OCR GCSE 21ST CENTURY BIOLOGY B · J257

BIOLOGY



EXAM QUESTION PACK

B3.3 HOW ARE ORGANISMS IN AN ECOSYSTEM INTERDEPENDENT? (FOUNDATION)

SCORE	PERCENTAGE
/87	%

STEMUP

These questions belong to OCR, not to us.

The examination questions, mark schemes and examiner comments in this pack were written and published by OCR. They are past assessment materials, reproduced here so that students can revise from them.

What we do not own

STEMUP is not affiliated with OCR and does not own, and makes no claim to own, any of the question, mark scheme or examiner report material in this pack. OCR has not endorsed, approved or been involved in the production of it. OCR and the qualification titles used here belong to their respective owners and appear for identification only.

Where to find the originals

OCR publishes its past papers, mark schemes and examiner reports. Always check the current specification at ocr.org.uk before you revise, because content and wording can change between series.

If you hold the rights to any material in this pack and would like it amended or removed, contact admin@stemup.co.uk and we will act on it.

1(a).

(i) Alligators eat fish, birds, turtles and snakes.

These foods are high in protein.

Put a tick (✓) in the box that describes what proteins are made of.

Amino acids	☐
Fatty acids	☐
Glycerol	☐
Sugars	☐

[1]

(ii) Describe a test that could be used to show if these foods contain protein.

---

[3]

© OCR 2019.

STEMUP.CO.UK

(b).

(i) Alligators are unable to control their own internal temperature and rely on external sources of heat to regulate their body temperature.

They are most active at 33°C.

Put in a tick (✓) in the box that best explains why.

There will be more collisions between enzymes and substrates so reactions will happen faster. ☐

The enzymes will be denatured so reactions will slow down. ☐

There will be fewer collisions between enzymes and substrates so the reactions will happen slower. ☐

There will be no collisions between enzymes and substrates so no reactions will happen. ☐

[1]

(ii) Humans are able to control their internal temperature.

Describe how the skin looks when the temperature drops.

---

[2]

(iii) Humans need to be able to maintain a constant environment within their bodies, within very narrow limits.

What is this called?

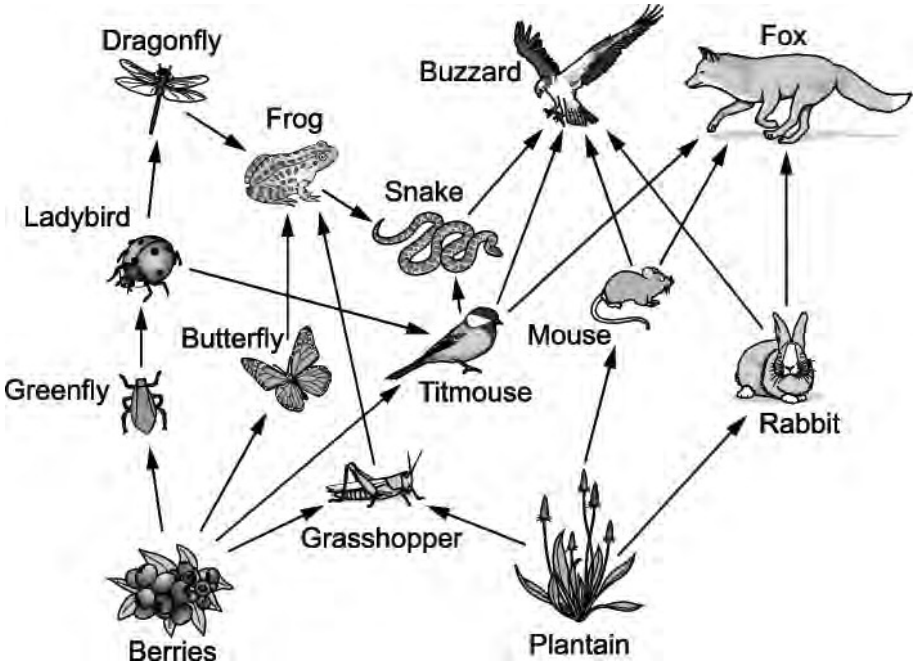
---

[2]

© OCR 2019.

