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BIOLOGY

GENETICS, POPULATIONS, EVOLUTION & ECOSYSTEMS

Level & Board	AQA (A-LEVEL)
TOPIC:	POPULATIONS IN ECOSYSTEM
PAPER TYPE:	QUESTION PAPER - 1
TOTAL QUESTIONS	6
TOTAL MARKS	37

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Populations in Ecosystems - 1

1.

Go over the passage that follows.

More fish species can be found in Lake Malawi in East Africa than in any other lake worldwide. A common ancestor is the source of evolution for many of these species. One of the world's largest lakes, Lake Malawi developed many million years ago. The water level has changed significantly since then. Because of this, five tiny, distinct lakes used to make up what is today a huge lake.

The entire land area of Malawi is 118 000 km². Only 94 080 km² of land are really on land because Lake Malawi occupies around one-fifth of the nation.

As of December 1990, 41.4% of Malawi's total land area was covered by forests.

As of December 2016, 26.4% of Malawi's total land area was covered by forests.

Increased soil erosion and nutrient loss into Lake Malawi are results of deforestation and farming near the lake's edge. Certain fish populations have decreased as a result of this. The size of a fish population can be estimated using the mark-release-recapture approach. However, in very big lakes, this strategy may yield inconsistent findings.

Answer the following questions using the facts in the passage and your own understanding.

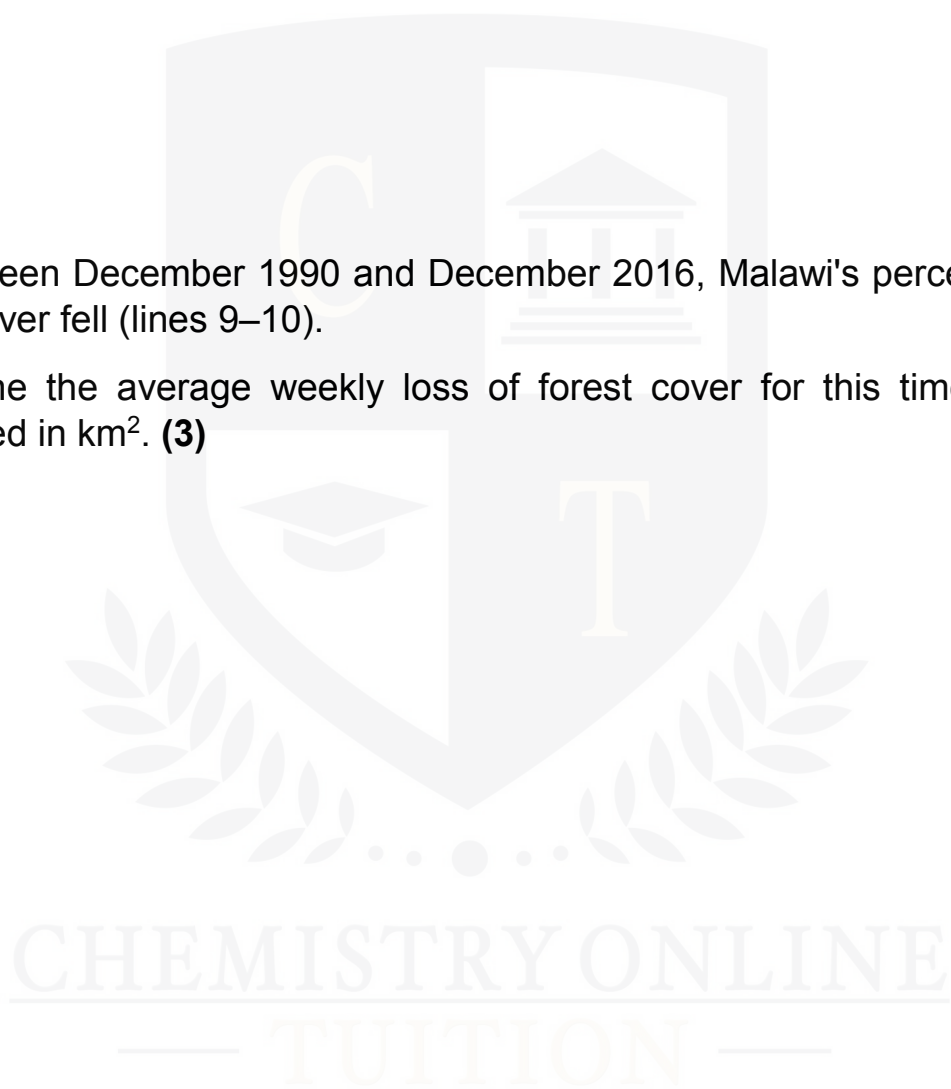
(a) More fish species can be found in Lake Malawi in East Africa than in any other lake in the world (line 1).

Provide a theory as to how this speciation might have happened. **(4)**

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(b) Between December 1990 and December 2016, Malawi's percentage of forest cover fell (lines 9–10).

Determine the average weekly loss of forest cover for this time period, expressed in km². **(3)**



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(c) Certain fish populations have decreased as a result of Lake Malawi's nutrient loss (lines 12–13).

