Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

BIOLOGY **0610/33**

Paper 3 Extended **October/November 2014**

1 hour 15 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **17** printed pages and **3** blank pages.

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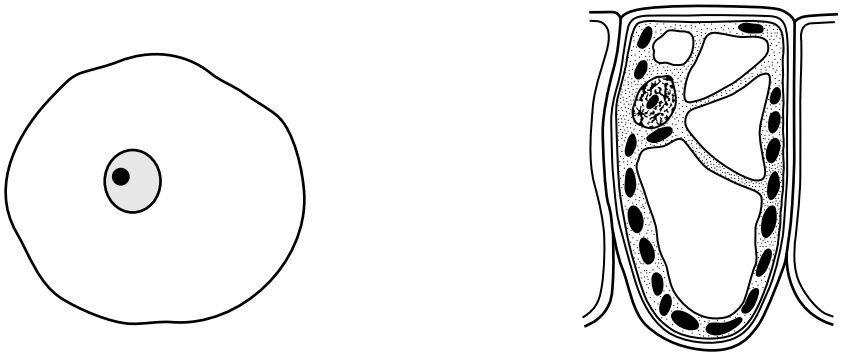
1 Fig. 1.1 shows an animal cell and a plant cell as seen with a light microscope.



animal cell plant cell

Fig. 1.1

(a) Table 1.1 shows some structural features of the animal cell and the plant cell in Fig. 1.1.

Complete the table by

- finishing the row for nucleus
- adding **three** structural features, visible in Fig. 1.1, and indicating whether they are present (✓) or absent (✗) in the animal cell and in the plant cell.

Table 1.1

structural feature	animal cell	plant cell
cell wall	✗	✓
nucleus		

[4]

(b) The cells were kept in a dilute salt solution. They were then transferred to distilled water.

Explain what will happen to each of these two cells when they are placed into distilled water.

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.....[4]

(c) Magnesium is a plant nutrient. Scientists think that magnesium is involved in the transport of sucrose from the leaves to the rest of a plant.

(i) Name the tissue that transports sucrose in plants.

.....[1]

The scientists grew some tomato plants with their roots in a solution that contained all the mineral nutrients that plants require. After a while, the plants were divided into two groups.

- Group **A** continued to receive the solution containing all the nutrients.
- Group **B** received a solution that did not contain any magnesium.

After 12 days, measurements were made on the leaves and the results are shown in Fig. 1.2.

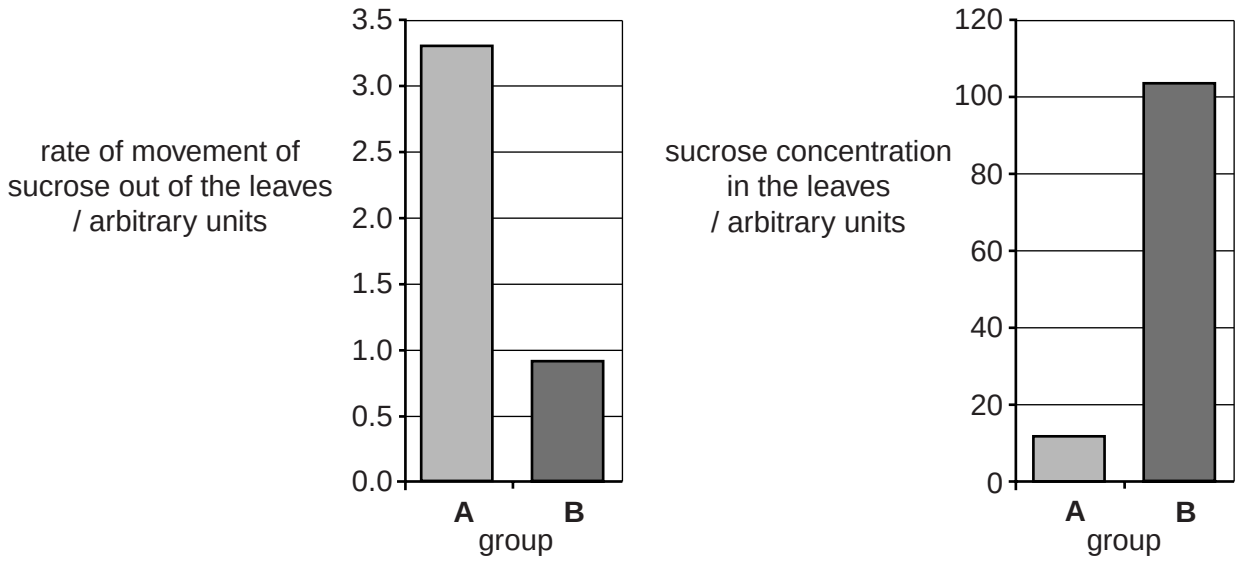

Fig. 1.2

(ii) Describe the effect of magnesium deficiency on the transport of sucrose out of the leaves and the sucrose concentration in the leaves.

transport of sucrose out of the leaves .....

