Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

BIOLOGY **0610/23**

Paper 2 Core **May/June 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 four insects.

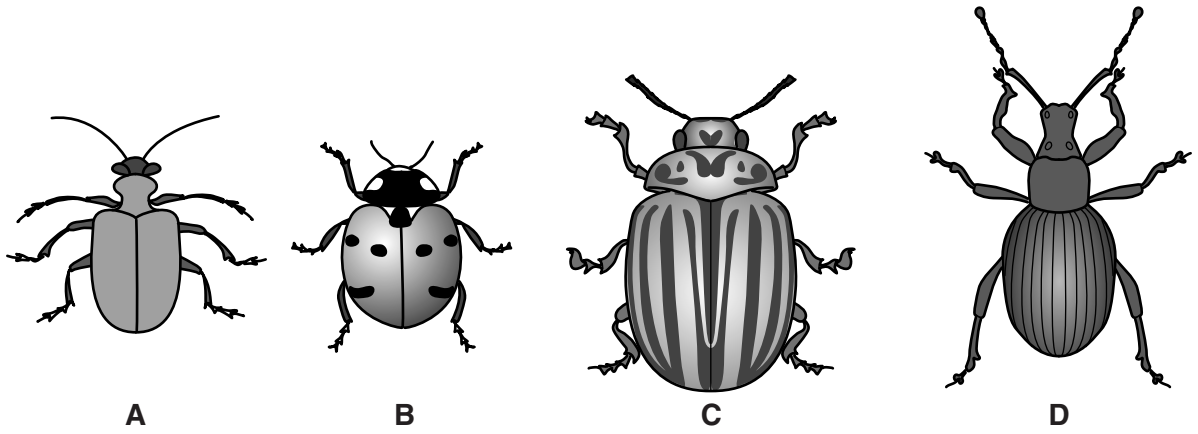


Fig. 1.1

(a) State **one** feature of the insects shown in Fig. 1.1 that is a characteristic of this group.

.....[1]

(b) Use the key to identify the four insects.

Write the name of each insect in the correct box in Table 1.1.

key			name of insect
1	(a)	body has stripes	go to 2
	(b)	body has no stripes	go to 3
2	(a)	head is long and narrow	*Otiorhynchus*
	(b)	head is wide and rounded	*Leptinotarsa*
3	(a)	antennae are longer than width of head	*Lilioceris*
	(b)	antennae are shorter than width of head	*Coccinella*

Table 1.1

insect	name of insect
A	
B	
C	
D	

[3]

[Total: 4]

