



A-Level Biology

Succession

Question Paper

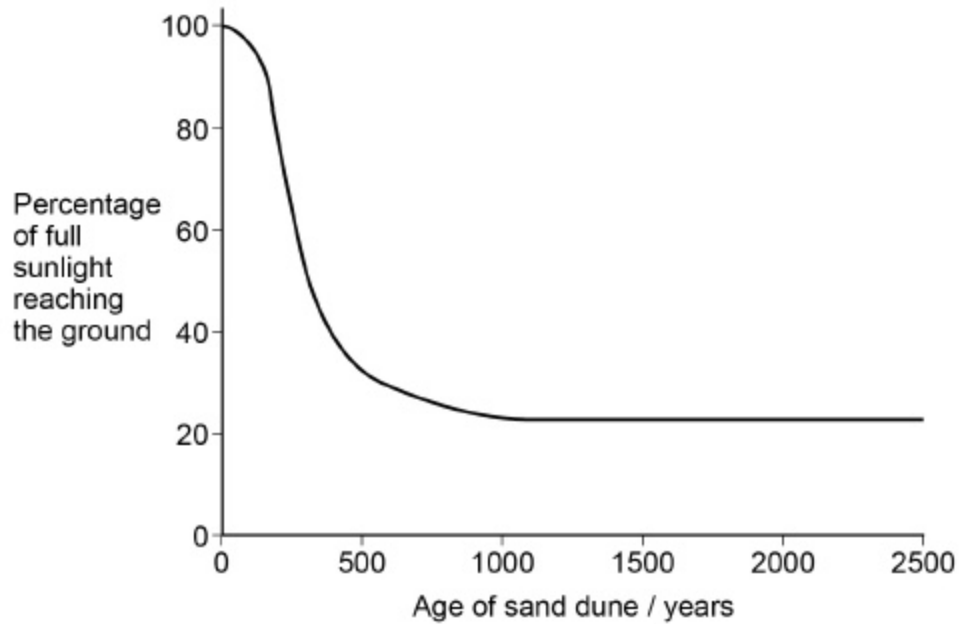
Time available: 60 minutes

Marks available: 51 marks

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The scientists also investigated how the proportion of sunlight reaching the ground changed during succession. Some of the results the scientists obtained are shown in **Figure 2**.

Figure 2



(c) Use **Figure 1** to explain the results in **Figure 2**.

(1)

(d) Using evidence from **Figure 2**, what can you conclude about the net primary productivity (NPP) in the sand dunes that are older than 1000 years?

Explain your answer.

(2)

(Total 10 marks)

- (b) The populations of *Cryptolabis paradoxa* and *Leptohyphes packeri* both increased between days 13 and 63.

Calculate how many times the population growth per day of *Cryptolabis paradoxa* is greater than that of *Leptohyphes packeri* between these days.

Answer = _____

(2)

- (c) The stream eventually recovered to reach a climax community.

Give **two** features of a climax community.

