Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

4780148124

BIOLOGY **0610/42**

Paper 4 Theory (Extended) **February/March 2021**

1 hour 15 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

INFORMATION

- The total mark for this paper is 80.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **20** pages. Any blank pages are indicated.

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1 **(a)** Fig. 1.1 is a diagram showing the position of some organs in the human body.

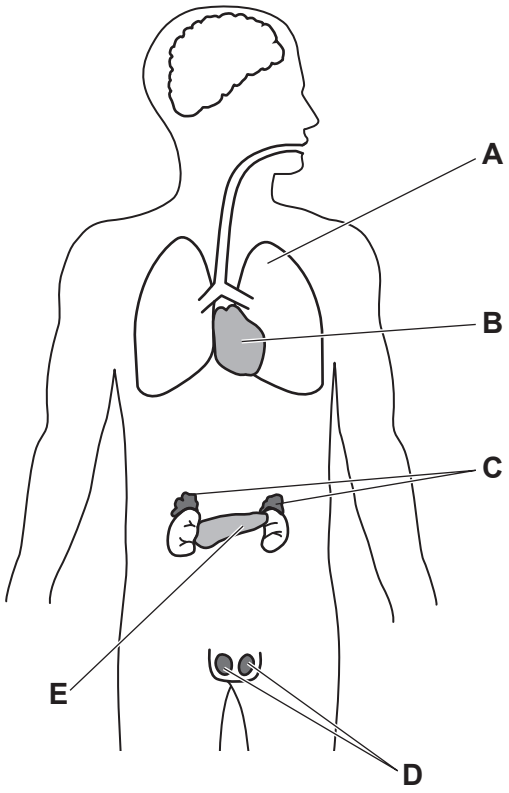


Fig. 1.1

Some of the organs shown in Fig. 1.1 are endocrine glands.

Table 1.1 shows the names of some of the endocrine glands, their identifying letters and the hormones that they produce.

Complete Table 1.1.

Table 1.1

name of endocrine gland	letter in Fig. 1.1	hormone produced
	C	
		insulin
testes		

[3]

(b) Fig. 1.2 shows two graphs representing:

- the relative blood concentrations of two hormones, **A** and **B**, released by the ovaries during the menstrual cycle
- the thickness of the lining of the uterus.

