

APOLLO

Transfers of energy and matter

SL

Biology

First assessment 2025

18 questions | questions

- 28.** Which organisms use oxidation of simple inorganic substances as an energy source?
- A. Photoautotrophs
 - B. Heterotrophs
 - C. Chemoautotrophs
 - D. Saprotrophs

30. What directly causes oxygen levels to drop during eutrophication in aquatic ecosystems?

- A. Increased photosynthesis by aquatic plants
 - B. Enhanced respiration by fish
 - C. More decomposition of organic matter by bacteria
 - D. Lower levels of nitrogen in the water
-

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DataBase Center for Life Science (DBCLS), 2019. 201905 BottlenoseDolphin. [image online] Available at: https://commons.wikimedia.org/wiki/File:201905_BottlenoseDolphin.svg. Licensed under the Creative Commons Attribution 4.0 International license: <https://creativecommons.org/licenses/by/4.0/deed.en>. [Accessed 5 June 2024]. Source adapted.
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24. Dry rot fungus (*Serpula lacrymans*) secretes digestive enzymes to externally digest dead wood.



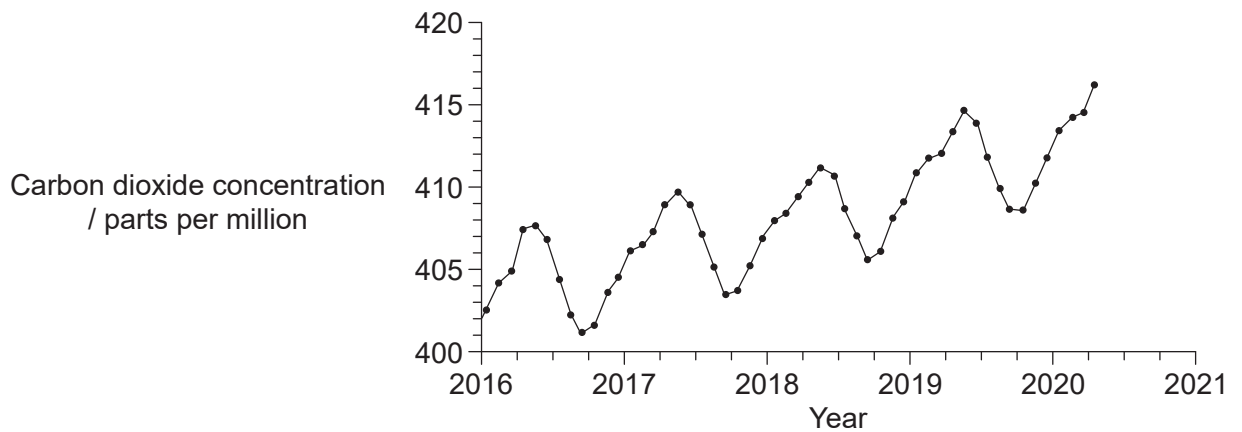
What type of nutrition is used by dry rot fungus?

- A. Holozoic
- B. Saprotrophic
- C. Mixotrophic
- D. Autotrophic

- 26.** What is the energy source of photoautotrophs and chemoautotrophs?
- A. They both use light only.
 - B. They both use oxidation reactions only as an external energy source.
 - C. Photoautotrophs use oxidation reactions, while chemoautotrophs use light.
 - D. Photoautotrophs use light, while chemoautotrophs use oxidation reactions.