STEMUP.CO.UK

2(a). This is a food web from woodland with a pond nearby.



(i) Name a producer in this food web.

---------- [1]

(ii) How many trophic levels does the longest food chain in this food web have?

---------- [1]

(iii) What do the arrows in the food web mean?

---------- [1]

© OCR 2019.

STEMUP.CO.UK

(b). One food chain from this food web is:

Berries → Titmouse → Fox

Draw a pyramid of biomass for this food chain in the space below.

Label your pyramid.

[2]

(c). A group of students decide to investigate the populations of animals and plants in this food web.

Suggest the piece of apparatus they would use to sample:

(i) the small plants in the woodland.

---

[1]

(ii) invertebrates, such as woodlice, on the ground in the woodland.

---

[1]

© OCR 2019.

STEMUP.CO.UK

(d). A species of toad that liked to eat butterflies and dragonflies was introduced into this community.

It had skin that tasted bitter so nothing wanted to eat it.

Explain the effect of the introduction of this toad on the food web.

---

[4]

© OCR 2019.

STEMUP.CO.UK

3(a). Rainforests are an important ecosystem.

Rainforests obtain their energy from sunlight.

Explain why scientists regard sunlight as a sustainable source of energy.

[2]

(b). Rainforests used to be thought of as closed-loop systems.
Now, large amounts of biomass are removed when timber is harvested.
Explain the effects that the removal of timber has on the closed-loop system.

[2]

(c). Burning is another way that biomass is removed from a rainforest.
Rainforests are burnt to create grassland to keep cattle.
Write down **two** groups of people who might be affected by this action.

Identify the advantage **or** disadvantage to each group.

Group 1

Group 2

[2]

STEMUP.CO.UK

4(a). Nitrates enter plant roots from the soil.

Plants use the nitrogen in nitrates to make some chemicals.

Which nitrogen-containing chemicals do plants make?

Put rings around the **two** correct answers.

amino acids	cellulose	enzymes	oxygen	starch	water

[2]

(b). Plants need chemicals to survive.

One essential chemical is glucose.

What can happen to glucose in plants?

Put ticks (?) in the boxes next to the **two** correct answers.

Glucose can be …

… used in respiration. ☐

… taken up from the soil. ☐

… produced as a waste product. ☐

… converted into starch for storage. ☐

… lost from the underside of plant leaves. ☐

… absorbed by the green chemical chlorophyll. ☐

[2]

© OCR 2019.

STEMUP.CO.UK

5. Carbon is recycled through the environment.

Explain how this process takes place.

You may draw a diagram to help explain your answer.

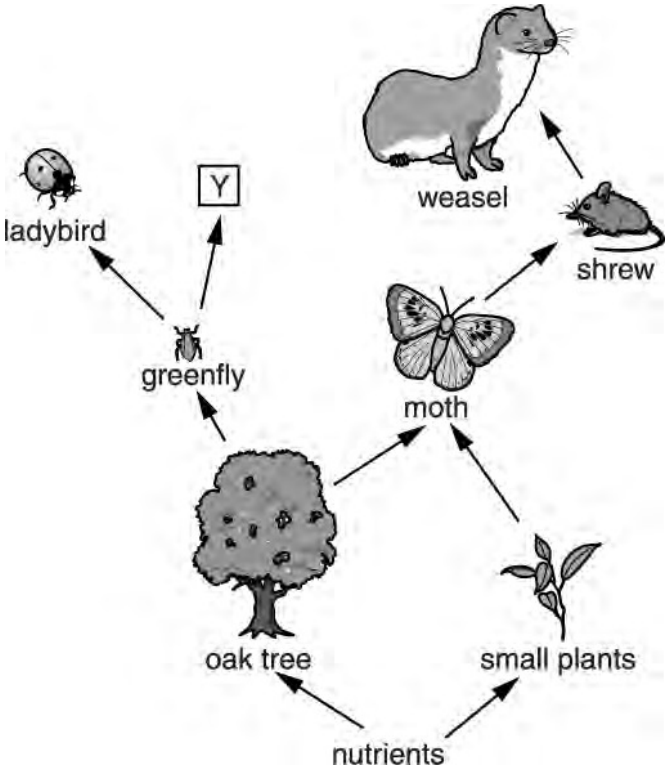


The quality of written communication will be assessed in your answer.

