating buffer zones around rivers, lakes and wetlands.

(b) correct identification of a method given in part (a) **B1**

(b) a valid explanation linked to that method, e.g. buffer zones reduce fertiliser and pesticide runoff into rivers, protecting aquatic and bankside species; or hedgerows provide habitat and food for insects, birds and small mammals that would otherwise be lost from intensively farmed land **B1**

(b) Answer: For example, creating buffer zones (unplanted strips) along rivers reduces the amount of fertiliser and pesticide runoff entering the water, protecting aquatic and bankside species and helping to maintain a wider range of organisms in that habitat.

Question 3

(a) X: photosynthesis **B1**

(a) Y: respiration **B1**

(a) Answer: X is photosynthesis; Y is respiration.

(b) correct formulae: CO_2, H_2O, $C_6H_{12}O_6$, O_2, with correct balancing numbers ($6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$) **M1**

(b) all correct state symbols included: $6CO_2(g) + 6H_2O(l) \rightarrow C_6H_{12}O_6(aq) + 6O_2(g)$ (light energy required) **A1**

(b) Answer: $6CO_2(g) + 6H_2O(l) \rightarrow C_6H_{12}O_6(aq) + 6O_2(g)$, using light energy.

(c) decomposers (bacteria and fungi) break down/digest the complex carbon compounds in dead organisms and waste material (oe) **B1**

(c) the decomposers respire (aerobically) as they do this, releasing carbon dioxide into the atmosphere as a waste product **B1**

(c) Answer: Decomposers such as bacteria and fungi break down the carbon compounds in dead organisms and waste material, and release carbon dioxide into the atmosphere as they respire.

Question 4

(a) energy from the Sun causes water to evaporate from oceans, lakes and rivers, turning liquid water into water vapour **B1**

(a) the water vapour rises and cools, condensing into tiny droplets of water that form clouds **B1**

(a) the water droplets in clouds combine/grow until they are heavy enough to fall as precipitation (rain, sleet or snow) **B1**

(a) Answer: Energy from the Sun evaporates water from oceans, lakes and rivers into water vapour; this vapour rises, cools and condenses into tiny droplets that form clouds, and these droplets combine until they are heavy enough to fall as precipitation.

(b) it provides a continuous/renewable supply of fresh water that organisms need for essential processes such as drinking, photosynthesis or transporting substances (oe) **B1**

(b) Answer: It provides a continuous, renewable supply of fresh water that plants and animals need for essential processes such as drinking, photosynthesis and transporting substances around their bodies.

(c) it requires a large amount of energy (e.g. to evaporate/distil water, or to generate the pressure needed for reverse osmosis), which makes it very expensive to carry out on a large scale (oe) **B1**

(c) Answer: Desalination requires a large amount of energy, which makes it expensive to carry out on a large scale.

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Question 5

(a) (289 / 850) x 100 **M1**

(a) 34% cao **A1**

(a) Answer: 34%.

(b) area remaining after year 10 = 850 - 289 = 561 hectares **M1**

(b) loss over the next 10 years = candidate's percentage from part (a) applied to 561, e.g. 0.34 x 561 (= 190.74); allow ecf from part (a) **M1**

(b) 370 hectares (awrt 370), allow ecf from part (a) **A1**

(b) Answer: Approximately 370 hectares.

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