Turn over

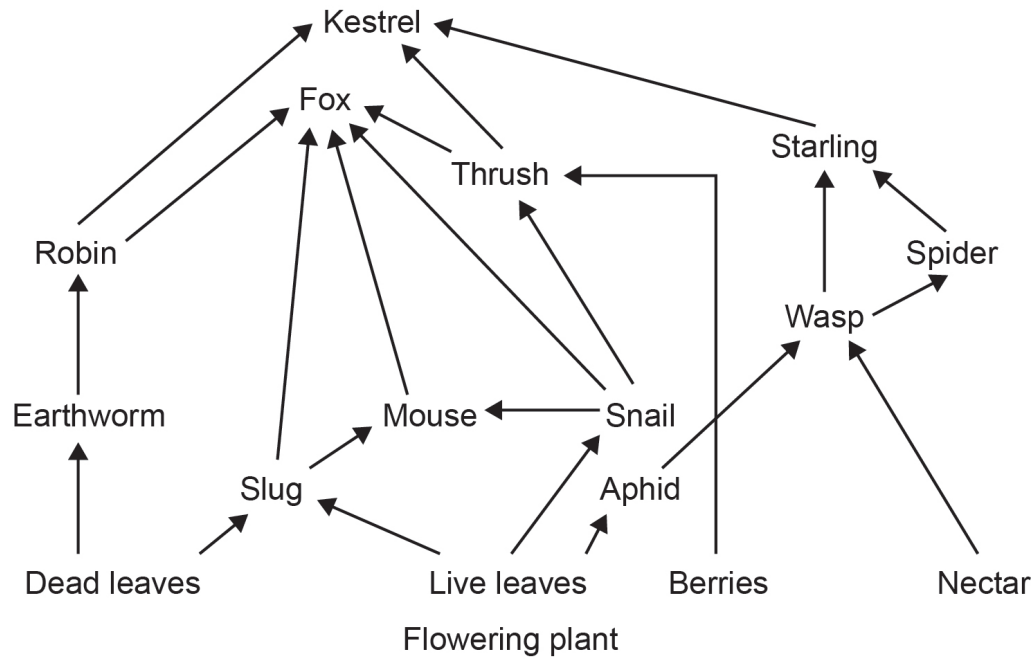
- 28.** The graph shows annual fluctuations of atmospheric carbon dioxide in the Northern Hemisphere. There is a relative increase in carbon dioxide concentration during winters.



Which reason might explain this increase during winters?

- A. Increase in atmosphere–ocean diffusion
- B. Decrease in photosynthesis of plants
- C. Increase in respiration of all organisms
- D. Decrease in combustion from wildfires

28. A terrestrial food web is shown.



How many species in the food web are **only** primary consumers?

- A. 3
- B. 4
- C. 5
- D. 6

30. Which action will decrease carbon sequestration?

- A. Afforestation
 - B. Primary production
 - C. Deforestation
 - D. Rewetting peatlands
-

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Section A

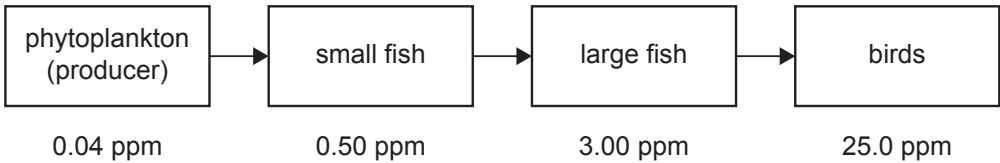
Answer **all** questions. Answers must be written within the answer boxes provided.

5. (a) Broad-spectrum insecticides kill many different species of insect. Narrow-spectrum insecticides only target a specific species of insect. Suggest **one** disadvantage of using a broad-spectrum insecticide. [1]

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- (b) The diagram shows the concentration of an insecticide, in parts per million (ppm), at different trophic levels of an aquatic food chain.



- (i) Identify the trophic level of the large fish. [1]

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- (ii) Explain the high concentration of insecticide in birds. [3]

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Section B

Answer **one** question. Up to one additional mark is available for the construction of your answer. Answers must be written within the answer boxes provided.