[6]

STEMUP.CO.UK

6(a). The diagram shows a food web.



A new organism that eats greenflies enters the food web at Y.

(i) Suggest what effect the introduction of the new organism will have on the oak trees.

Put a tick (✓) in the box next to the correct statement.

The tree will be in a better condition. ☐

The tree will be unaffected. ☐

The tree will be in a worse condition. ☐

[1]

(ii) Which of these statements about the new organism are true?
Put ticks (✓) in the boxes next to the **two** correct answers.

STEMUP.CO.UK

The new organism is …

… a disease-causing organism. ☐

… a decomposer. ☐

… a competitor. ☐

… a microorganism. ☐

… a predator. ☐

[2]

(b). Not all the energy is kept within the food web.
Suggest reasons why.

---

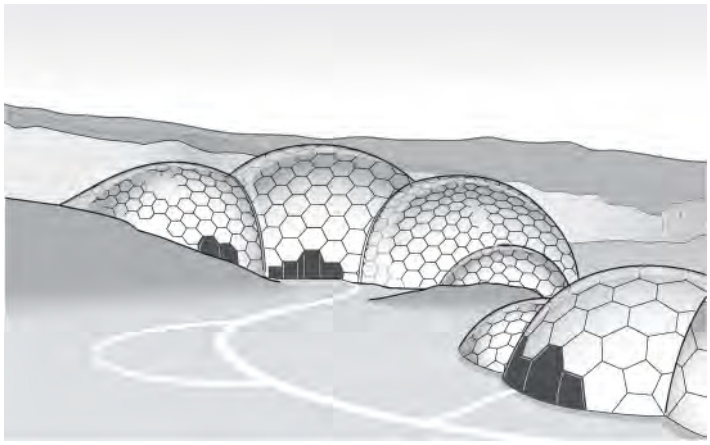
[3]

STEMUP.CO.UK

7(a). The drawing shows the Eden Project in Cornwall.

Each dome contains a different environment such as ‘Mediterranean’ and ‘rainforest’.

Visitors can enter each dome to see the different animals and plants in each environment.



Jason visits the Eden Project on a school trip.
He thinks that each dome is a closed-loop system.

Explain what Jason means by a closed-loop system.
Discuss reasons why Jason may be right and why he may be wrong.

The quality of written communication will be assessed in your answer.

[6]

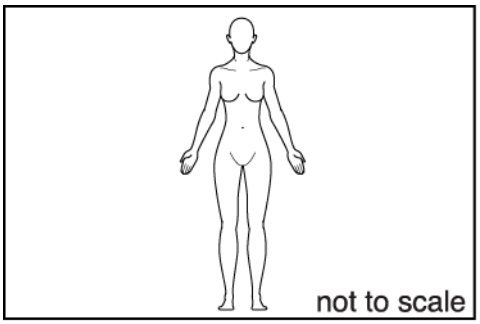
STEMUP.CO.UK

(b). The Eden Project does not use pesticides to kill unwanted pests.
Use ideas about closed-loop systems to suggest why.

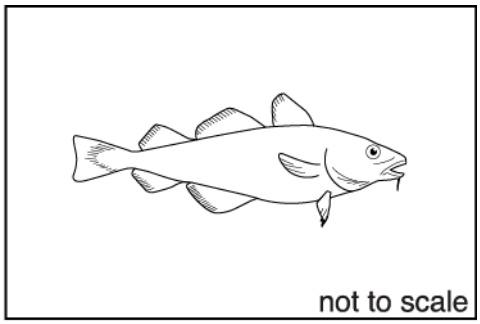
---[2]

8(a). A human female usually only produces one egg at a time.