[Turn over

2 Fig. 2.1 shows the human alimentary canal.

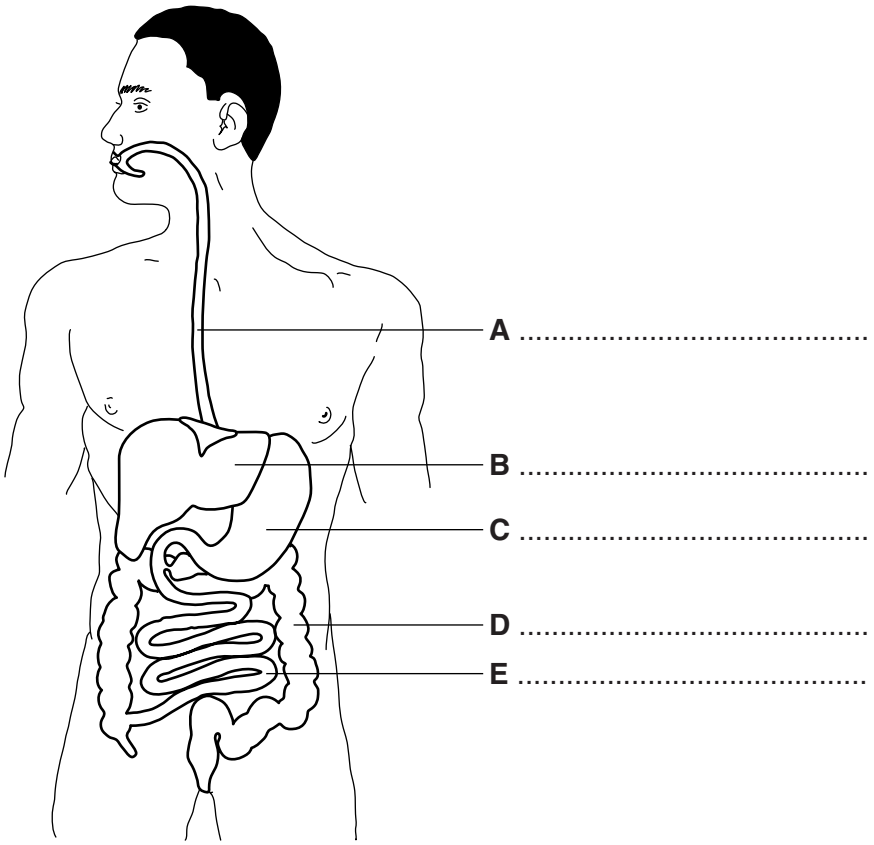


Fig. 2.1

(a) Choose words from the list to label the structures **A**, **B**, **C**, **D** and **E**.

anus **large intestine** **liver** **oesophagus**

pancreas **rectum** **small intestine** **stomach**

Write your answers on Fig. 2.1. [5]

(b) Two types of muscle move food along the alimentary canal.

(i) Name the two types of muscle.

..... and .....[1]

(ii) State the name of the process that moves the food.

.....[1]

(iii) Describe how the muscles in **(b)(i)** move food along the alimentary canal.

.....

.....

.....

.....[2]

(c) Scientists have invented a radio transmitter, which fits into a small tablet. When this tablet is swallowed, the pH along the alimentary canal is shown on a computer.

Fig. 2.2 shows the changes in pH as the tablet travels along the alimentary canal.

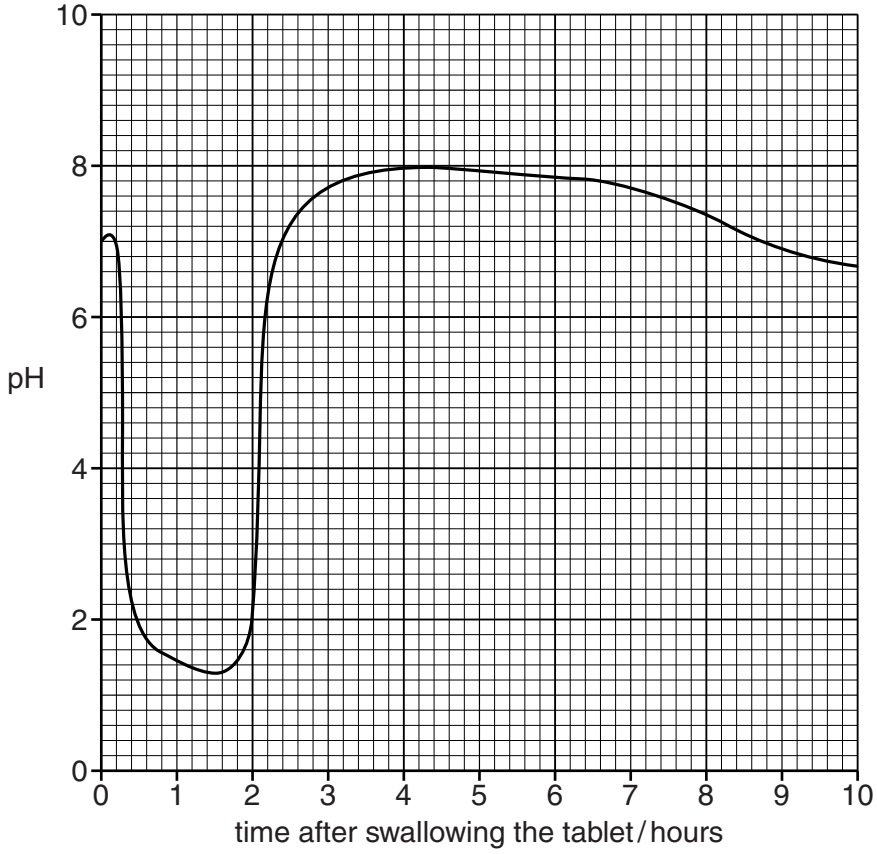


Fig. 2.2

(i) On Fig. 2.2 write the letter **X** to show when the tablet was inside the stomach. [1]

(ii) Give a reason for your answer to **(c)(i)**.

