

Cycling of carbon, water and nitrogen (qualitative)

Q1.(2019,4)

Figure 6 shows the global movement of carbon into or out of the atmosphere.

process	movement of carbon into or out of the atmosphere in gigatonnes per year
photosynthesis	120.1
respiration	119.6
ocean uptake	92.8
ocean loss	90.0
combustion of fossil fuels	6.4

Figure 6

Calculate the net mass of carbon added to the atmosphere each year.

(2)

.....gigatonnes

Q2.a(2019,4)

Joseph Priestley was a scientist who investigated how green plants and combustion affected the carbon cycle.

Figure 7 shows his first experiment.

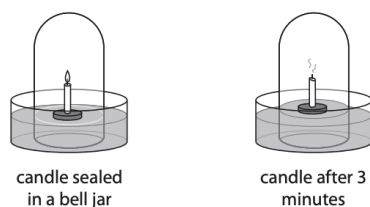


Figure 7

(i) State why the candle was not burning after three minutes.

(1)

Q2.b(2019,4)

Joseph Priestley continued the investigation but placed a plant inside the bell jar as shown in Figure 8.



Figure 8

He observed that the candle stayed alight for two minutes more than the candle in the bell jar in the first experiment.

Explain his observation.

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Q2.c(2019,4)

State **two** variables that would need to be controlled to compare these two experiments.

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Q2.d(2019,4)

Nitrogen is cycled through the environment.

Describe the roles of bacteria in the nitrogen cycle.

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Q3.a(2021,4)

Figure 1 shows an area of woodland with some small plants growing in the ground between the trees.



(Source: © Maksym Holovinov/Shutterstock)

Figure 1

- (a) Name a group of organisms that break down the dead leaves and release mineral ions into the soil.

(1)

Q3.b(2021,4)

The mineral ions are absorbed from the soil into the roots of plants.

Describe how these mineral ions are transported from the roots to the leaves of the plants.

(2)

Q3.c(2021,4)

A scientist recorded the mean light intensity and the mean number of small plants per m² for six 25 m² areas of the woodland.

Figure 2 shows the results.

area of woodland	mean light intensity in lux	mean number of small plants per m ²
A	1500	2.7
B	1300	1.6
C	1000	1.1
D	800	0.6
E	550	0.3
F	350	0.1

Figure 2

- (i) Explain the effect of light intensity on the number of small plants per m².

(2)

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Q3.d(2021,4)

State **one** variable the scientist should have controlled to make sure the light intensity measurements could be compared.

(1)

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Q3.e(2021,4)

The scientist selects an area near the edge of the woodland where many stinging nettles are growing.

This area is partly shaded by the trees.

Describe how the scientist should use a belt transect to investigate how light intensity affects the growth of stinging nettles.

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Q4.a(2022,4)

Figure 5 shows part of the nitrogen cycle.

dead animals and plants $\xrightarrow{\text{X}}$ ammonia $\xrightarrow{\text{Y}}$ nitrates

Figure 5

- (i) Identify the types of microorganism involved in process X and process Y.

(2)

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Q4.b(2022,4)

Explain how crop rotation increases nitrate levels in the soil.

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Q4.c(2022,4)

Explain why increased nitrate levels in the soil improve crop yield.

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Q5.(2023,4)

Explain the role of denitrifying bacteria in the nitrogen cycle.

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Q6.(2023,4)

Describe how carbon is cycled through the biotic and abiotic components of an ecosystem.

(6)