A female codfish can release over 1 million eggs at one time.



Human female



Female codfish

Suggest why there is such a large difference in the number of eggs produced by humans and by codfish.

---[2]

(b). Suggest why the number of eggs produced by the codfish is not wasteful for the ecosystem.

---[1]

(c). Codfish live in a natural ecosystem.
Humans depend on natural ecosystems for 'ecosystem services'.

Write down **one** service provided by the ecosystem in which the codfish lives.

---[1]

© OCR 2019.

STEMUP.CO.UK

9. Coral reefs are found in tropical seas.

They are made by living organisms called reef-building corals.

Reef-building corals have a symbiotic relationship with microscopic algae. Algae are single-celled plants.

In a symbiotic relationship both organisms **benefit** from each other.

(i) Using your knowledge of photosynthesis, what are the benefits for the organisms in this symbiotic relationship?

Put a tick (✓) in the **three** correct boxes.

Algae give carbon dioxide to the coral. ☐

Algae give chlorophyll to the coral. ☐

Algae give glucose to the coral. ☐

Algae give oxygen to the coral. ☐

Coral gives carbon dioxide to the algae. ☐

Coral gives chlorophyll to the algae. ☐

Coral gives glucose to the algae. ☐

Coral gives oxygen to the algae. ☐

[3]

(ii) Algae can convert glucose into other substances.

Put a (ring) around **two** substances that the algae can make from glucose.

calcium **carbon** **cellulose** **nitrogen** **starch**

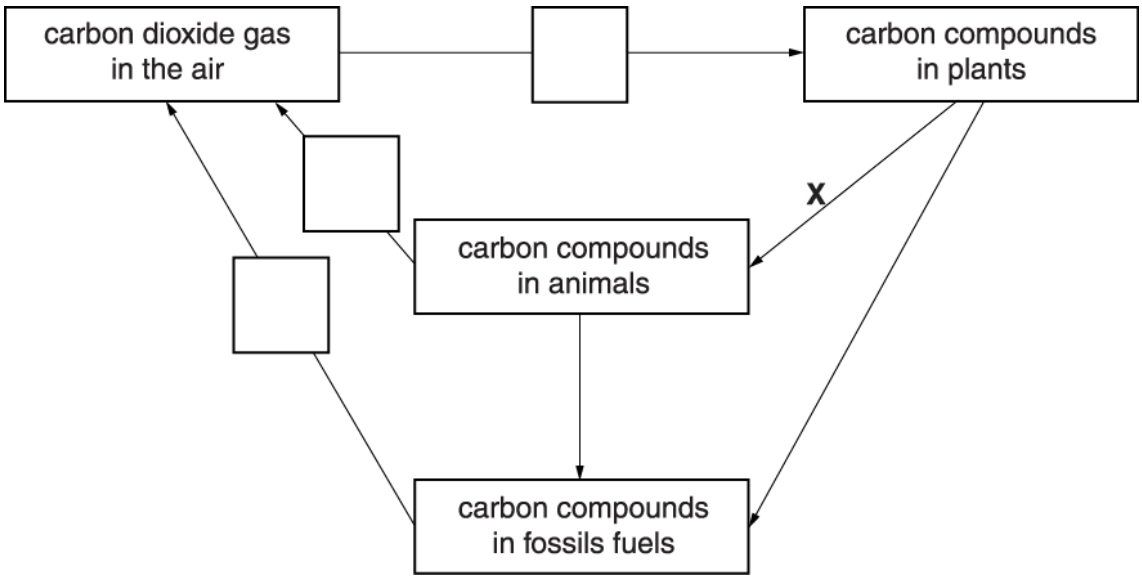
[2]

© OCR 2019.

STEMUP.CO.UK

10(a) The diagram shows parts of the carbon cycle.

.