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concentration of sucrose in the leaves .....

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.....[4]

(iii) The plants in Group **B** remained in the magnesium-deficient solution for longer than 12 days. At the end of this time they showed symptoms of magnesium deficiency.

Describe and explain the symptoms that the plants would show.

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.....[3]

[Total: 16]

2 **(a)** Sickle cell anaemia is an inherited disease. The gene for haemoglobin exists in two forms, Hb^N and Hb^S. People who are Hb^SHb^S have the disease and experience symptoms including fatigue and extreme pain in their joints. People who are Hb^NHb^S are carriers of the disease and may have mild symptoms, if any at all.

(i) Table 2.1 shows four genetic terms.

Complete Table 2.1 by stating a specific example, used in the paragraph above, of each genetic term.

Table 2.1

genetic term	example used in the passage
an allele	
a heterozygous genotype	
a homozygous genotype	
phenotype	

[4]

(ii) Sickle cell anaemia is not found throughout the whole world. Most cases of the disease occur in sub-Saharan Africa and in parts of Asia. The distribution is similar to that for the infectious disease malaria.

Explain why the distribution of sickle cell anaemia and malaria are similar.

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.....[5]

(b) Down's syndrome is an example of a characteristic that shows discontinuous variation.

State the cause of Down's syndrome.

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.....[1]

(c) Explain how discontinuous variation differs from continuous variation, in its expression and cause.

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.....[3]

[Total: 13]

3 **(a)** Define the term *growth.*

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.....[3]

(b) Fig. 3.1 shows the events that follow fertilisation in a human.