.....

.....[1]

(iii) State the highest pH that was detected by the tablet. .....[1]

(d) Name the part of the alimentary canal where most of the digested food is absorbed.

.....[1]

[Total: 13]

3 Fig. 3.1 is an incomplete diagram of the carbon cycle.

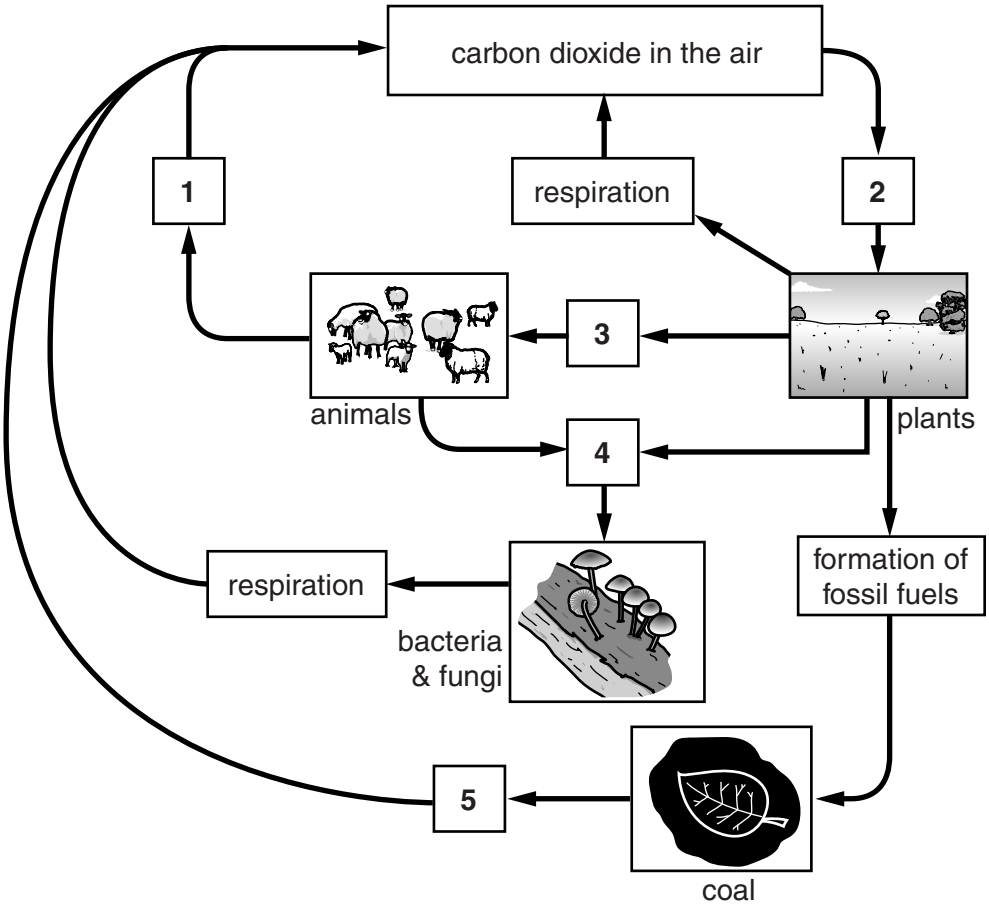


Fig. 3.1

(a) Complete the word equation for aerobic respiration.

..... + ... → carbon dioxide + ... [2]

(b) Name the processes **1**, **2**, **3**, **4** and **5** shown in Fig. 3.1.

Write your answers in Table 3.1.

Table 3.1

number	name of process
1	
2	
3	
4	
5	

[5]

(c) Fig. 3.2 shows a newspaper headline about global warming.

GLOBAL DISASTER AHEAD

Government spokesman announces that climates will change if we do not reduce the amount of greenhouse gases in the atmosphere.

Scientists have shown that the amounts of carbon dioxide and methane in the atmosphere are continuing to rise.