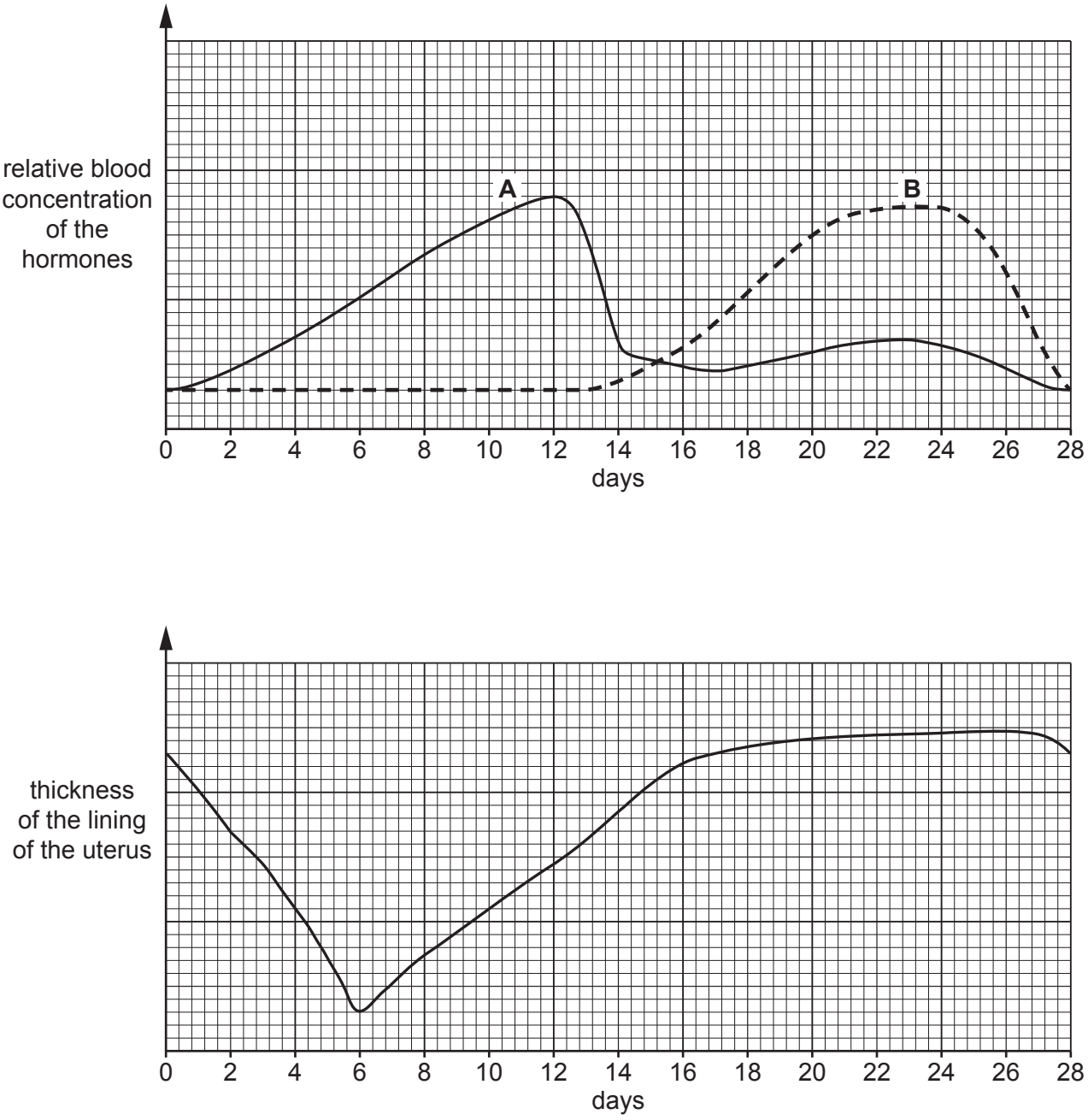


Fig. 1.2

(i) Describe the roles in the menstrual cycle of hormone **A**.

.....

.....

.....

.....

.....

.....

..... [3]

(ii) State the day in Fig. 1.2 when ovulation is most likely to occur.

..... [1]

(iii) State the days in Fig. 1.2 when the lining of the uterus is lost from the body.

..... [1]

(c) The female contraceptive pill is a chemical method of birth control, which is available in many countries.

(i) Describe the social implications of the increased availability of the female contraceptive pill.

.....

.....

.....

.....

..... [2]

(ii) The hormones in the female contraceptive pill can enter rivers.

Describe the negative impacts of female contraceptive hormones entering rivers and contaminating drinking water.

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..... [3]

(iii) State **two** barrier methods of contraception.

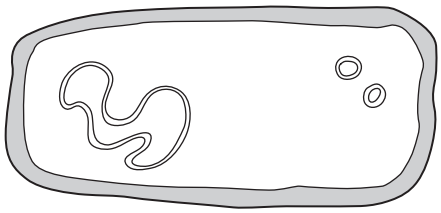
1 .....

2 .....
[2]

[Total: 15]

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2 **(a)** Fig. 2.1 is a diagram of a prokaryotic cell.



not to scale

Fig. 2.1

(i) State **one** visible feature in Fig. 2.1 that identifies this cell as a prokaryotic cell.

..... [1]

(ii) State **one** cell structure that is present in the cells of all organisms.

..... [1]

(b) Prokaryotes, Animals and Plants are three of the five kingdoms of organisms.

State the names of the **two other** kingdoms.

1 .....

2 .....
[2]

(c) Fig. 2.2 shows part of the nitrogen cycle.

