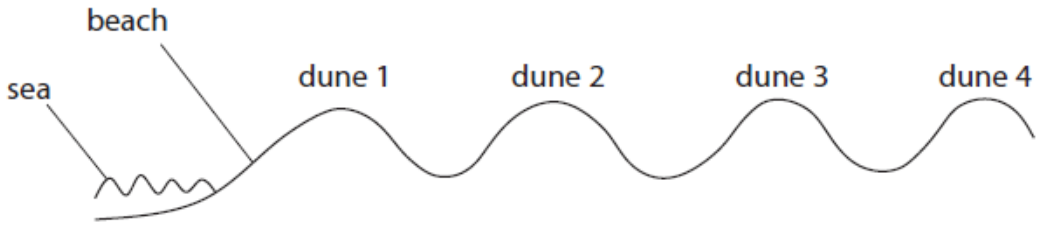
Populations in Ecosystems - Questions by Topic

Q1.

Sand dunes are a habitat that can often be found by the edge of the sea.

An investigation was carried out to study the variety of plant species found on sand dunes.

Four adjacent sand dunes from the sea to further inland were selected, as shown in the diagram.



Each species of plant present on dune 1 was recorded along with the total number of each species of plant present. This was repeated for dunes 2, 3 and 4 and the results are shown in the table.

Plant species	Number of each plant species present			
	dune 1	dune 2	dune 3	dune 4
A	169	9	0	0
B	5	123	19	0
C	0	0	126	182
D	1	44	0	0
E	0	0	5	2
F	0	0	20	10
G	0	0	86	35
H	0	0	0	62
I	0	0	32	17
J	0	0	0	119

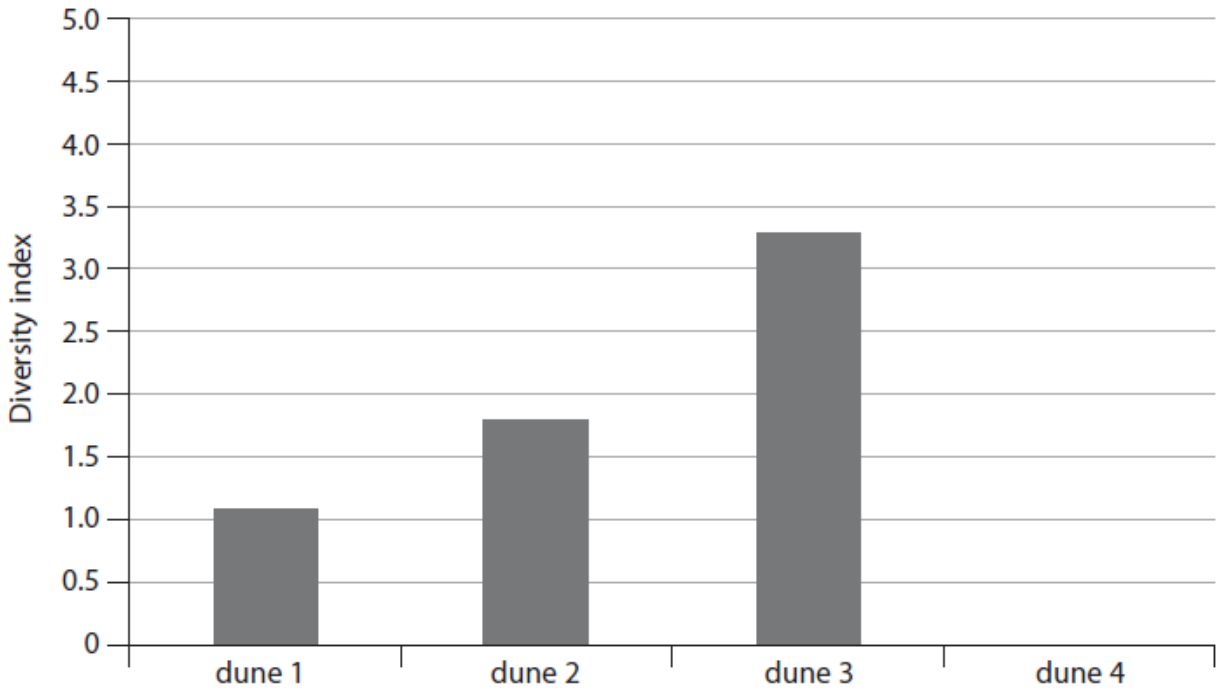
(i) The diversity index was calculated for dunes 1, 2 and 3 using this equation.