Fig. 3.2

(i) Explain **two** causes of the increase in the amount of carbon dioxide in the atmosphere.

cause .....

.....

explanation .....

.....

cause .....

.....

explanation .....

.....[4]

(ii) Suggest **one** action which governments might take to reduce the amount of greenhouse gases in the atmosphere.

.....

.....[1]

[Total: 12]

4 Fig. 4.1 shows the organisms in a woodland food chain.

The numbers written below each organism show the relative amount of energy at each trophic level in the food chain.

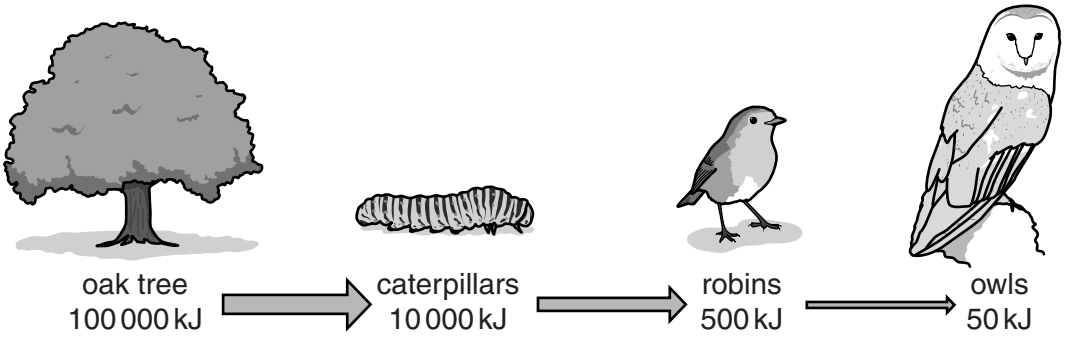


Fig. 4.1

(a) (i) State what the arrows in Fig. 4.1 represent.

.....[1]

(ii) Suggest why the arrows are different sizes.

.....

.....[1]

(b) State the amount of energy that passes from the producers to the first consumers in Fig. 4.1.

..... kJ [1]

(c) Name **two** carnivores shown in Fig. 4.1.

..... and ..... [1]

(d) Only 10% of the energy in the robins passes to the owls.

Describe what happens to the other 90% of the robins' energy.

.....

.....

.....

.....[2]

[Total: 6]

Question 5 starts on page 10.

5 **(a)** Enzymes are biological catalysts.

(i) Define the term *catalyst*.

.....

.....

.....[2]

(ii) What are enzymes made of?

Choose your answer from the list.

carbohydrates **genes** **hormones** **proteins** **vitamins**

..... [1]

(b) The activity of an enzyme can be affected by certain conditions.

(i) State **one** condition that could affect an enzyme.

.....[1]

(ii) Describe how the condition stated in **(b)(i)** affects the activity of an enzyme.

.....

.....

.....

.....[2]

(c) Milk is sometimes described as the 'complete food'.
Milk is made up of 84% water and 16% milk solids.

Fig. 5.1 shows the percentage composition of milk solids.

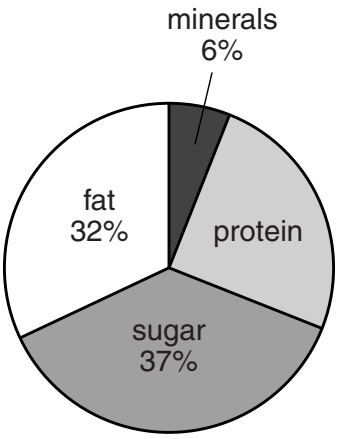


Fig. 5.1

Use the data in Fig. 5.1 to calculate the percentage of protein present in the milk solids.
Show your working.

% protein in the milk solids .....[2]

(d) Enzymes are used to break down the protein in milk before it can be absorbed by the body.

(i) Complete the passage by writing the correct words from the list in the spaces.

You may use each word once, more than once or not at all.

amino acids **amylase** **fatty acids** **glucose**

glycerol **lipase** **protease**

During digestion, protein in milk can be broken down by ..... .

This enzyme turns the protein into ..... . [2]

(ii) Explain why the protein molecules must be broken down before they can be absorbed by the body.