Three different processes are involved:

1 combustion
2 photosynthesis
3 respiration.

Write the letters **A**, **B** and **C** in the correct boxes to complete the diagram.

[2]

(b). Explain what is happening at arrow **X**.

---

[2]

STEMUP.CO.UK

(c). Microorganisms have a very important role in the carbon cycle.

Describe the role of microorganisms in the carbon cycle.

---

[2]

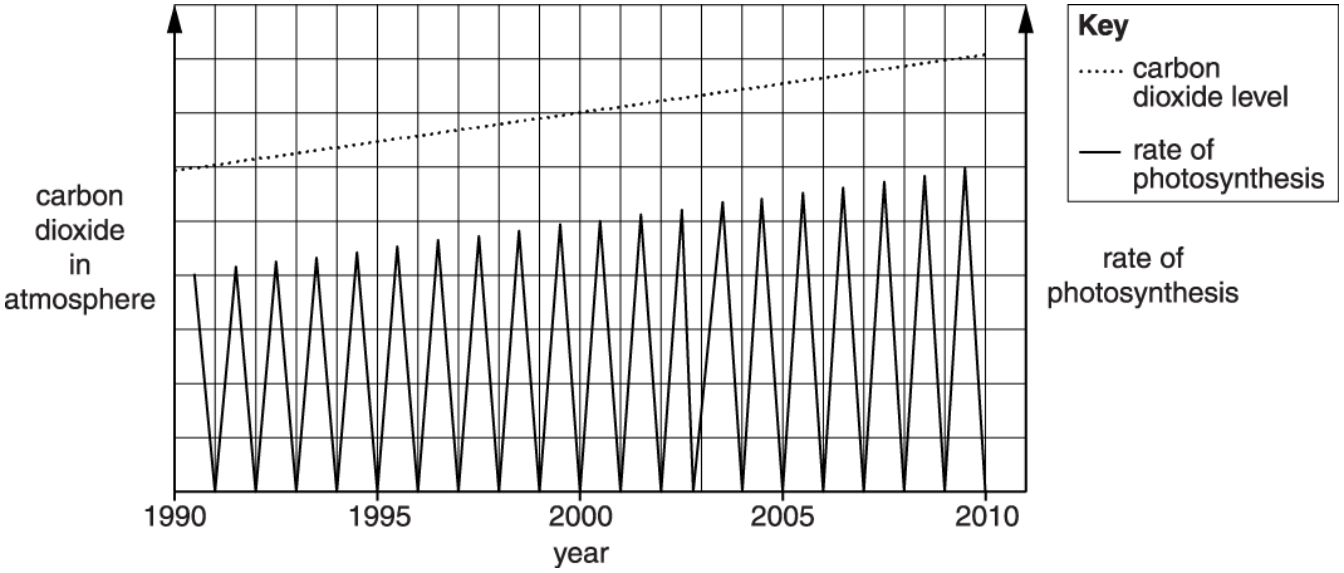
© OCR 2019.

STEMUP.CO.UK

11. Scientists study the effect of increasing levels of atmospheric carbon dioxide on an ecosystem.

They measure carbon dioxide levels in the atmosphere and the rate of photosynthesis in plants over a twenty-year period.

Look at the graph.



(i) The graph shows a correlation.
Name the **factor** and the **outcome** in this correlation.

factor _____

outcome _____

[2]

(ii) A student thinks that the graph shows evidence that the ecosystem being studied is a closed loop system.

Use data from the graph to explain why the student is wrong.

_____

_____

_____ **[1]**

(iii) All the following statements are true.
Which two statements explain why the rate of photosynthesis varies more than the levels of carbon dioxide?

© OCR 2019.

STEMUP.CO.UK

Put ticks (?) in the boxes next to the **two** statements that explain this.

Plants release oxygen and animals release carbon dioxide. ☐

Deforestation reduces the amount of photosynthesis. ☐

Photosynthesis stops during winter months. ☐

Animals cannot photosynthesise. ☐

The amount of carbon dioxide in the air is much larger than the amount used in photosynthesis. ☐

[2]

© OCR 2019.