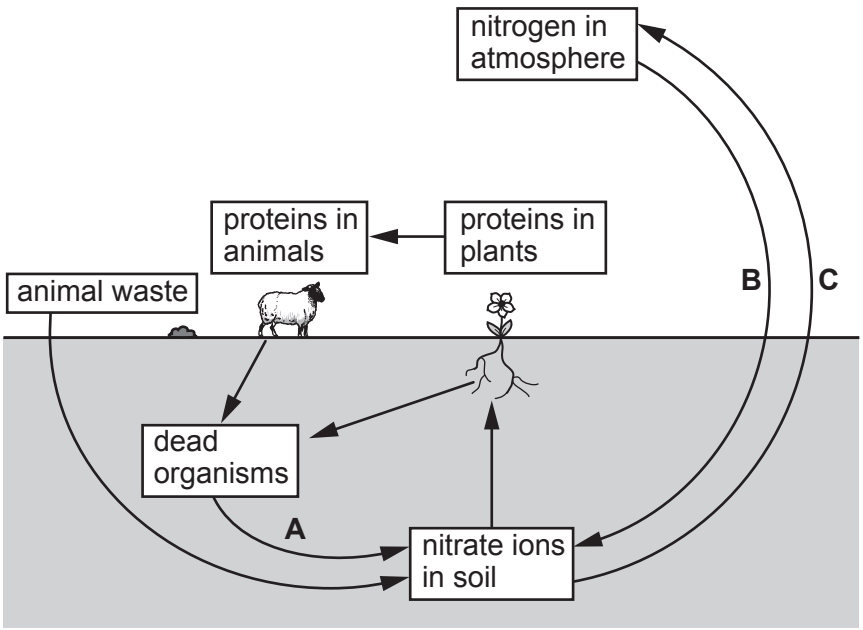


Fig. 2.2

(i) Describe processes **A**, **B** and **C** in Fig. 2.2.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [6]

(ii) State the name of the process that plants use to absorb nitrate ions.

..... [1]

[Total: 11]

3 **(a)** The activity of the heart can be monitored using different methods.

Fig. 3.1 shows two ECG traces. One trace was recorded when the person was at rest and the second trace was recorded during exercise.

The length of time taken for one heart beat is indicated in Fig. 3.1 on the ECG trace recorded at rest.