.....

.....

.....

.....[2]

[Total: 12]

6 Some students used beetles to investigate inheritance.

One group of students decided to breed a beetle which had long antennae with a beetle which had short antennae. Fig. 6.1 shows the beetles they used.

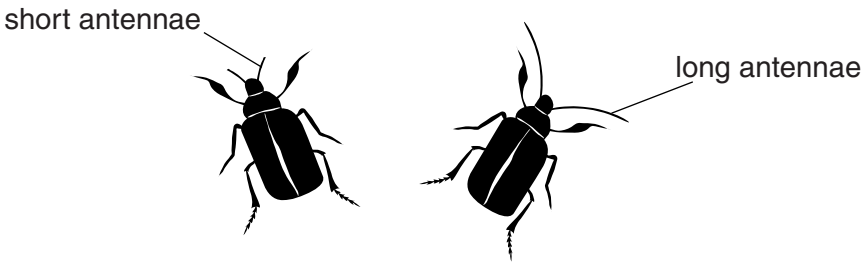


Fig. 6.1

All of the offspring from this **first** breeding experiment had long antennae.

(a) The students decided that the beetles they had used must have been **pure-breeding** for the lengths of their antennae.

Explain the term *pure-breeding*.

.....

.....[1]

(b) The students used the results of their breeding experiment to make conclusions about the *alleles* for long and short antennae.

(i) State what is meant by an *allele*.

.....[1]

(ii) What conclusions can be made about the alleles for long and short antennae?

long antennae .....

short antennae .....[2]

(c) The students decided to breed two of the offspring (with long antennae) from their first breeding experiment with each other.

There were 20 offspring from this **second** breeding experiment.
15 of these beetles have long antennae.

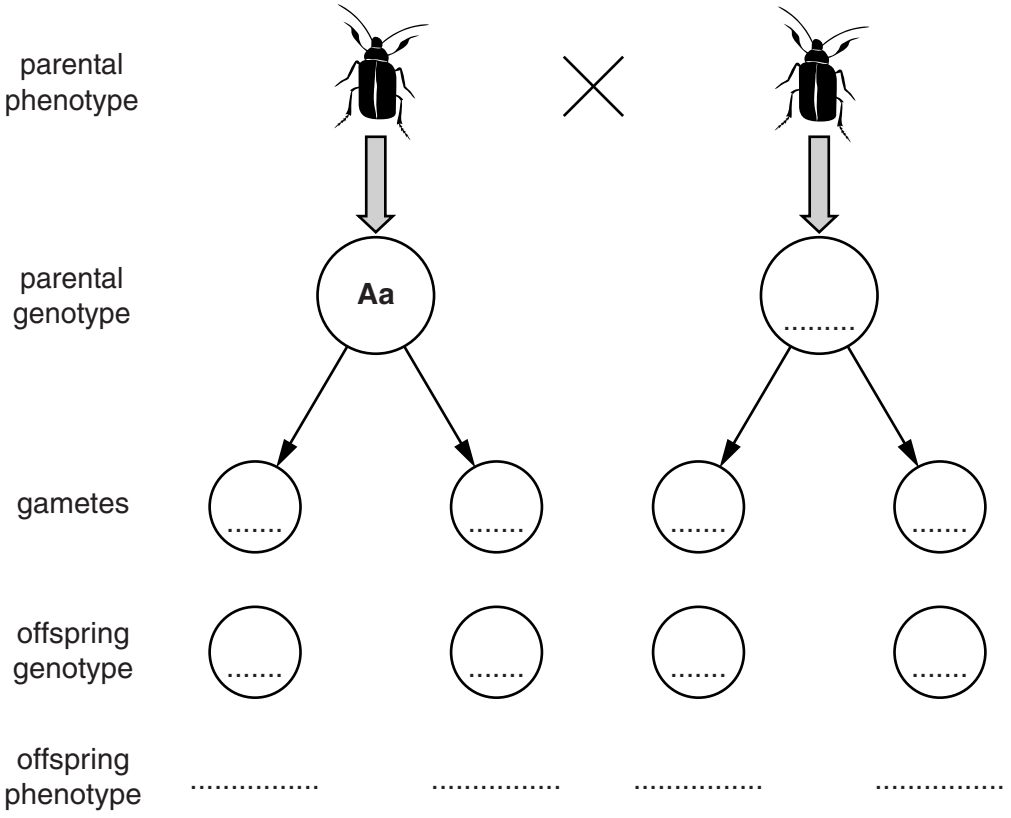
(i) State the number of beetles which have short antennae. .....[1]