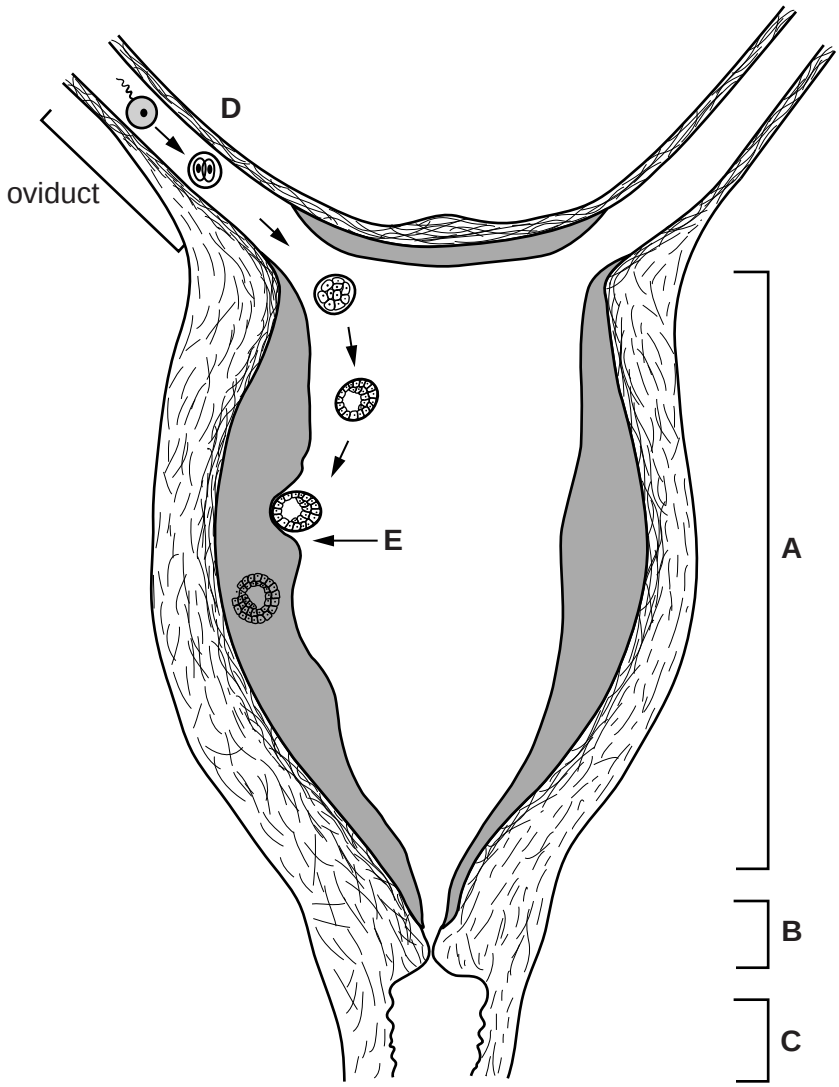

Fig. 3.1

(i) Name structures **A**, **B** and **C**.

A .....

B .....

C .....[3]

(ii) State the process that is occurring at **D** and the process that is occurring at **E**.

D .....

E .....[2]

(iii) Suggest how the embryo is moved along the oviduct.

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.....[2]

[Total: 10]

4 Yeast, *Saccharomyces cerevisiae*, is a single-celled fungus.

(a) State **one** reason why yeast is classified as a fungus and **not** as a bacterium.

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.....[1]

(b) A student investigated the anaerobic respiration of yeast to find out how the yeast population changed and how much alcohol was produced over a period of 14 hours.

Complete **and** balance the chemical equation for anaerobic respiration in yeast.

$C_6H_{12}O_6$ ⟶ ..... + ... [2]

(c) The student set up a small fermenter containing:

- 1.0 g dry yeast
- 250 cm^3 glucose solution
- a solution containing ammonium compounds as a source of nitrogen.

The fermenter is shown in Fig. 4.1.

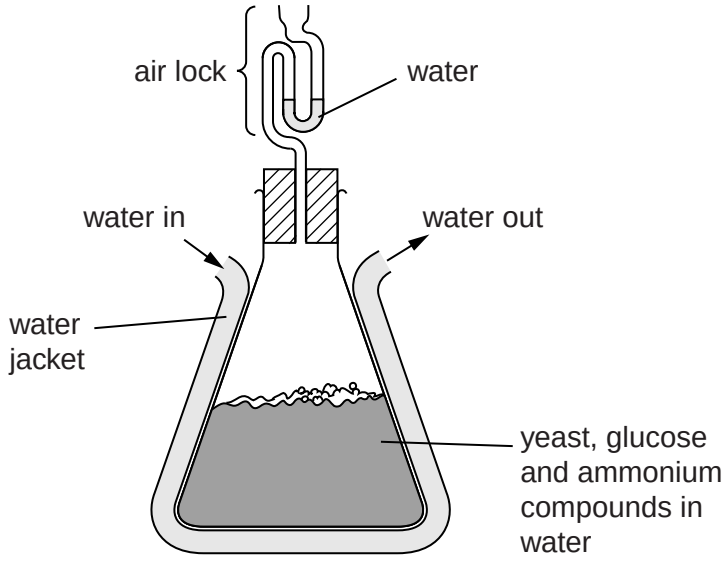

Fig. 4.1

Explain the importance of each of the following:

(i) the water jacket

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.....[2]

(ii) a source of nitrogen

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.....[2]

(iii) the air lock.

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(d) Fig. 4.2 shows the change in the yeast population and in the alcohol content in the student's fermenter.