8. Cycles play an important role both within and outside the body.
- (a) Outline the roles of progesterone in the menstrual cycle. [4]
 - (b) Describe the polymerase chain reaction (PCR). [4]
 - (c) Explain how carbon is recycled in a terrestrial ecosystem. [7]



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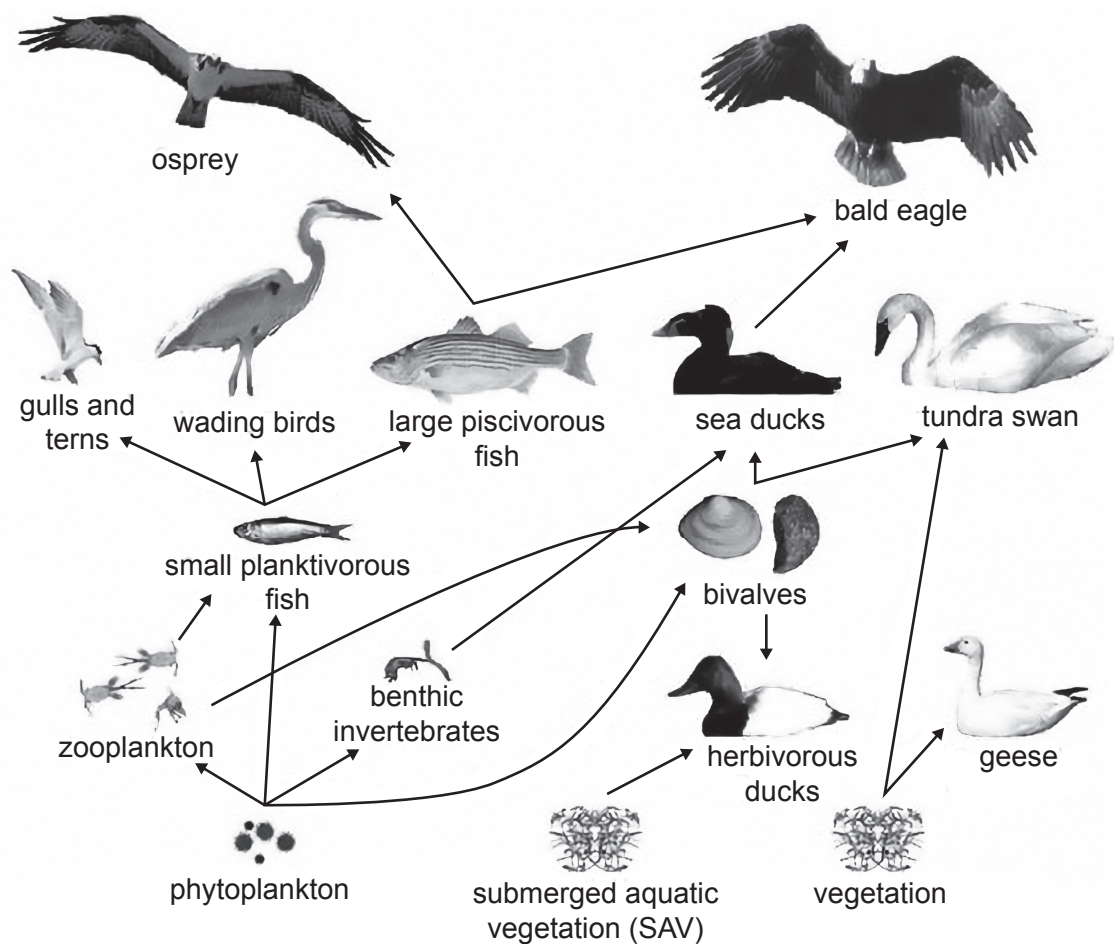
References:

