

AQA Examination-style questions

Chapter 17 Biodiversity

- 1 Lacewings are insects that feed on aphids and mites, which are crop pests. The numbers of six species of lacewings, A to F, were counted on samples of apple and strawberry crops. The results are shown in the table.

Crop	Number of adults of each species of lacewing						Diversity index
	A	B	C	D	E	F	
Strawberry	31	0	3	29	17	1	3.2
Apple	10	1	1	7	0	1	

The diversity index (d) is obtained from the formula

$$d = \frac{N(N-1)}{\sum n(n-1)}$$

where N is the total number of organisms of all species and n is the total number of organisms of each species.

- (a) Calculate the diversity index for lacewing species in the apple crop and note the figure. Show your working. (2 marks)
- (b) Suggest **one** reason why the diversity index for the lacewings is different between the two crops. (1 mark)

AQA, 2004

- 2 Deforestation often involves clearing large areas of forest for use as agricultural land. Deforestation reduces the diversity index of an area cleared in this way. Explain why. (2 marks)

AQA, 2005

- 3 The Solomon Islands are situated in the Pacific Ocean. The nearest large land mass is Australia, which is about 1500 km away. The biggest islands are mountainous, with large areas of tropical forest and a wide range of habitats. Some islands have a very high species diversity, and many species are endemic, that is they occur only in the Solomon Islands. The table shows the total number of species on the islands in four vertebrate classes and the percentage which are endemic.

Vertebrate class	Total number of species	Endemic species / %
Mammals	53	36
Birds	223	20
Reptiles	31	13
Amphibians	17	53

- (a) How many reptile species are endemic? (1 mark)
- (b) Suggest an explanation for the high proportion of endemic species on the Solomon Islands. (3 marks)

AQA, 2004

4 **Figure 1** shows a transect across a sand-dune ecosystem.

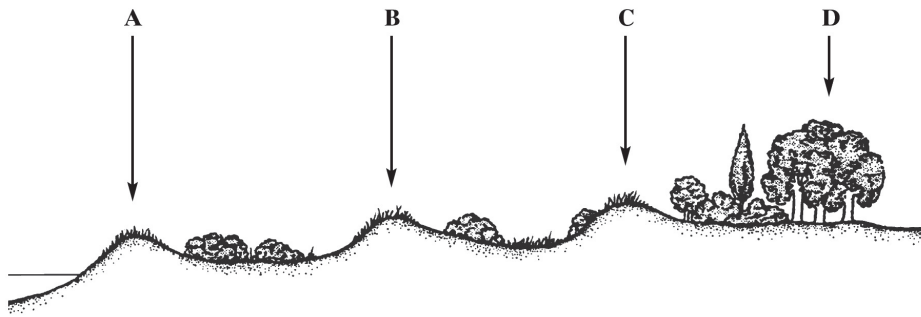


Figure 1

Species	Number of plants in sample
Marram grass	40
Ling	9
Bell heather	4
Gorse	1

The data in the table were obtained from a sample of quadrats taken at position B on the transect. The index of diversity may be calculated from the formula

$$d = \frac{N(N - 1)}{\sum n(n - 1)}$$

Where N = total number of organisms of all species

And n = total number of organisms of each species

- (a) Use the data in the table to calculate the index of diversity for this sample. Show your working. (2 marks)
- (b) Explain why the value of the index of diversity increases along the transect from position A to position D. (1 mark)

AQA, 2003

5 The table shows the numbers of adult butterflies in two areas of the same tropical forest. In the logged area some trees had been cut down for timber. In the virgin forest no trees had been cut down. The two areas were the same size.

Butterfly species	Logged forest		Virgin forest	
	Number	$n(n - 1)$	Number	$n(n - 1)$
<i>Eurema tiluba</i>	72	5112	19	342
<i>Cirrochroa emalea</i>	43	1806	132	17 292
<i>Partenos sylvia</i>	58	3306	14	182
<i>Neopithecops zalmora</i>	6	30	79	6162
<i>Jamides para</i>	37	1332	38	1406
Total	216	11 586	282	25 384

- (a) The index of diversity of a forest can be calculated using the equation

$$d = \frac{N(N - 1)}{\sum n(n - 1)}$$

Calculate the index of diversity for the virgin forest. Show your working. (2 marks)

- (b) What does the table show about the effects of logging on the butterfly populations? (2 marks)

AQA, 2006