1. _____

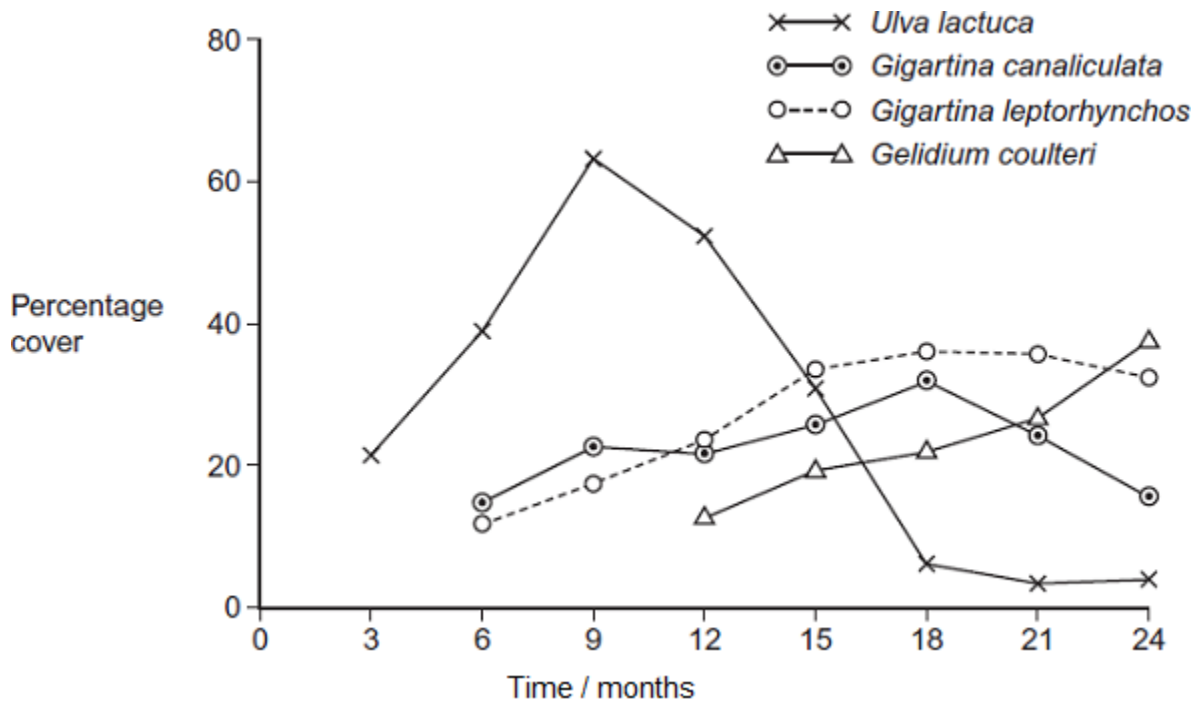
2. _____

(2)

(Total 9 marks)

3.

Algae are photosynthesising organisms. Some algae grow on rocky shores. A scientist investigated succession involving different species of algae. He placed concrete blocks on a rocky shore. At regular intervals over 2 years, he recorded the percentage cover of algal species on the blocks. His results are shown in the graph.



(a) Name the pioneer species.

(1)

(b) (i) The scientist used percentage cover rather than frequency to record the abundance of algae present. Suggest why.

(1)

(ii) Some scientists reviewing this investigation were concerned about the validity of the results because of the use of concrete blocks. Suggest **one** reason why these scientists were concerned about using concrete blocks for the growth of algae.

(1)

(c) Use the results of this investigation to describe and explain the process of succession.

(4)

(Total 7 marks)

4.

A student investigated an area of moorland where succession was occurring. She used quadrats to measure the percentage cover of plant species, bare ground and surface water every 10 metres along a transect. She also recorded the depth of soil at each quadrat. Her results are shown in the table.

	Percentage cover in each quadrat A to E				
	A	B	C	D	E
Bog moss	55	40	10	–	–
Bell heather	–	–	–	15	10
Sundew	10	5	–	–	–
Ling	–	–	–	15	20
Bilberry	–	–	–	15	25
Heath grass	–	–	30	10	5
Soft rush	–	30	20	5	5
Sheep's fescue	–	–	25	35	30
Bare ground	20	15	10	5	5
Surface water	15	10	5	–	–
Soil depth / cm	3.2	4.7	8.2	11.5	14.8

– Indicates zero percentage cover.

(a) Explain how these data suggest that succession has occurred from points **A** to **E** along the transect.

(3)

(b) The diversity of animal species is higher at **E** than **A**. Explain why.

(2)

(c) The student used the mark-release-recapture technique to estimate the size of the population of sand lizards on an area of moorland. She collected 17 lizards and marked them before releasing them back into the same area. Later, she collected 20 lizards, 10 of which were marked.

(i) Give **two** conditions for results from mark-release-recapture investigations to be valid.

1. _____

2. _____

(2)

(ii) Calculate the number of sand lizards on this area of moorland. Show your working.

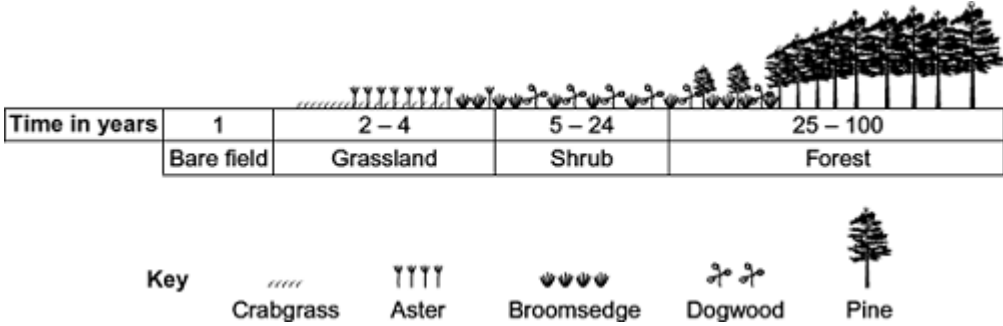
Answer = _____

(2)

(Total 9 marks)

5.