Describe your reasoning. **(4)**

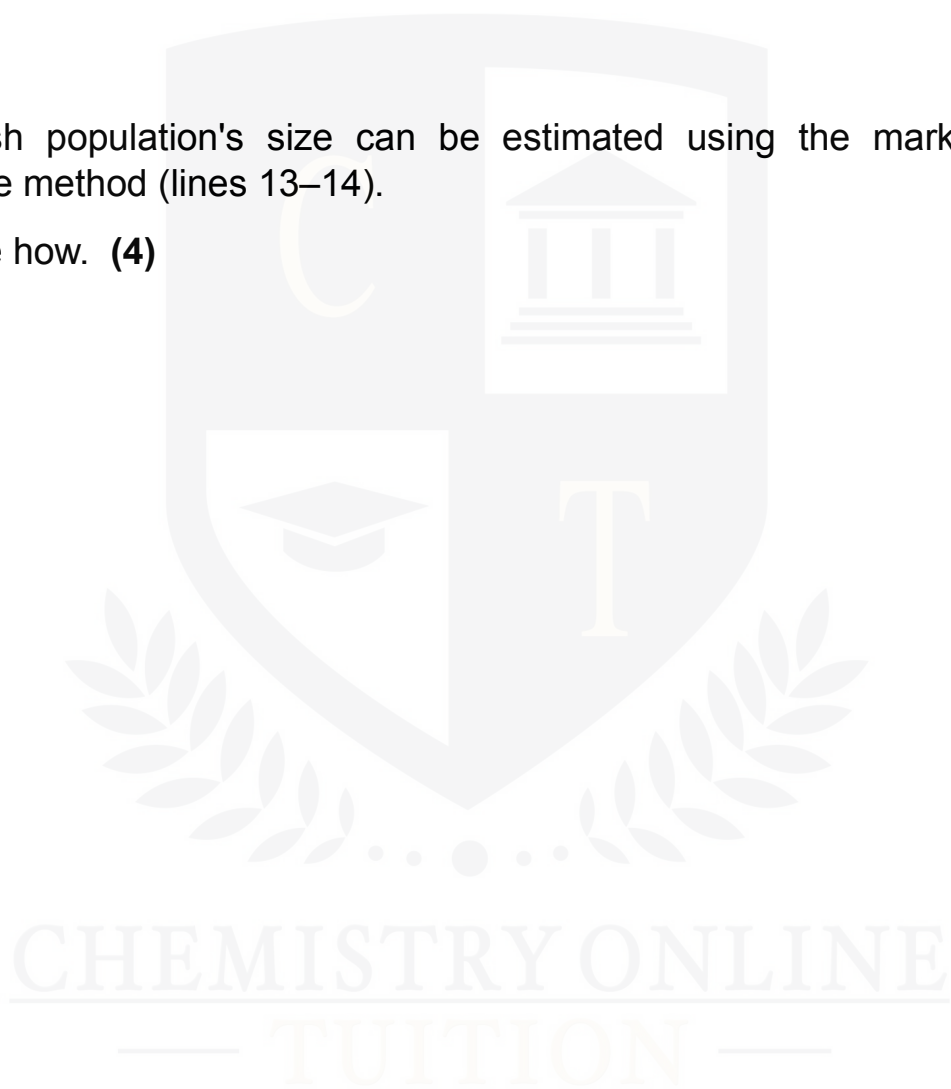


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2.

(a) A fish population's size can be estimated using the mark-release-recapture method (lines 13–14).

Describe how. **(4)**



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(b) Explain why, in very vast lakes, the mark-release-recapture approach can yield inconsistent results (lines 14–15). **(2)**



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3.

(a) Ecosystems in nature experience succession. Describe and elucidate the process of succession. **(4)**

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4.

Growing in moist environments like bogs and marshes, the sundew is a tiny flowering plant. Bogs and marshes have acidic soil with extremely low nutrient concentrations. Insects can be caught and digested by sundew.

(a) Give an example of how you might calculate the number of sundews in a small marsh. **(5)**

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(b) Explain how the sundew is able to thrive in soil that has very low amounts of certain nutrients by suggesting ways in which insects can be digested. **(2)**