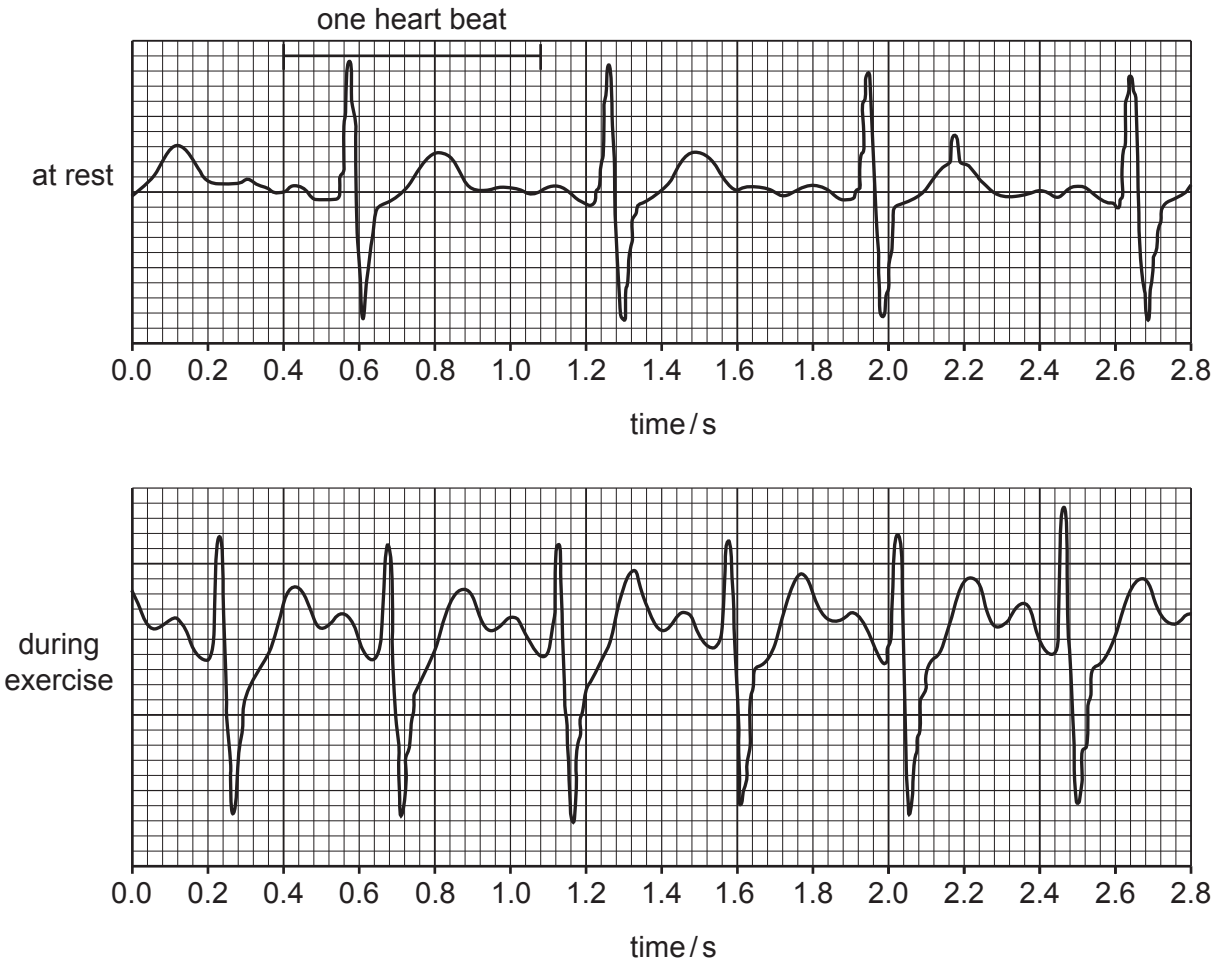


Fig. 3.1

(i) Estimate the resting heart rate of the person from their ECG trace in Fig. 3.1.

Space for working.

..... beats per minute
[2]

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(ii) Explain why the ECG trace recorded during exercise differs from the ECG trace recorded at rest.

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

(iii) Suggest **one other** way of monitoring the activity of the heart.

.....

..... [1]

(b) If exercise is very intense an oxygen debt is formed.

(i) Complete the sentence.

An oxygen debt results in a build-up of ..... in the

..... during vigorous exercise.

[2]

(ii) Outline how the body removes an oxygen debt.

.....

.....

.....

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.....

.....

.....

.....

..... [4]

[Total: 13]

4 **(a)** A leaf can be described as an organ.

Define the term *organ*.

.....

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..... [1]

(b) Fig. 4.1 is a photomicrograph of a cross section of part of a leaf.