The diagram shows the dominant plants in communities formed during a succession from bare soil to pine forest.



(a) Name the pioneer species shown in the diagram.

(1)

(b) The species that are present change during succession. Explain why.

(2)

(c) The pine trees in the forest have leaves all year. Explain how this results in a low species diversity of plants in the forest.

(1)

(Total 4 marks)

6.

The photograph shows marram grass growing on a sand dune.



Marram grass on sand dune by Nigel Chadwick [CC-BY-SA], via Wikimedia Commons

(a) Describe how you would investigate the distribution of marram grass from one side of the dune to the other.

(3)

(b) Marram grass is a pioneer species that grows on sand dunes. It has long roots and a vertically growing stem that grows up through the sand. Sand dunes are easily damaged by visitors and are blown by the wind. Planting marram grass is useful in helping sand dune ecosystems to recover from damage.

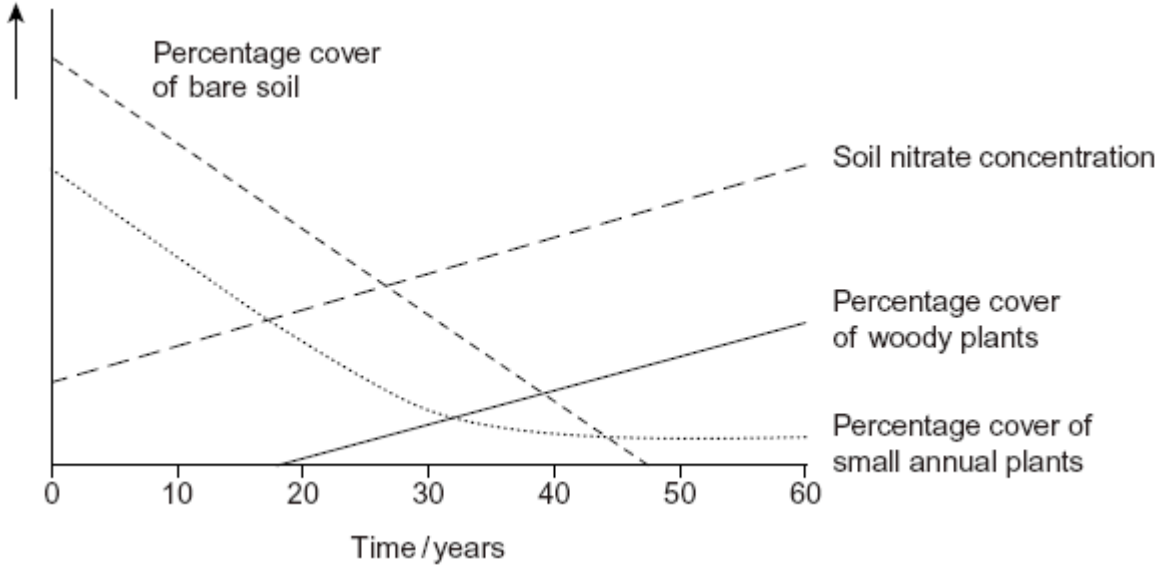
Use your knowledge of succession to explain how.

(2)

(Total 5 marks)

7.

Ecologists investigated succession in some abandoned crop fields. The data that they collected are shown in the graph. The curves show the trends that occurred over a period of 60 years.



(a) Explain the change in soil nitrate concentration shown on the graph.

(2)

(b) The pioneer plants had different characteristics from the plants that colonised the fields after 50 years.

(i) The pioneer plants had seeds that germinate better when the temperature fluctuates. Explain the advantage of this to these pioneer plants.

(2)

- (ii) Explain the advantage to a plant that colonises after 50 years of having a high rate of photosynthesis at low light intensities.

(1)

- (c) Conservation of grassland habitats involves management of succession. Use the data in the graph to explain why.

(2)

(Total 7 marks)