GCSE Biology B (Twenty First Century Science)

J257/03 Breadth in Biology (Higher)

Question Set 1

1. The Galapagos Islands are a group of 13 islands found in the Pacific Ocean.

(a) **(i)** Charles Darwin visited the Galapagos Islands during the 19th century.

He collected samples and made many observations.

This work helped Darwin to develop a new explanation for the evolution of species.

Which of the following are observations made by Darwin?

Tick (✓) **two** boxes.

There are differences between fossils and living examples of similar organisms.	✓
Pea plants with red flowers can produce offspring with white flowers.	
There is usually extensive variation within a population of a species.	
Some bacteria have become resistant to antibiotics.	
Isolated populations of the same species living in different places have different characteristics.	✓

[2]

(ii) Darwin suggested a theory to explain his observations.

Write down the name of the theory he suggested

Natural Selection

[1]

(b) **(i)** Algae live in the marine environment around the Galapagos Islands.

Photosynthesis takes place in the cells of algae.

In which cell structure does photosynthesis take place?

Chloroplasts

[1]

(ii) Many factors can limit the rate of photosynthesis.

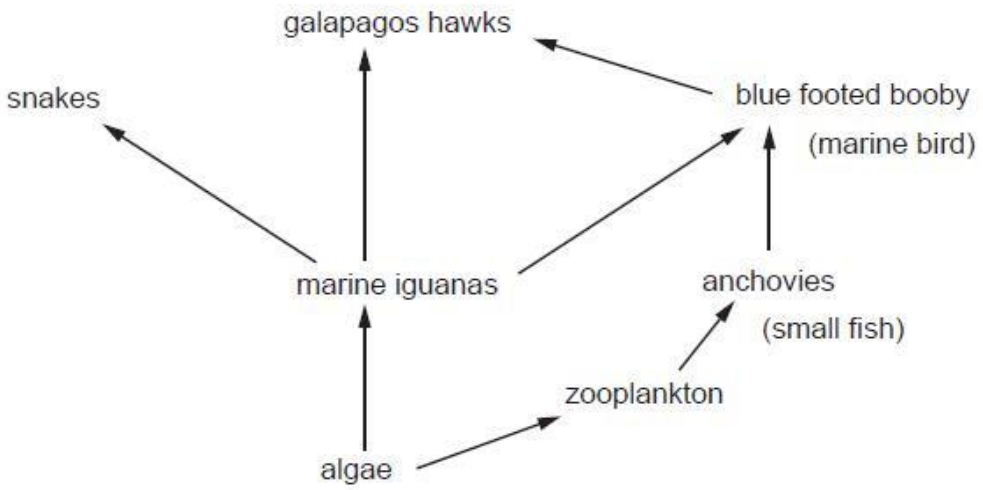
Which factor will **not** limit the rate of photosynthesis in the algae? Put a ring around the correct answer.

carbon dioxide concentration **light intensity** **temperature**

water availability

[1]

(c) **(i)** The food web shows the feeding relationships of some Galapagos Islands species.



A weather event called El Niño occurs every three years. This causes the population of algae to decrease.

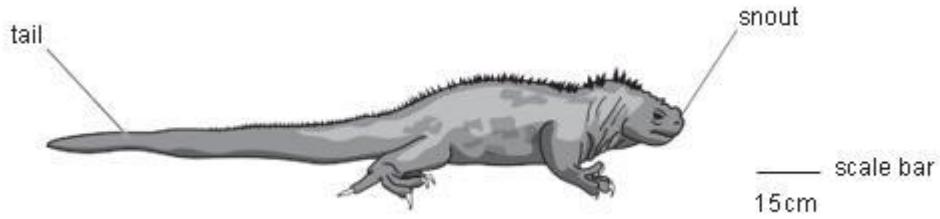
Explain what effect this could have on the population of marine iguanas.

Decrease due to shortage of food. **[2]**

(ii) Scientists have discovered that during this event the marine iguanas can shrink in size.

The length of the marine iguana is determined by measuring the distance from the snout to the end of the tail.

Below is a drawing of a marine iguana.



Use the scale bar to calculate the actual length of this marine iguana in metres.

measured length = 10 cm

10 x 15 = 150 cm = 1.5m

Length of marine iguana = ……1.5……m **[2]**

(iii) Some marine iguanas can shrink by up to 20% of their original length.

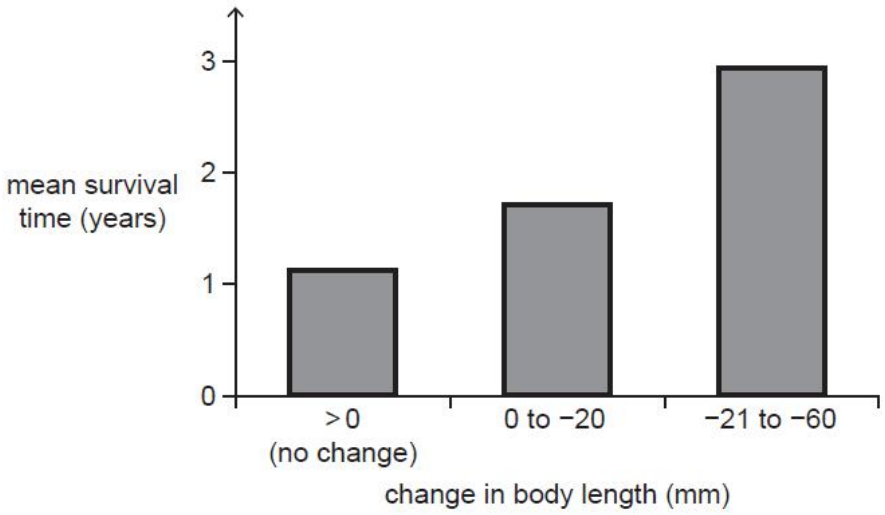
Calculate the length of this marine iguana after maximum shrinkage.

Length after maximum shrinkage = ……1.2……m **[1]**

1.5 x 0.8 = 1.2

(iv) Scientists calculated the change in body length of the iguanas and measured how long they survived during the El Niño event.

The results are shown in the graph.



What can be concluded from the data?

Tick (✓) **two** boxes.

- [ ] The marine iguanas that decreased in size the least survived longer.
- [ ] The change in body length made no difference to the survival time of the marine iguanas.
- [x] The marine iguanas that decreased in size the most on average lived for a greater length of time.
- [x] The marine iguanas that did not decrease in size survived for approximately 2 years less than the marine iguanas that decreased in size by up to 60 mm.
- [ ] The marine iguanas that decreased in size by 20 mm survived more than double the length of time than those that did not change in size.

[2]

Total Marks for Question Set 1: 12

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