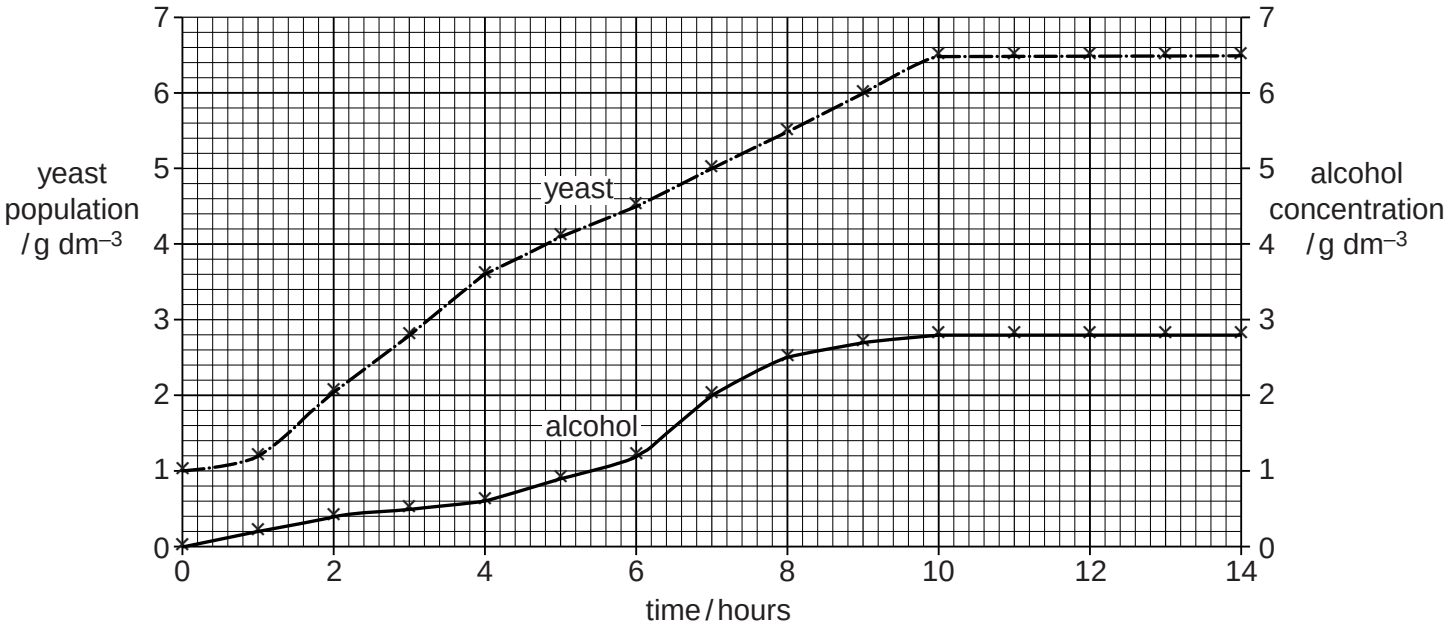

Fig. 4.2

(i) Describe the changes in the population of yeast.

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(ii) Explain the changes you have described.

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.....[3]

(e) Name **two** industrial processes that rely on anaerobic respiration of yeast.

1.....

2.....[2]

[Total: 17]

5 **(a)** A researcher carried out four experiments, **A** to **D**, to investigate the effect of light intensity on the rate of photosynthesis of cucumber plants. The experiments were carried out at two concentrations of carbon dioxide and at two temperatures.

The results are shown in Fig. 5.1.