(ii) Calculate the ratio of long antennae to short antennae. .....[1]

(d) Fig. 6.2 shows part of the genetic diagram for the **second** breeding experiment.

Complete Fig. 6.2.

- Use **A** to represent the allele for long antennae.
- Use **a** to represent the allele for short antennae.



[4]

Fig. 6.2

(e) In **another** investigation, a beetle with long antennae and a beetle with short antennae were bred together several times.

A total of 60 offspring were produced.

There were 31 with long antennae and 29 with short antennae.

Deduce the genotype of the parent that had long antennae.

.....[1]

[Total: 11]

7 Fig. 7.1 shows a method of growing tomato plants without soil.
The plants are supported above a tank of mineral solution aerated by an air pump.

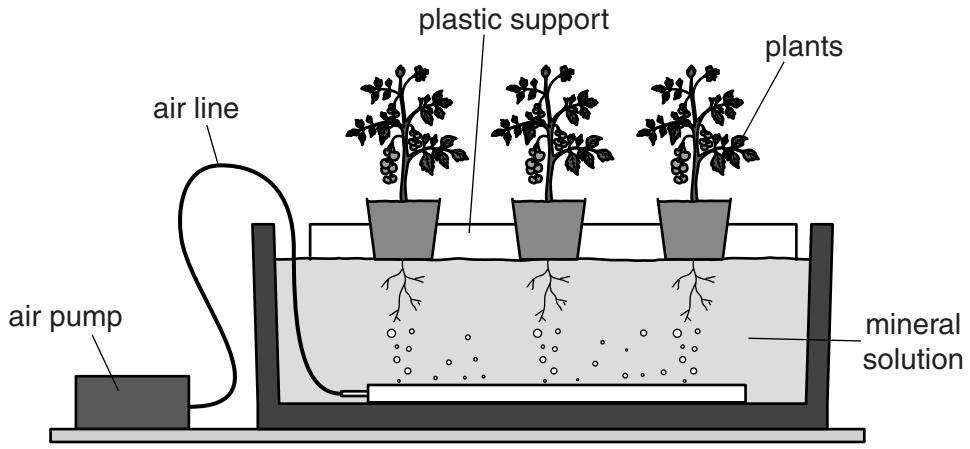


Fig. 7.1

Mineral ions from the solution enter the tomato plants and are transported to the leaves.

(a) Name the type of cell that is responsible for:

absorbing water and minerals into the plant; .....

transporting water and minerals to the leaves. .....[2]

(b) Tomato plants need nitrate ions and magnesium ions.

Explain why these ions are important for healthy plant growth.

nitrate ions .....

.....

magnesium ions .....

.....[2]

(c) The mineral solution in the tank is checked regularly to see whether more minerals are needed.

Suggest **two** reasons why it is necessary to continue to add minerals to the solution.

1 .....

2 .....[2]

(d) Tomato plants need potassium ions to form flowers and fruits.

Fig. 7.2 shows the mass of potassium ions absorbed by the tomato plants when the air pump is switched off and when the air pump is switched on.

