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4.1 Species, Communities, Ecosystems & Energy Flow

Hard

BIOLOGY

IB HL

4.1 Species, Communities, Ecosystems & Energy Flow

Question Paper

Course	DP IB Biology
Section	4. Ecology
Topic	4.1 Species, Communities, Ecosystems & Energy Flow
Difficulty	Hard

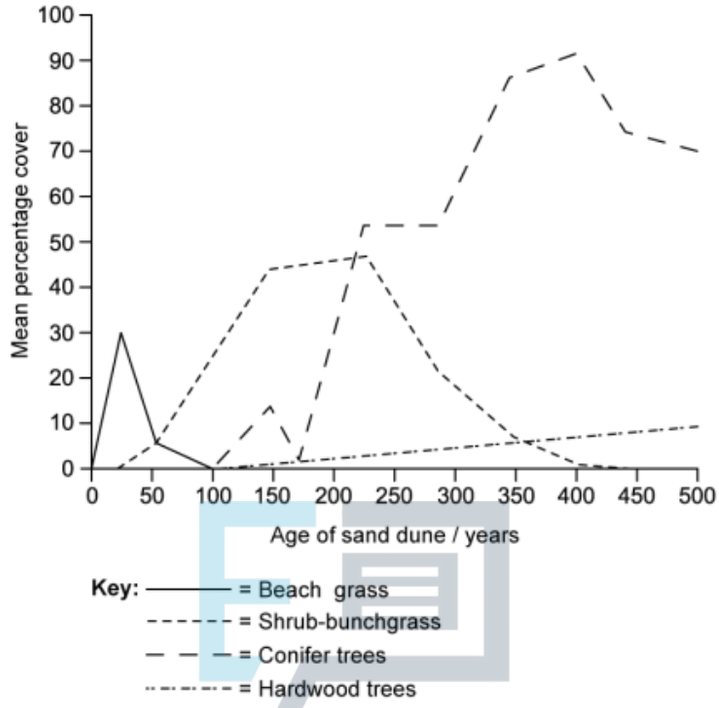
Time allowed: 10

Score: /6

Percentage: /100

Question 1

The graph shows changes in percentage cover of four plant species on a sand dune ecosystem over 500 years.



Which of the following explanations cannot be supported using the information in this graph.

A. All four species never formed part of the same community

B. Beech grass became extinct after 100 years

C. Interspecific competition between conifer trees and shrub bunchgrass occurs leading to a decrease in shrub bunchgrass

D. Intraspecific competition results in a decrease in conifer trees after around 400 years

[1 mark]

Question 2

A water quality investigation was carried out after some cases of heavy metal poisoning were detected in a countryside village with a river running through it. The investigators were trying to establish if poisoning was worse on the north or the south of the river.

	North of the river	South of the river
Number of cases of heavy metal poisoning	26	12

The results from a chi-squared test were:

Chi-squared value:	5.2
Degrees of freedom:	1

Critical values table:

Degrees of Freedom	P = 0.05	P = 0.01	P = 0.001
1	3.83	6.64	10.83
2	5.99	9.21	13.82
3	7.82	11.35	16.27

What conclusions can be drawn from the information above?

A. The χ^2 value is greater than the critical value so there is an association between heavy metal poisoning and location

B. The χ^2 value is lower than the critical value so there is no association between heavy metal poisoning and location

C. Poisoning from heavy metals is worse in villages

D. Heavy metals are found in both locations, north and south of the river

[1 mark]

Question 3

Which row of the table correctly identifies an observation of food chains and the theory used to explain that observation?

	Observation	Theory
I	Food chains are short	Energy losses occur at each trophic level
II	Food chains have a pyramid structure	Organisms with a larger biomass provide more energy to the next trophic level
III	Food chains all start with a producer	Producers transfer energy most efficiently
IV	Energy losses occur at each trophic level	Energy is transferred to the surroundings during respiration

A. I only

B. I and IV

C. II and IV

D. I and III

[1 mark]

Question 4

Which of the following is **not** true about mesocosms?

A. Mesocosms allow the control of environmental conditions

B. Mesocosms allow collection of reliable data

C. Continuous data can be collected from a mesocosm

D. It is easy to mimic natural environmental conditions in a mesocosm

[1 mark]

Question 5

The Ghost Orchid (*Epipogium aphyllum*) is a rare plant species which lacks leaves or chlorophyll. The plant has formed a symbiotic relationship with a fungus in order to obtain the nutrition it requires. The growth of the fungus is slowed as a result of the relationship.

Which of the following rows correctly describes *E.aphyllum*?

	Heterotroph	Autotroph	Parasite	Saprotroph
A	✓	X	X	✓
B	X	✓	X	✓
C	✓	X	✓	✓
D	✓	X	✓	X

[1 mark]

Question 6

Which of the following statements about inorganic nutrients are true?

I. Carbon and hydrogen are key components of inorganic ions necessary for cell growth and development
II. Inorganic ions enter the ecosystem through plant roots using energy from ATP
III. Drought leading to dry soils results in a reduced availability of inorganic ions
IV. Sustainability of an ecosystems relies on inorganic ions being locked up within the biomass of an organism

A. I, II and IV

B. II and III

C. II, III and IV

D. II only

[1 mark]