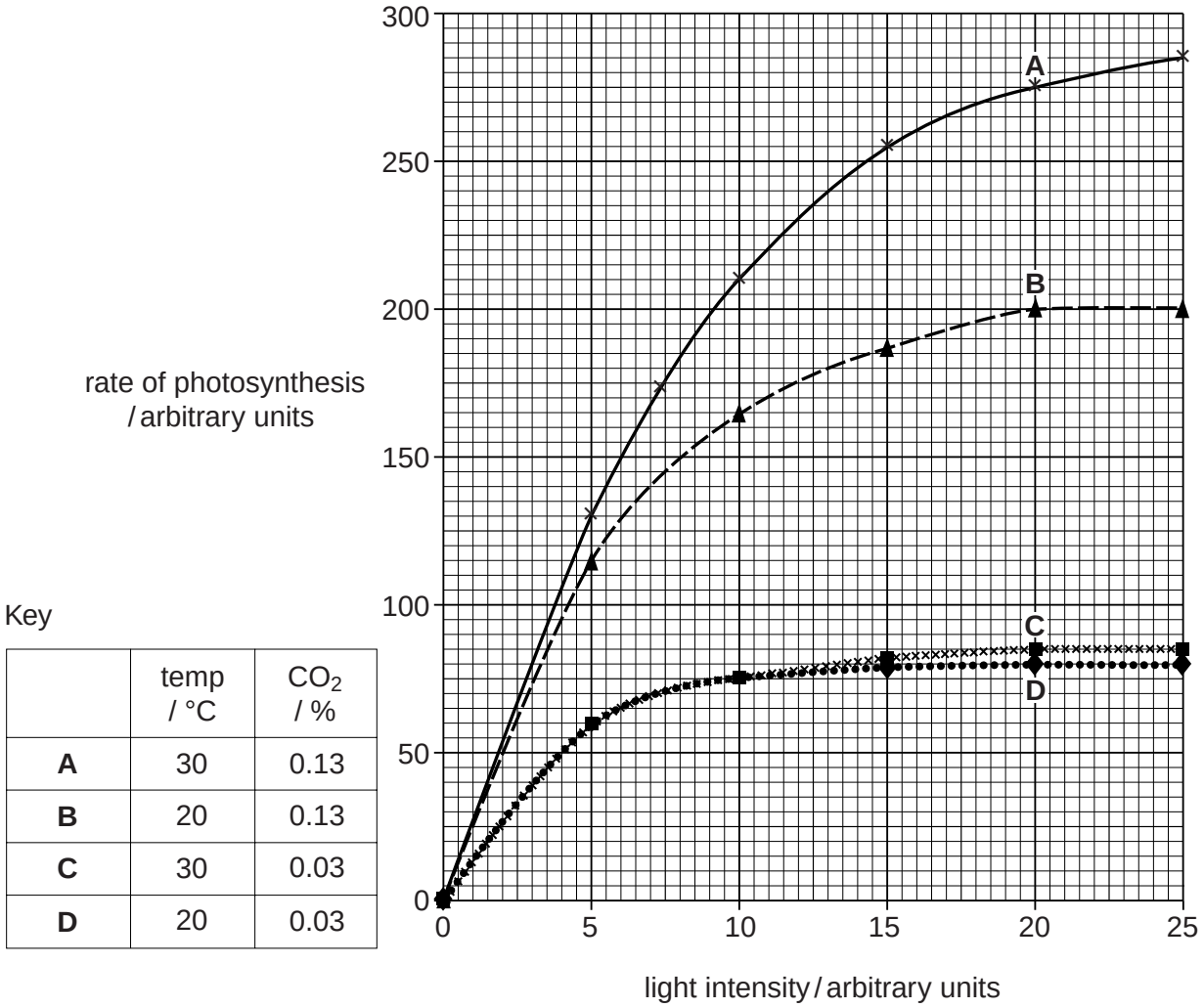

Fig. 5.1

(i) Use the results in Fig. 5.1 to identify the limiting factor for the rate of photosynthesis at the light intensities given in Table 5.1.

Write your answers in Table 5.1.

Table 5.1

experiment	light intensity / arbitrary units	limiting factor
A	20	
B	20	
C	20	
D	5	light intensity

[3]

(ii) Define the term *limiting factor*.

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.....[2]

Fig. 5.1 shows that providing plants with more carbon dioxide can increase the rate of photosynthesis.

An investigation was carried out in China using crop residues and animal manure mixed together in composting units that were placed into a glasshouse containing crop plants.

Fig. 5.2 shows a composting unit in which decomposition takes place.

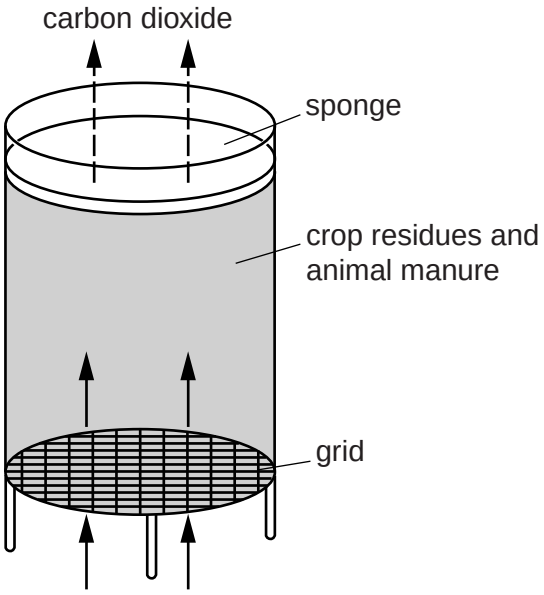

Fig. 5.2

(b) (i) Suggest the reason for using a grid instead of a solid base for the composting unit.

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.....[2]

(ii) The sponge was soaked in sulfuric acid to remove any ammonia gas released by the decomposing material (compost).

Explain how the ammonia was produced.

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.....[2]

(c) Two glasshouses were used in this investigation. One glasshouse contained composting units and the other did not. Each glasshouse contained the same number and type of crop plants.

The concentration of carbon dioxide in both glasshouses was measured at midday.

The results are shown in Fig. 5.3.