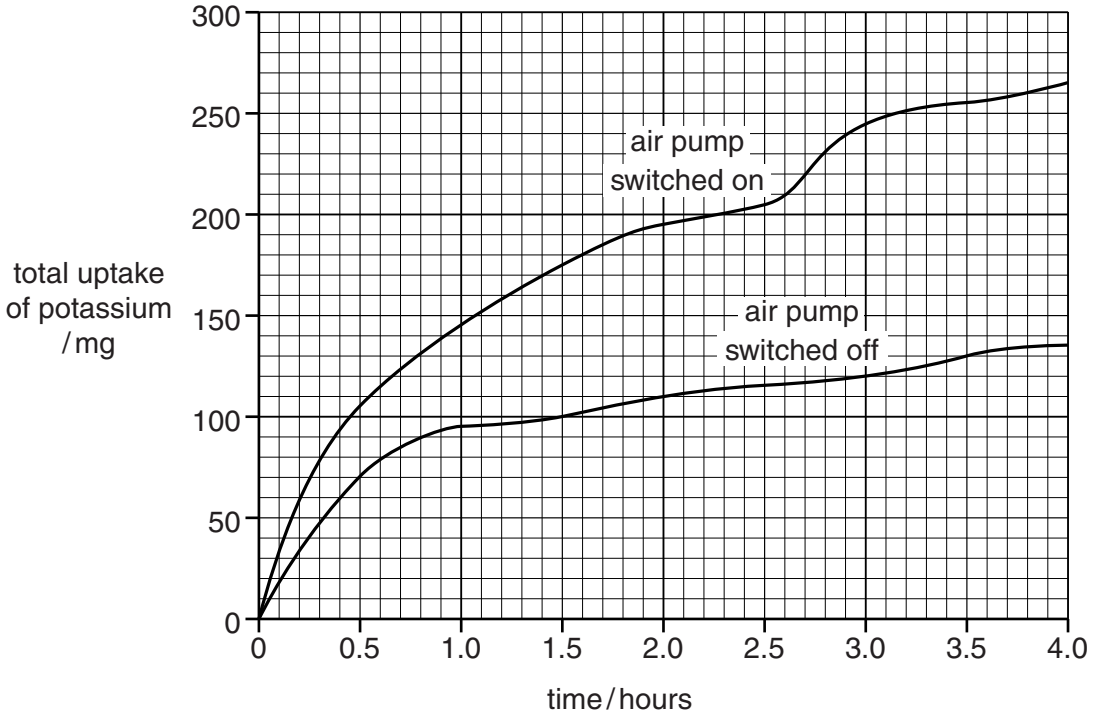


Fig. 7.2

(i) Describe the trend shown by **both** sets of results.

.....

.....

.....

.....[2]

(ii) Use data from Fig. 7.2 to explain how the yield of tomatoes would be affected if air was **not** bubbled through the mineral solution.

effect on yield . .....

explanation .....

.....

.....

.....[3]

(e) State **two** factors other than water and minerals that plants need to grow.

1 .....

2 .....[2]

[Total: 13]

8 Potatoes exist in different shapes and sizes as shown in Fig. 8.1.
Some potato varieties are frost resistant, others are rich in vitamins or contain antioxidants.

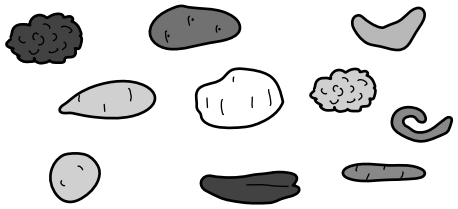


Fig. 8.1

(a) Suggest **two** other features that growers might want to introduce into a new variety of potato.

1 .....

2 .....[2]

(b) Potatoes can be grown from seeds.
Seeds can be obtained by breeding two varieties of potato together.

The six statements **A** to **E** describe stages in producing a new variety of potato.

These statements are **not** in the correct order.

A collect pollen from the first potato plant
B collect the seeds and use them to grow new plants
C cover the second plant to exclude bees
D place pollen on the stigma of the second potato plant
E remove the anthers from the second potato plant
F select varieties with the features you want to breed together

(i) Put each of the stages in the correct order by writing letters in the empty boxes.

Two of the boxes have been done for you.

		E	**C**		

[2]

(ii) Explain why potato plants that are bred from two plants are **not** identical to either parent.

.....

.....

.....

.....[2]

(c) Explain why all the plants that are grown from the tubers of one potato plant are very similar.

.....

.....

.....

.....[2]

(d) It is now possible to alter the DNA in potato plants so that they produce chemicals that can be used as bioplastics or biofuels.

State the name of the process used to alter the DNA in plants.

Choose your answer from the list.

artificial selection **genetic engineering** **natural selection** **selective breeding**

.....[1]

[Total: 9]

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