STEMUP.CO.UK

12. Fish are an important source of protein in our diet.

Ben wants to show that fish contain protein.

He uses the following method:

1. He adds a small sample of fish to a test tube.
2. He adds a small amount of Benedict's solution to the sample.
3. He observes a colour change.

(i) Ben's friend thinks he has made a mistake in his method.

Describe the mistake Ben has made and how he should correct it.

Mistake ----------

Correction ----------

---[2]

(ii) What change would Ben observe when using the correct method?

Tick (✓) **one** box.

Colourless to cloudy white emulsion ☐

Light blue to lilac/purple ☐

Red-brown precipitate formed ☐

STEMUP.CO.UK

Pale brown to blue-black 

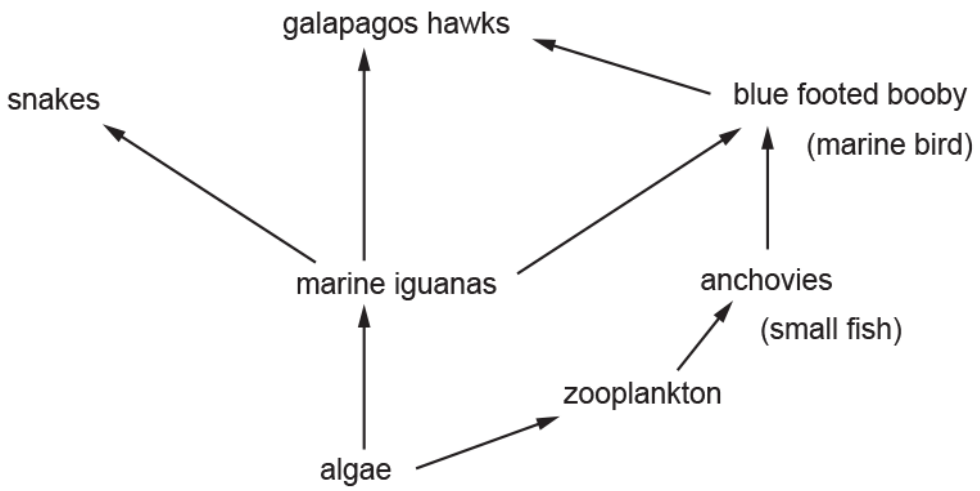
[1]

© OCR 2019.

STEMUP.CO.UK

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

The food web shows the feeding relationships of some Galapagos Islands species.



(i) 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.

---

[2]

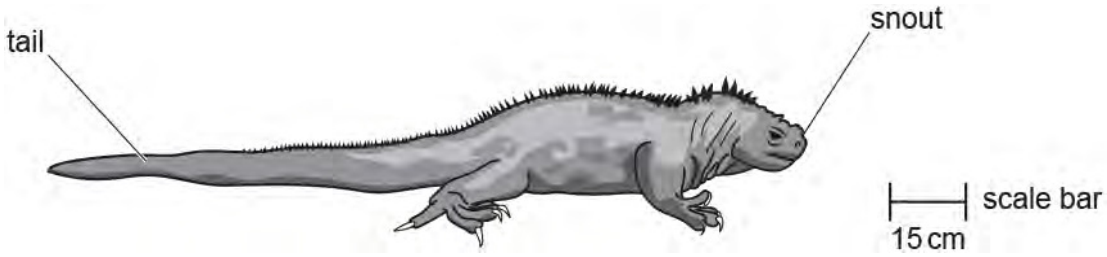
(ii) Scientists have discovered that during this event the marine iguanas can shrink in size.

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.

© OCR 2019.

STEMUP.CO.UK



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

Length of marine iguana = _____ 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.

