PEARSON EDEXCEL A-LEVEL BIOLOGY B · 9BI0

BIOLOGY



EXAM QUESTION PACK

TOPIC 10: ECOSYSTEMS

THE NATURE OF ECOSYSTEMS

SCORE	PERCENTAGE
/36	%

STEMUP

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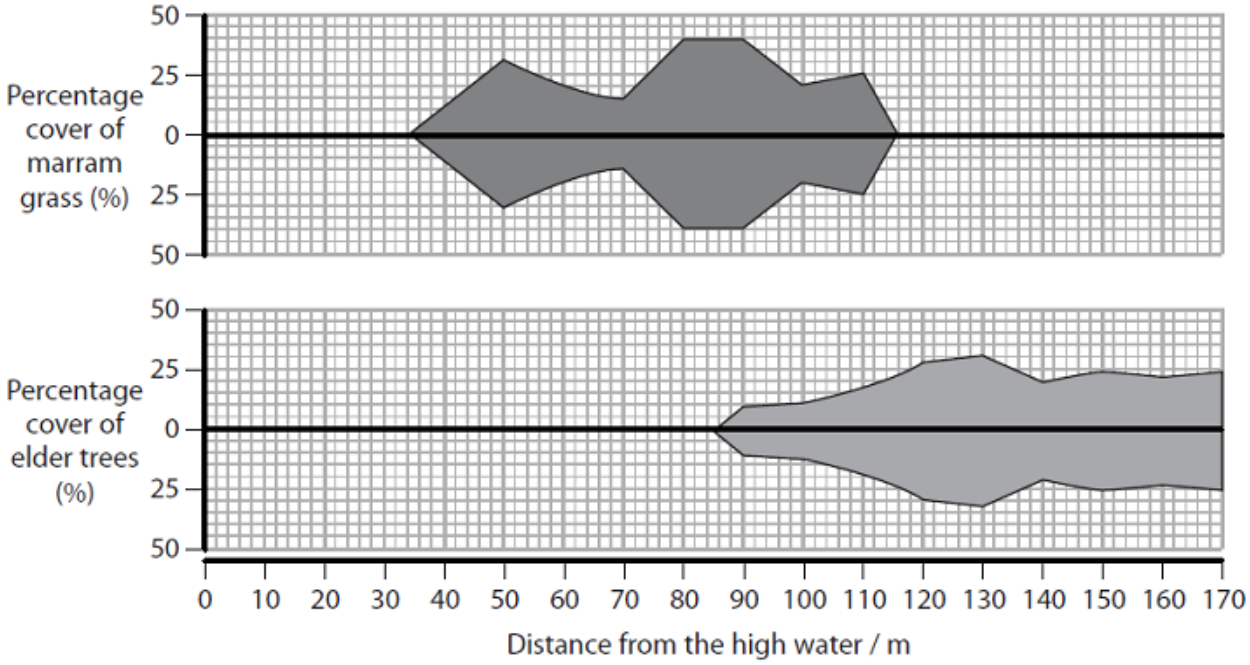
Q1.

A student measured the distribution of two plant species at the coast.

The distribution was measured from the high water line to 170 m inland.

The student represented the distribution of the two plant species in a kite diagram as shown.

The height of each kite diagram represents the percentage cover of plant species at different distances from the high water line.



(i) Compare and contrast the distribution of marram grass and elder trees.

(2)

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(ii) Explain how the student could have collected the data shown in the diagram.

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(Total for question = 5 marks)

Q2.

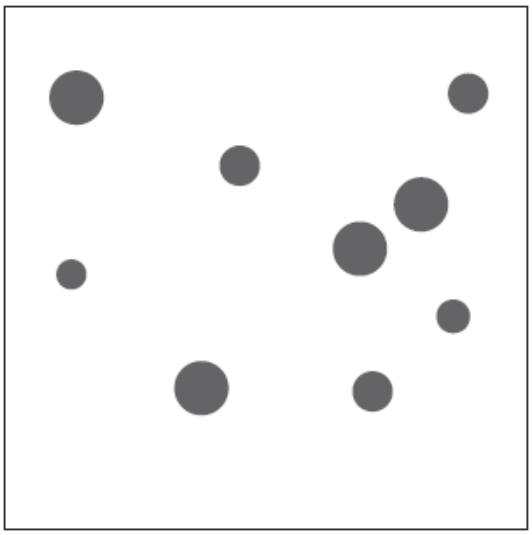
The drawing shows a plant called white clover, *Trifolium repens*.



A student used a 50 cm × 50 cm quadrat to compare the abundance of white clover in a trampled area of grassland and an untrampled area of grassland.