$$\text{Diversity index } (D) = \frac{N(N-1)}{\Sigma n(n-1)}$$

Where N is the total number of all individuals of all species in each dune. Use the table and diversity index equation to calculate the diversity index for dune 4.

Plot your answer on the bar chart.

(3)



(ii) Explain how the data demonstrate the process of succession.

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Q2.

(i) Describe and explain how global warming could affect plant species.

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(ii) Explain how the effects on plant species could affect animal species.

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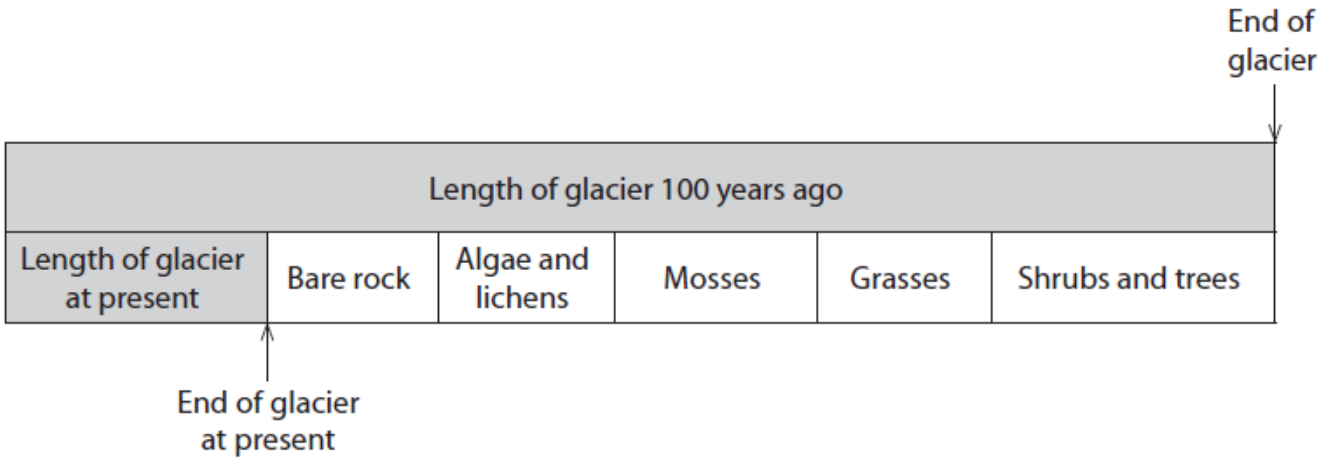
Q3.

Glaciers are long, large masses of ice that formed thousands of years ago. As a result of warmer climates, more ice is melting. This is reducing the length of the glaciers. As a result, bare rock that was once covered by the glacier becomes exposed.

The diagram below shows the length of a glacier 100 years ago and the glacier at present. It also shows what is now found in a transect taken from where the front edge of the glacier is at present.



(a) Using the information in the diagram, describe and explain the changes in the distribution of organisms with distance from the front edge of this glacier.

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(b) *Epilobium latifolium* is a plant that occupies a niche in an area once covered by this glacier. It is a short flowering plant that grows in clumps.

The photograph below shows three clumps of *Epilobium latifolium*.

Magnification ×0.2

(i) Explain what is meant by the term **niche**, using the plant *Epilobium latifolium* as an example.

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(ii) Describe how to carry out a study of the distribution of *Epilobium latifolium* from the front edge of this glacier.

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(iii) Suggest **one** abiotic factor that might affect the abundance of *Epilobium latifolium* and describe how this factor could be measured.

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(Total for question = 13 marks)