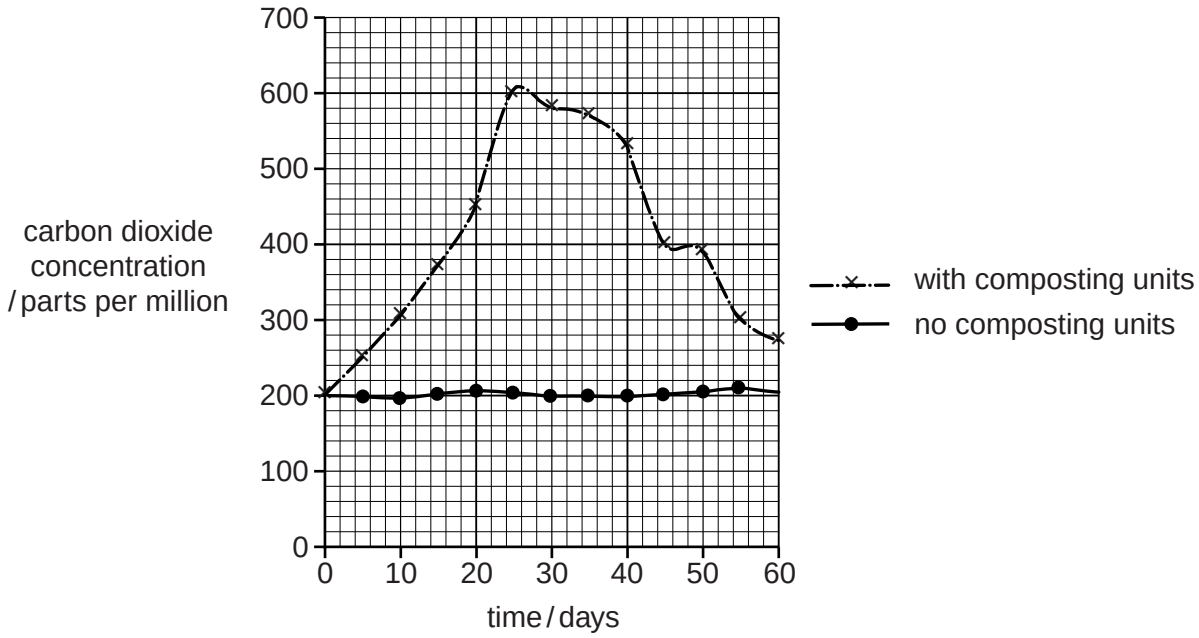

Fig. 5.3

(i) State why a glasshouse without composting units was used in the investigation.

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(ii) Describe the results shown in Fig. 5.3.

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(d) At the end of the investigation the crop plants were harvested and weighed. Table 5.2 gives the results.

Table 5.2

crop plant	mean fresh mass / g per plant	
	no composting units	composting units
Chinese cabbage	115.7	355.8
celery	44.7	133.9
lettuce	95.5	349.4

Use the information in Fig. 5.3 and in Table 5.2 to summarise the results of the study.

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[Total: 18]

6 Fig. 6.1 shows the movement of the ribs and the diaphragm during breathing in.

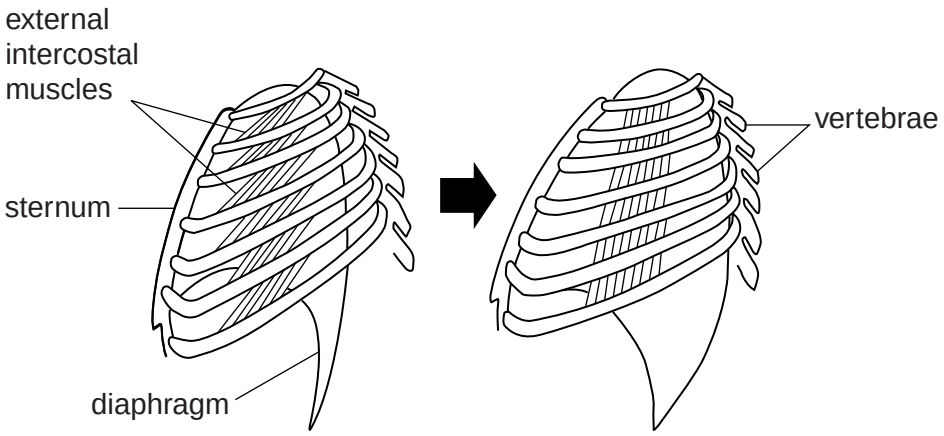

Fig. 6.1

(a) State what happens to the following structures during breathing in.

diaphragm.....

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ribcage.....

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external intercostal muscles .....

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(b) Explain the effect of strenuous physical activity on the pH of the blood.

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[Total: 6]

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