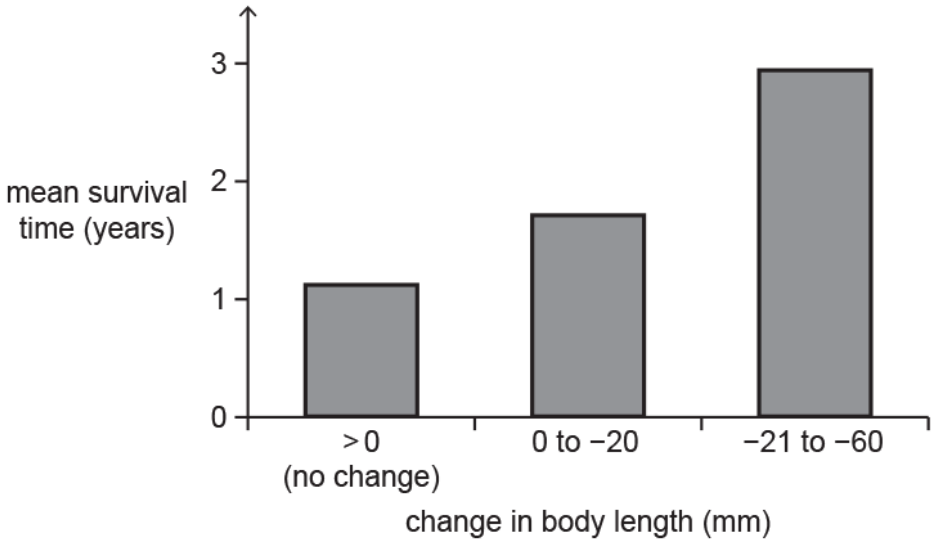
Length after maximum shrinkage = _____ m **[1]**

(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.

© OCR 2019.

STEMUP.CO.UK



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. ☐

The marine iguanas that decreased in size the most on average lived for a greater length of time. ☐

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]

© OCR 2019.

STEMUP.CO.UK

14. One farmer grows a crop called oilseed rape.

Honey bees feed on the oilseed rape, as shown in the food chain in Fig. 2.1.

The measurements below the food chain show the amount of biomass in each trophic level.

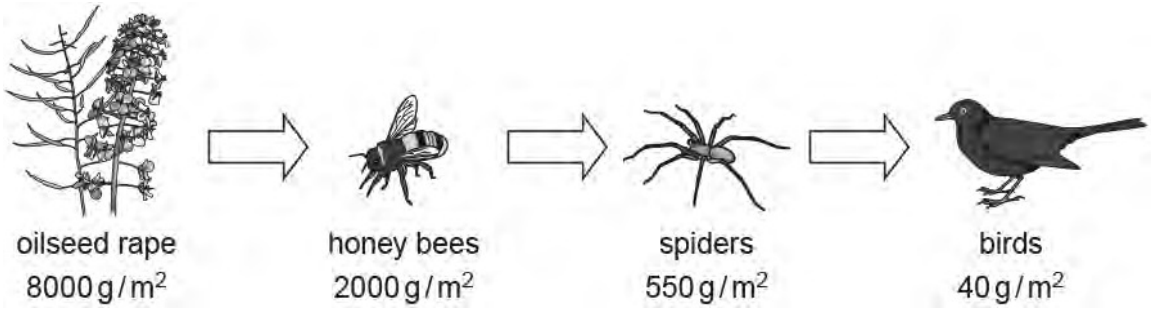


Fig. 2.1

(i) A food chain is one way of showing the feeding relationships in this ecosystem. A pyramid of biomass is another way.

Complete the pyramid of biomass for this ecosystem.

Species		Biomass (g / m^2)
birds		40
spiders		550
.....		.....
oilseed rape		8000

[2]

(ii) Calculate the efficiency of biomass transfer from the **oilseed rape** to the **honey bees**.

Give your answer as a percentage.

Efficiency = ---------- % [2]

© OCR 2019.

STEMUP.CO.UK

15. Plant cells make their own antimicrobial substances.

Explain how antimicrobial substances help plants to survive and why this is essential for **human** survival.

---

[3]

END OF QUESTION PAPER

STEMUP.CO.UK