- 1.a** From *The New England Journal of Medicine*, Mark A. Mintun, Albert C.Lo, Cynthia Duggan Evans, Donanemab in Early Alzheimer's Disease. 384(18), pp. 1691–1704. Copyright © 2021 Massachusetts Medical Society. Reprinted with permission from Massachusetts Medical Society.
- 1.d** Öhrfelt, A., Brinkmalm, A., Dumurgier, J., et al., 2019. A Novel ELISA for the Measurement of Cerebrospinal Fluid SNAP-25 in Patients with Alzheimer's Disease. *Neuroscience* 420, pp. 136–144. <https://doi.org/10.1016/j.neuroscience.2018.11.038>. Source adapted.
- 3.** *The regions of Africa where the chimpanzee and the bonobo are found*, n.d. [online] Available at: <https://www.chrismadden.co.uk/where-are-we/chapters/chapter-16.html> [Accessed 1 May 2024]. Source adapted.
- 6.** Image by OpenClipart-Vectors from Pixabay. Source adapted

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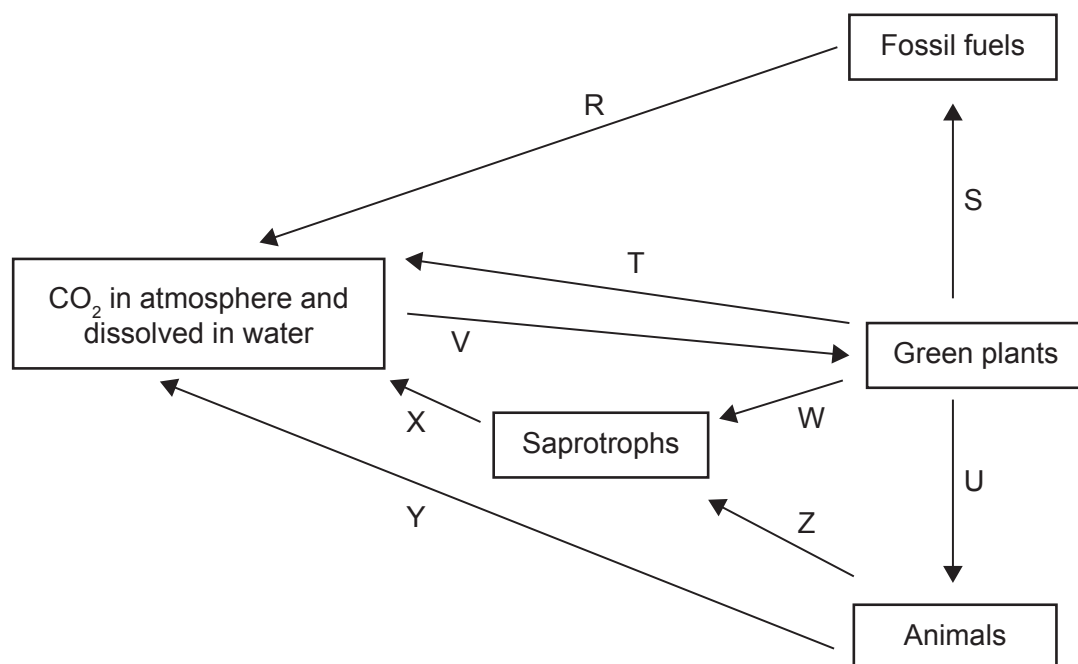
27. The image shows a food web from Chesapeake Bay, USA.



Which organisms are tertiary consumers in at least one food chain?

- A. Small planktivorous fish and tundra swans
- B. Herbivorous ducks and bald eagles
- C. Wading birds and geese
- D. Ospreys and benthic invertebrates