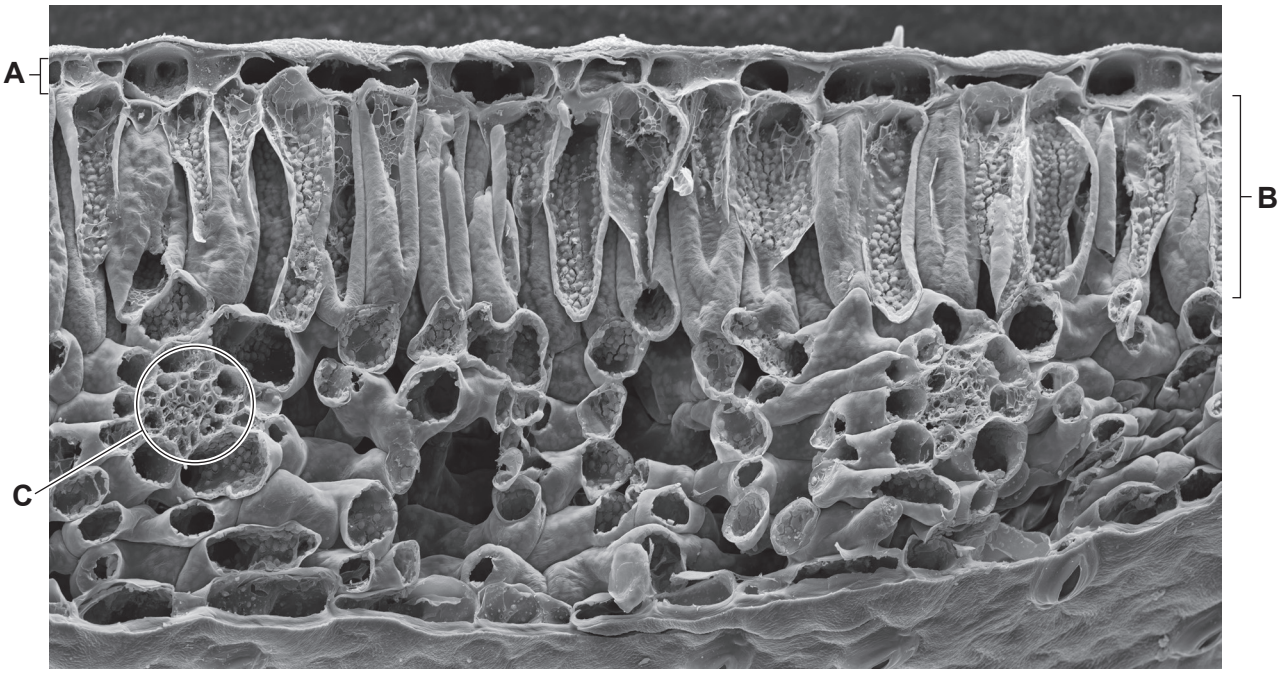


Fig. 4.1

(i) Identify the tissue labelled **A** in Fig. 4.1.

..... [1]

(ii) Identify the structure labelled **C** in Fig. 4.1.

..... [1]

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(iii) Describe how the tissue labelled **B** is adapted to maximise photosynthesis.

.....

.....

.....

.....

.....

.....

..... [3]

(c) (i) State **two** substances that are transported only in the phloem.

..... [1]

(ii) Explain why some parts of a plant can act as both a source and a sink.

.....

.....

.....

.....

..... [2]

(d) The effect of carbon dioxide concentration on the rate of oxygen production in an aquatic plant was measured.

- A lamp was used to keep the light intensity constant.
- The oxygen gas released by the plant was collected in a gas syringe.
- The plant was placed in water that was kept constant at 20 °C.

Fig. 4.2 shows the results.

(i) The rate of oxygen production was assumed to be the same as the rate of photosynthesis.

Suggest why the rate of oxygen production was **not** the same as the rate of photosynthesis.

.....

.....

..... [2]