Each area measured 90 m × 45 m.

The diagram shows the distribution of white clover plants in one quadrat from the area of trampled grassland. Each circle represents one clover plant.



(i) Use the results from this quadrat to calculate the total number of white clover plants present in the area of trampled grassland.

(2)

Answer .....

(ii) The student used the same method to calculate the total number of white clover plants in the area of untrampled grassland.

The student decided that the calculated values were not accurate.

Explain how you would modify the method to obtain more accurate results.

(3)

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(Total for question = 5 marks)

Q3.

Chester Zoo has 12 000 animals from 400 different species.

Chester Zoo aims "to be a major force in conserving biodiversity worldwide".

Chester Zoo supports an *in-situ* rhinoceros conservation and monitoring project in Chyulu Hills National Park in Kenya.

It is difficult to find and count the black rhinoceros because they roam freely across a large area.

However, the DNA of a black rhinoceros can be obtained from its dung (faeces).

(i) Devise a method by which black rhinoceros dung could be used to estimate the number of black rhinoceros living in Chyulu Hills National Park.

(5)

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(ii) DNA from dung indicated that 14 black rhinoceros were present in the park.

Explain why 14 black rhinoceros could be an underestimate of the population.

(2)

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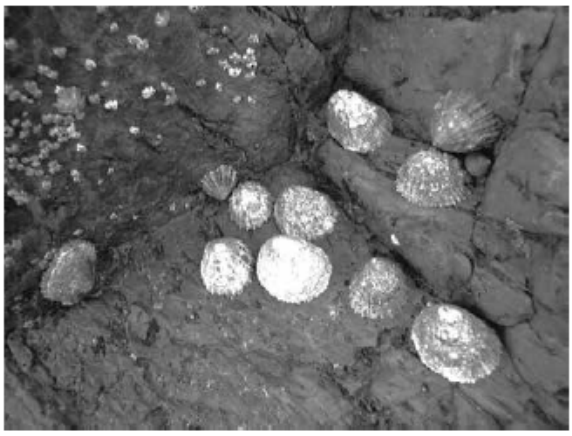
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Q4.

The photograph below shows limpets *Patella vulgata* living on a rocky seashore.

Limpets are snail-like animals with a conical shell. The limpets live on a part of the shore which is covered by the sea twice each day. They feed on algae when the rocks are covered with sea water.

When they are uncovered at low tide they clamp against the rock to prevent desiccation.



A student investigated the relationship between the size of the limpets and their location on the shore.

A 40 m transect was used, beginning at the low water mark and extending up a sloping rocky shore. A $1m^2$ quadrat was placed every 5 m along this transect and the diameter of 10 randomly selected limpets was measured.

The table below shows data collected from this investigation.

Distance from low water mark / m	Rank of distance	Mean diameter of limpets / mm	Rank of diameters	Difference in the two ranks (D)	D^2
0	9	19.8	3	6	36
5	8	20.2	1	7	49
10	7	19.6	4	3	9
15	6	18.8	5	1	1
20	5	20.1	2	3	9
25	4	17.4	6	−2	4
30	3	16.1			
35	2	16.9	8	−6	36
40	1	17.2			

(a) Complete the table to show the missing data.

(2)

(b) (i) To test the strength of the relationship between these two variables, the student decided to apply a Spearman's rank correlation test.

Calculate the Spearman's rank correlation coefficient for these two variables.

(3)

$$r_s = 1 - \frac{6(\Sigma D^2)}{n(n^2 - 1)}$$

Answer .....

(ii) A student formed the hypothesis that the size of the limpets would decrease as the distance up the shore increased.

The table below shows critical values of r_s at different significance levels.

Number of pairs	Significance levels			
	10%	5%	2%	1%
8	0.643	0.786	0.833	0.881
9	0.600	0.683	0.783	0.833
10	0.564	0.648	0.746	0.794

Use the calculated value of r_s and this table to comment on whether the student's hypothesis can be accepted.

(3)

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(c) The student carrying out the investigation wrote a further hypothesis:

'*The limpets lower on the shore have a longer time to feed and will grow bigger.*'

Design a laboratory experiment to test this hypothesis.

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(Total for question = 13 marks)

Q5.

The island of Surtsey was formed by a volcanic eruption in the Atlantic Ocean in 1965.

The photographs show the formation of Surtsey in 1965 and part of the island in 2018.



volcanocafe.files.wordpress.com



vulkaner.no

Scientists have been studying the development of ecosystems on this island since its formation.

(i) State what is meant by the term ecosystem.

(1)

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(ii) Explain how ecosystems have developed on Surtsey since 1965.

(5)

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(Total for question = 6 marks)