28. The diagram represents the carbon cycle.

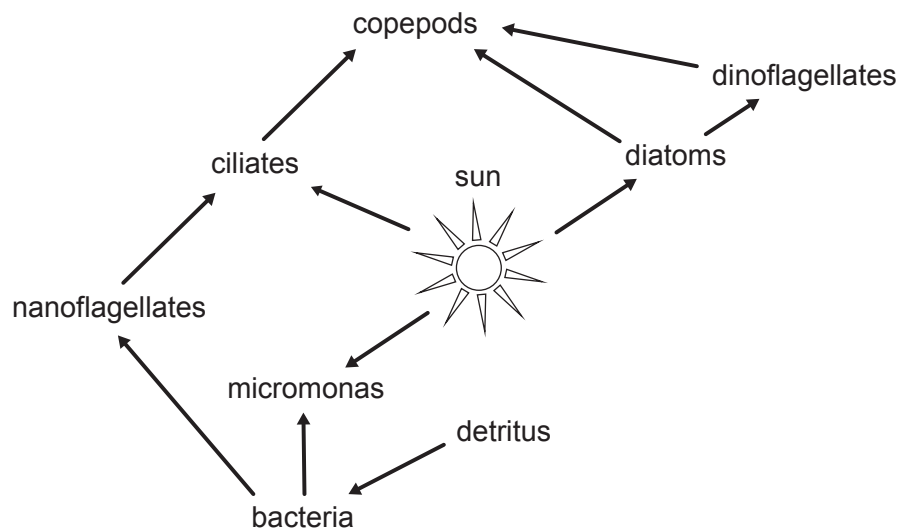


Which arrows represent respiration?

- A. R and V
- B. T and Y
- C. U and Z
- D. W and X

Turn over

25. The diagram shows the flow of energy between some Arctic species.

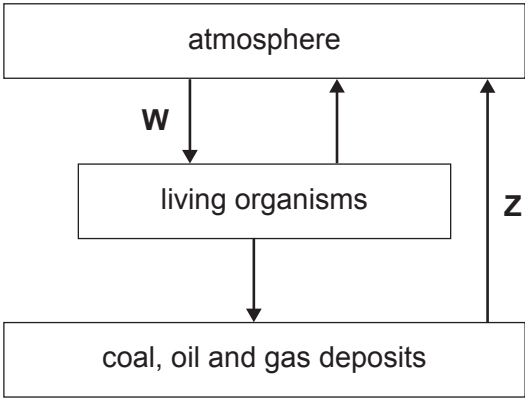


Which organism is a mixotroph?

- A. Bacteria
- B. Nanoflagellates
- C. Micromonas
- D. Copepods

Turn over

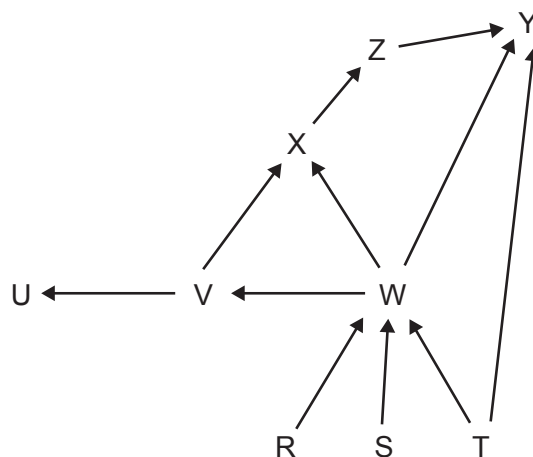
26. The diagram shows a simplified carbon cycle.



Which processes are taking place at W and Z?

	W	Z
A.	respiration	combustion
B.	photosynthesis	decomposition
C.	respiration	decomposition
D.	photosynthesis	combustion

28. The diagram shows a food web for an aquatic ecosystem in which the letters R–Z represent individual species.



Which organism is both a secondary and tertiary consumer?

- A. Organism T
- B. Organism X
- C. Organism Y
- D. Organism Z

Section A

Answer **all** questions. Answers must be written within the answer boxes provided.

5. Food chains combine to form food webs in an ecosystem.

(a) Define the term autotroph. [1]

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(b) Describe the role of decomposers in ecosystems. [2]

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(c) The efficiency of energy transfer along the various food chains in a food web varies. Suggest reasons for the differences. [3]

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(This question continues on the following page)



(Question 5 continued)

There are estimated to be over 940 million cattle in the world.