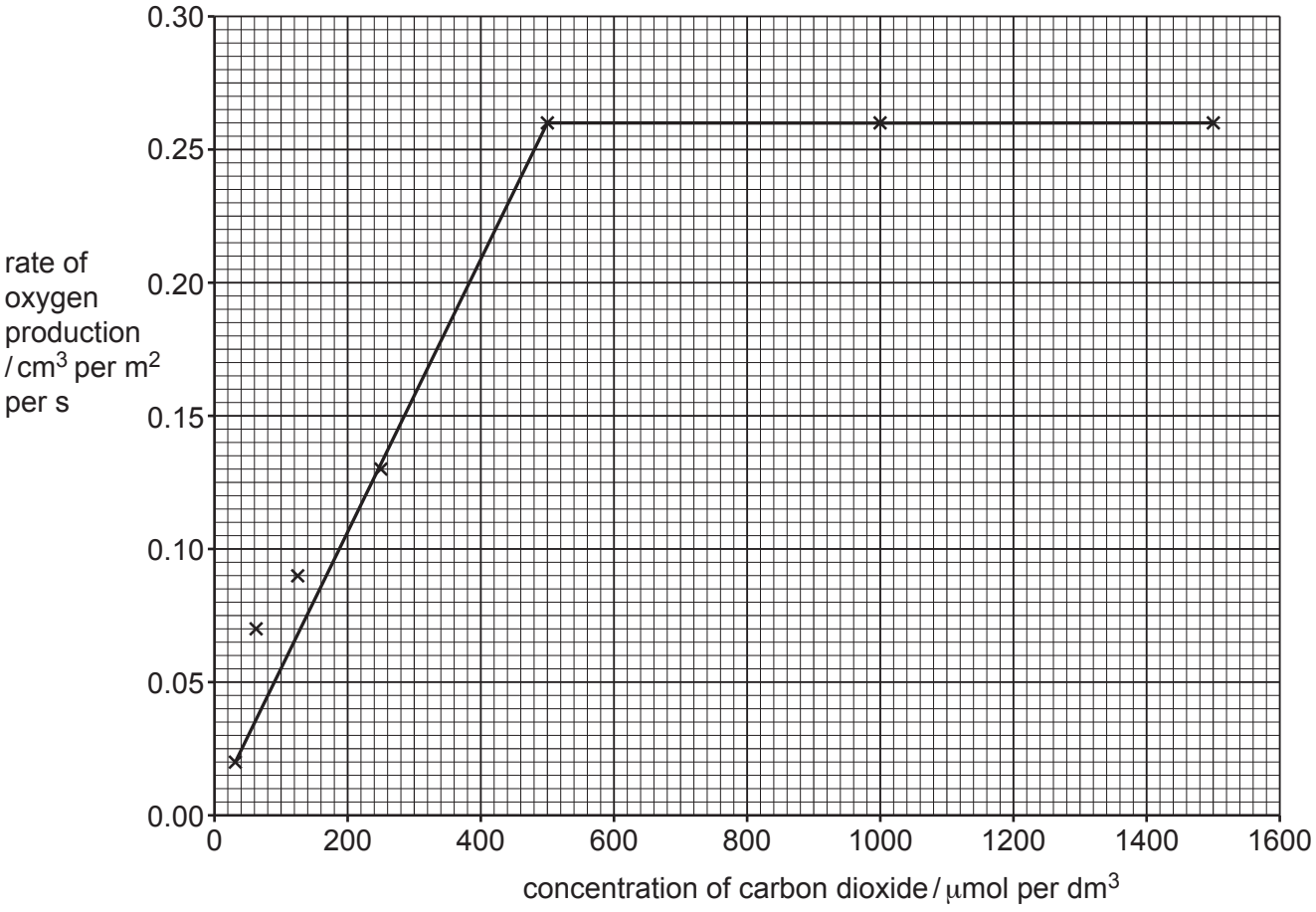


Fig. 4.2

(ii) Explain the results shown in Fig. 4.2.

.....

.....

.....

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..... [3]

(e) The investigation was repeated with the same type of aquatic plant at 10 °C.

Draw a line **on Fig. 4.2** to predict the results at 10 °C. [2]

[Total: 16]

5 **(a)** Measles is a transmissible disease.

The percentage of the population that were vaccinated against measles in a country was determined.

The number of confirmed cases of measles in the country was also recorded.

Fig. 5.1 shows the data that were collected between 1975 and 2010.