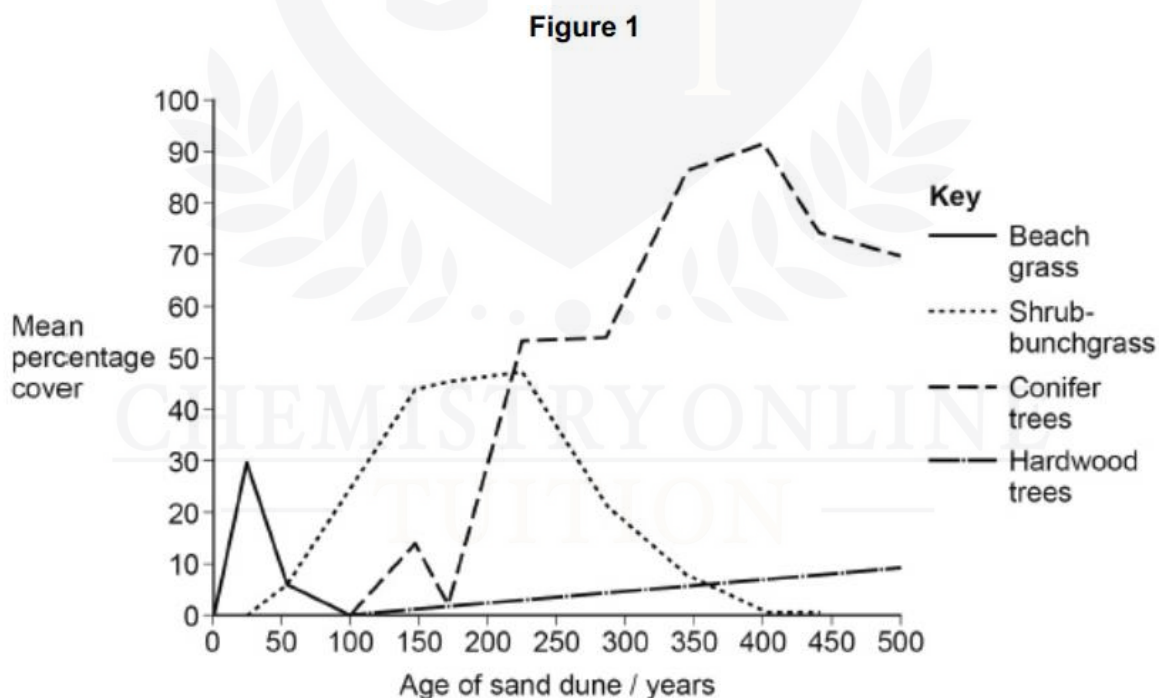
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5.

Researchers looked into the succession mechanism on sand dunes. They calculated the proportion of various plant species that were covered in sand dunes at various ages.

Figure 1 displays some of the findings that the scientists were able to get.



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(a) Give an example of how you would calculate the beach grass's mean percentage cover on a sand dune. **(3)**



(b) The scientists came to the conclusion that succession was at play in order to explain the results displayed in Figure 1.

Explain the scientists' reasoning for coming to this conclusion using Figure 1. **(4)**

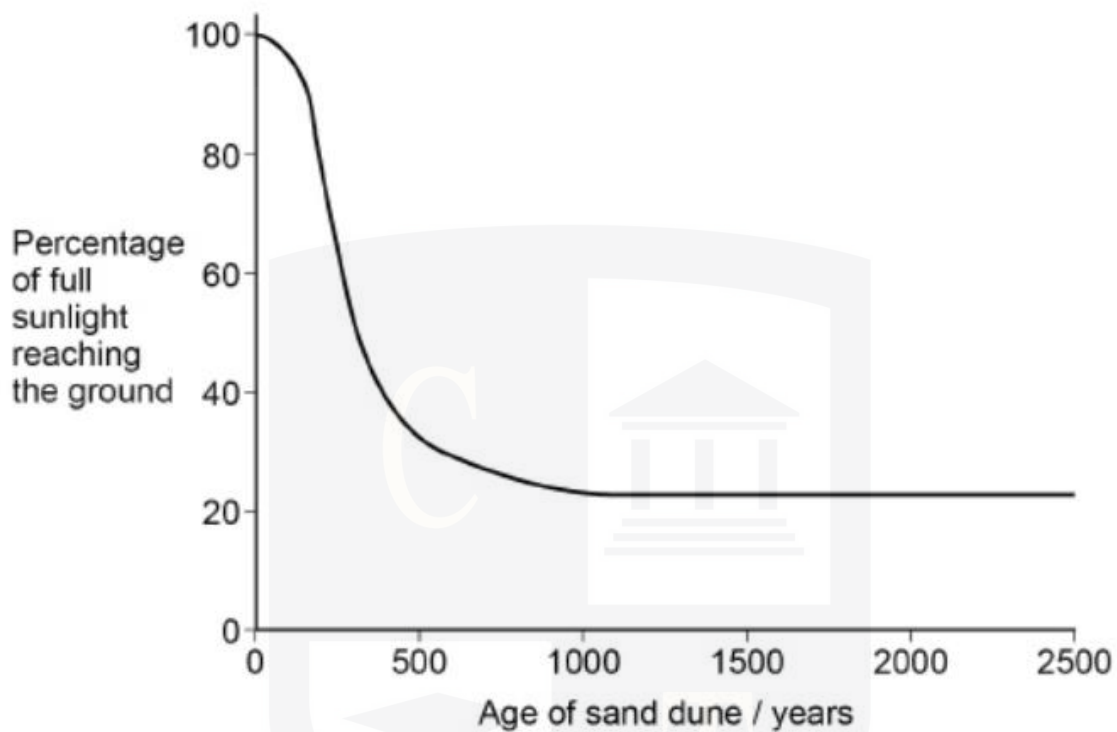
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6.

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



(a) Explain the findings in Figure 2 using Figure 1. **(2)**

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