(d) Suggest how increases in cattle farming are affecting climate patterns worldwide. [2]

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Turn over

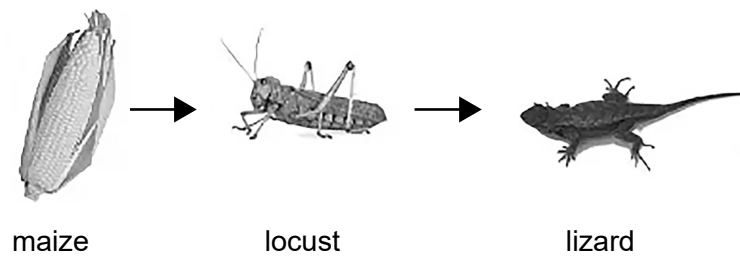
26. Which row of the table describes a type of nutrition?

	Type of nutrition	Source of energy	Source of carbon	Method of acquiring energy
A.	Autotrophic	sunlight	organic molecules containing carbon	respiration
B.	Heterotrophic	sunlight	carbon dioxide	photosynthesis
C.	Mixotrophic	sunlight and energy-rich organic molecules	carbon dioxide and organic molecules containing carbon	photosynthesis and ingestion
D.	Consumer	energy-rich organic molecules	organic molecules containing carbon	photosynthesis and respiration

Turn over

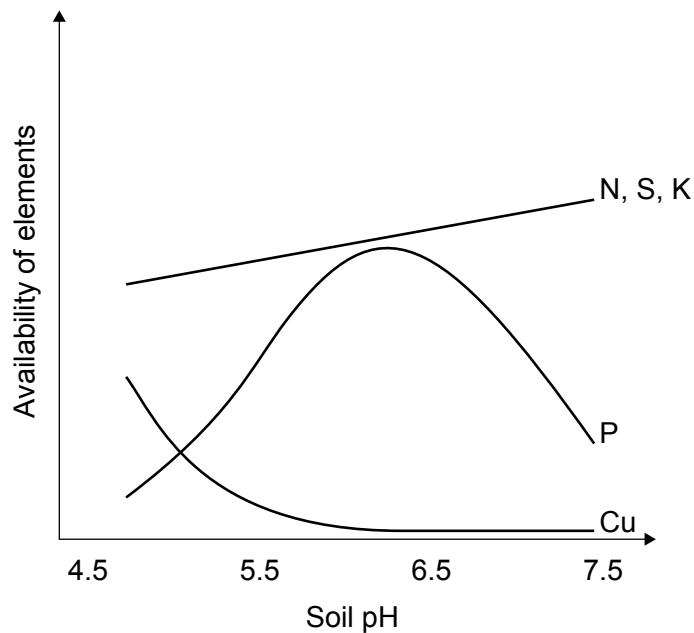
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27. With respect to the food chain shown in the image, what is the role of the locust?



- A. Secondary consumer
- B. Parasite
- C. Chemoautotroph
- D. Herbivore

1. The addition of some forms of nitrogen fertilizer to soil can lead to acidification. As a strategy to combat this, farmers will often undertake 'liming' to combat acidification. This involves adding lime to return the pH to neutral.



Certain soil pH levels are associated with copper (Cu) deficiency in cattle.

- (a) Explain how a copper deficiency in soil could lead to a copper deficiency in a cow. [2]

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- (b) Deduce with a reason which action (fertilizing or liming) could lead to a copper deficiency in a cow. [2]

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(This question continues on the following page)



(Question 1 continued)

- (c) Copper-deficient cows are more susceptible to infections and do not respond as well to vaccinations. Suggest a role for copper in cows. [1]

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- (d) Phosphorous deficiency leads to poor growth of plants.

- (i) State an example of a soil pH where phosphorous deficiency might result. [1]

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- (ii) List two biochemicals important to life that have phosphorous as a raw material. [1]

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Turn over