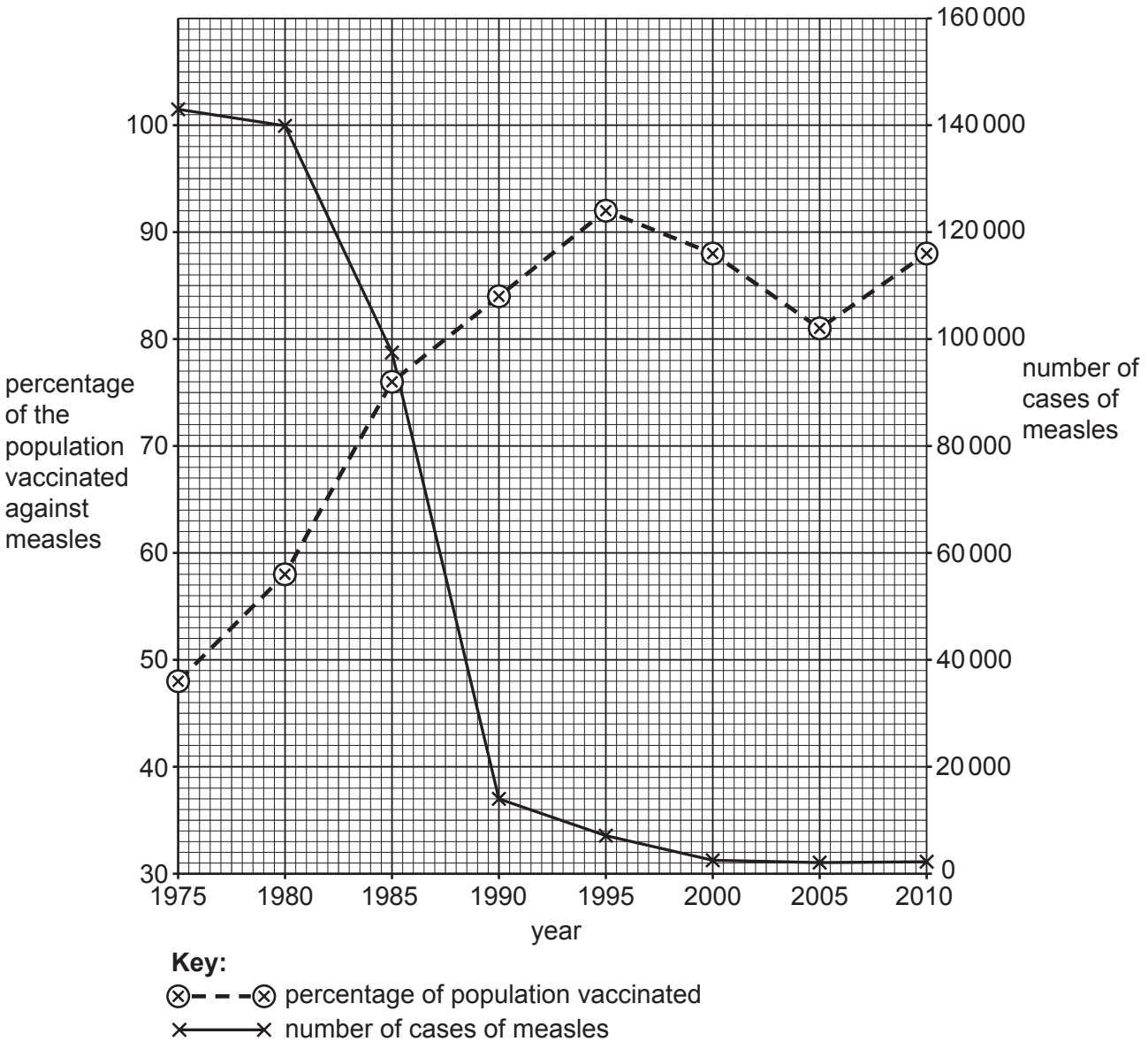


Fig 5.1

(i) Calculate the percentage change in the number of cases of measles between 1980 and 1990.

Space for working.

.....%
[2]

(ii) Describe the data shown in Fig. 5.1.

.....

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..... [4]

(iii) Explain how vaccination protects people against a transmissible disease such as measles.

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..... [5]

(b) The human body has several defences against pathogens.

(i) State **two** of the body's chemical barriers to pathogens.

1 .....

2 .....
[2]

(ii) Describe the process of blood clotting.

.....

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..... [3]

[Total: 16]

6 **(a)** Fig. 6.1 shows a food web.

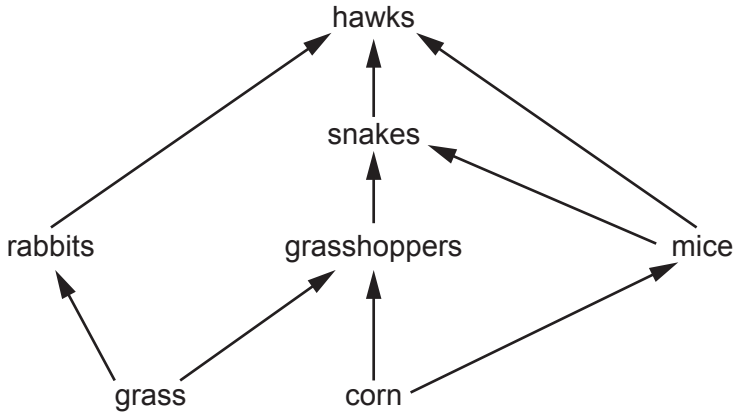


Fig. 6.1

(i) State the number of trophic levels in the food web in Fig. 6.1.

..... [1]

(ii) State the name of **one** organism that feeds at both the third and fourth trophic levels from Fig. 6.1.

..... [1]

(iii) State the name of the type of energy that is transferred between trophic levels.

..... [1]

(b) The total biomass of the snakes is much less than the total biomass of the mice in the food web shown in Fig. 6.1.

Explain why the total biomass of the snakes is less than the total biomass of the mice.

Use the term **energy** in your answer.

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..... [3]

(c) Food shortages that result in famine can be caused by many factors.

Describe how drought can contribute to famine.

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..... [3]

[Total: 9]

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