IB Style Test – Topic 4 Ecology

Includes new elements of the 2016 guide

Multiple choice questions

1. If two populations separated by a physical barrier could potentially and successfully interbreed then they are classified as
    A. Two different species
    B. One species
    C. Two sub-species
    D. Two groups

2. Which of the following are maintained in an ecosystem by nutrient cycling?

    I Nitrates
    II Carbon
    III Energy

    A I only
    B 1 and II only
    C I and III only
    D I, II and III

3. Which statement best describes the role of plants and algae in an ecosystem?
    A. All are autotrophs
    B. Most are symbionts
    C. All are producers
    D. Most are autotrophs

4. In what form is energy lost from the ecosystem?
    A. Egestion
    B. Light
    C. Excretion
    D. Heat

5. In aquatic ecosystems, which are the main carbon sources for photoautotrophs?

    I Carbon dioxide
    II Carbonate ions
    III Hydrogen carbonate ions
    IV Glucose

    A I only
    B II and III only
    C I and III only
    D I, II and IV only

6. Food chains have rarely more than 5 levels. What is the major factor that restricts the length of food chains?
    A. Energy loss
    B. The size of top carnivores
    C. Food availability
    D. Predation

7. Which unit is most commonly used to measure annual carbon fluxes?
    A. Tonnes
    B. Grams
    C. Gigatonnes
    D. Megatons

8. Methane gas is

    I Produced by methanogenic archaens
    II Is oxidised to carbon dioxide and water in the atmosphere
    III Is produced by marshes and waterlogged soils
    IV Is a contributor to the greenhouse effect

    A 1 and II only
    B II and IV only
    C I, II and III only
    D All of the above

9. Which of the following has been the most important cause of the increase in greenhouse gases in the atmosphere in the last 200 years?
    A. Logging and deforestation
    B. Agricultural livestock
    C. Nuclear reactors
    D. Combustion of fossil fuels

10. Which of the following are affected by changing concentrations of greenhouse gases?

    I Global temperatures
    II UV light incidence on the surface of the earth
    III Climate patterns

    A II only
    B 1 and II only
    C I and III only
    D I, II and III

Structured answer questions

11. Explain why an ecosystem has the potential to be sustainable over a long time period. (3 marks).

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12. Discuss why sustainability is important in human activities and give an example of one way in which sustainability can be promoted. (3 marks).

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13. Explain why mollusc and corals are important in the formation of limestone. (2 marks).

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14. Outline whether a plant-based diet could to some extent aid in alleviating the problem of world hunger (2 marks)

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15. By means of a specific example, describe what is meant by the term carbon flux. (3 marks).

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16. Detritivores and saprotrophs both obtain energy from detritus and decaying organic matter. What is the main difference in the manner in which they obtain nutrients? (2 marks)

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17. Considering the following data (source Ministry of the Interior, Greece)

Emissions by years for NATIONAL TOTAL for CO_2 in Greece (in Gigagrams)	
1996	89,041
1997	93,637
1998	98,289
1999	97,594
2000	103,429
2001	105,506
2002	105,504

There is a general increase in emissions from 1996 to 2001. Suggest why the figures from 2001 to 2002 do not follow this trend. (2 marks).

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18. Outline why increased concentrations of dissolved carbon dioxide in marine environments are a threat to coral reefs. (2 marks)

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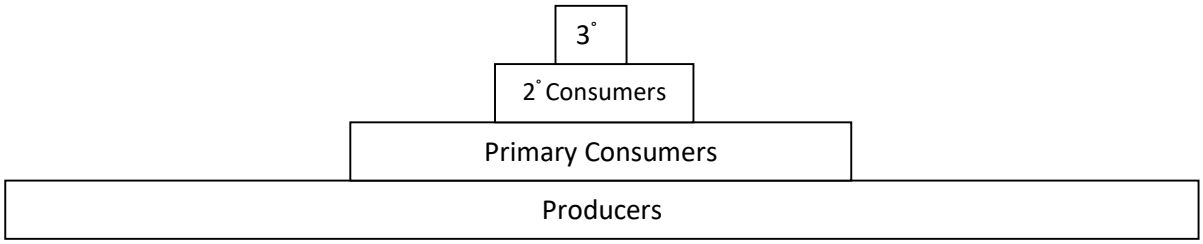
19. In the pyramid of energy shown below, 1cm represents 6000 kJ/m^2/yr



a. Calculate the energy present at the second trophic level. (2 marks).

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b. Explain the use of the unit kJ/m^2/yr to represent the energy at a trophic level. (2 marks).

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c. List three ways in which energy is lost in passing from the first to second trophic levels (3 marks)

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d. Using the data present in the pyramid of energy, explain why the population of tertiary consumers would be expected to be small. (3 marks)

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20. A species of buttercup (A) is thought to be able to accumulate nickel in its tissues. A comparable spp. (B) is not an accumulator.

Species A therefore may be useful for removing nickel pollution from the soil.

Each species of buttercup were seeded into two separate plots, one of which had previously been treated with 3g of nickel sulphate per square meter. Watering and other variables were controlled in all the plots

A month after germination, the populations were counted using quadrats of $1m^2$ and the following results were obtained:

Species	Untreated plot	Treated plot
A	486 plants in 6 quadrats	608 plants in 8 quadrats
B	584 plants in 8 quadrats	115 plants in 5 quadrats

a. Calculate comparable results and a suitable unit for the plant population in the two plots (3 marks)

Species	Density of plants in the Untreated plot. Plants/m^2	Density of plants in the treated plot. Plants/m^2
A		
B		

b. Suggest a hypothesis to explain the difference in populations of the two species in the treated and untreated plots. (2 marks).

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c. Complete the table for each plant and perform the X^2 test to test whether there is a significant difference in the population of species A in the two plots, one untreated and one treated with Nickel sulphate. (5 marks)

Species	Observed Density (O)	Expected Density (E)	(O-E)	$(O-E)^2$	$(O-E)^2/E$
A in untreated	81				
A in treated	76				

Sum $(O-E)^2/E$ = ...

d. The 0.05 (5%) significance level for X^2 for 1 degree of freedom is 3.85. What can you conclude from your result? (2marks).

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