Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

6419188534

BIOLOGY **5090/21**

Paper 2 Theory **October/November 2014**

1 hour 45 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.

Section A
Answer **all** questions.
Write your answers in the spaces provided on the Question Paper.
Section B
Answer **all** questions.
Write your answers in the spaces provided on the Question Paper.
Section C
Answer **either** question 8 **or** question 9.
Write your answers in the spaces provided on the Question Paper.

You are advised to spend no longer than one hour on Section A.

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.

This document consists of **14** printed pages and **2** blank pages.

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Section A

Answer **all** the questions in this section.

Write your answers in the spaces provided.

1 Fig. 1.1 shows a section through a plant organ with a very small pipette (micropipette) inserted into tissue **A**.

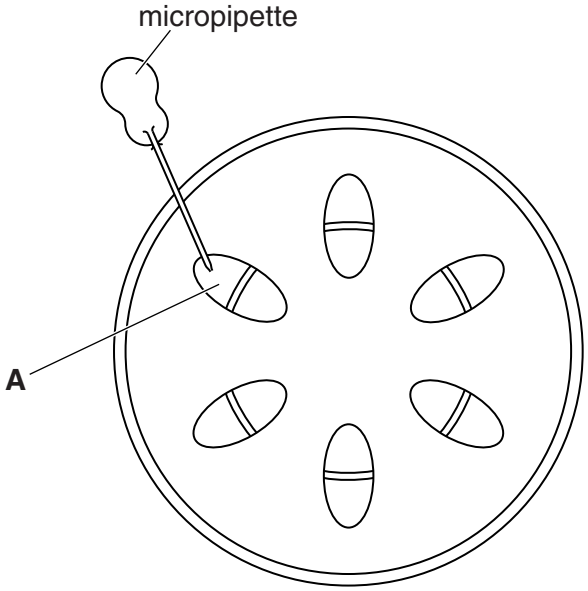


Fig. 1.1

(a) **(i)** Name the plant organ shown in Fig. 1.1. ..... [1]

(ii) Name the tissue labelled **A**. ..... [1]

(b) The micropipette is used to take samples from tissue **A** at regular intervals over a 24-hour period. These samples are then analysed for their content. Explain how this might provide information about the rate of photosynthesis in the plant.

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..... [4]

(c) Some insects have mouthparts similar to the tube of the micropipette. Suggest reasons for these insects using tissue **A** to supply their food.

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..... [4]

[Total: 10]

2 Fig. 2.1 shows the digestion, absorption and assimilation of a chemical (**B**). It also shows the formation of its waste product, chemical **F**.

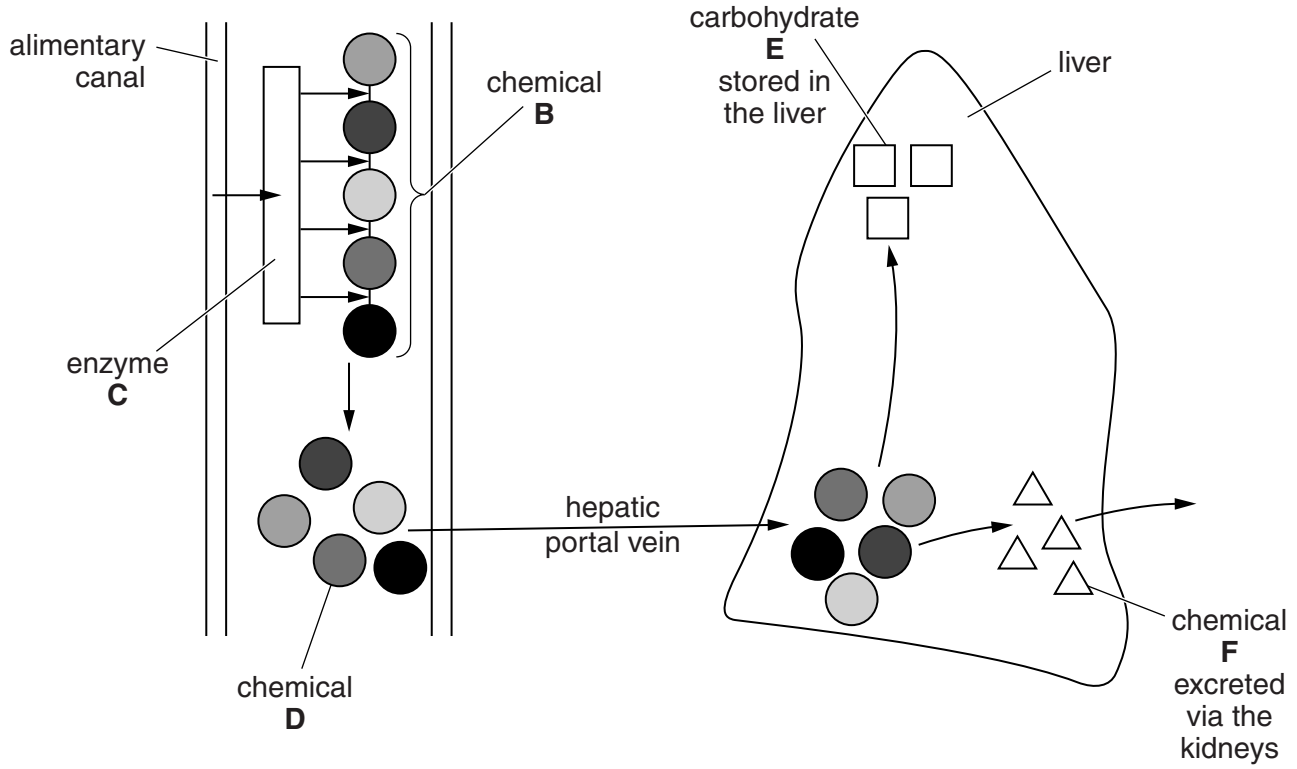


Fig. 2.1

(a) Name

chemical **B** .....

enzyme **C** .....

chemical **D** .....

carbohydrate **E** .....

chemical **F** ..... [5]

(b) **(i)** Describe what happens to carbohydrate **E** before it can be used in metabolic reactions in body cells.

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..... [2]

(ii) Name the process in which the product of carbohydrate **E** is used within a body cell.

process ..... [1]

(iii) Describe how different types of body cells and tissues make use of this process.

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..... [4]

[Total: 12]

3 **(a)** At puberty, hormones are produced that are responsible for the development of secondary sexual characteristics.

(i) Name **one** secondary sexual characteristic in males.

..... [1]

(ii) Name the hormone responsible for the development of secondary sexual characteristics in males.

..... [1]

(iii) Name the organs that produce this hormone. ..... [1]

(b) Fig. 3.1 shows the concentrations in the blood of two hormones, **F** and **G**, involved in a woman's menstrual cycle.

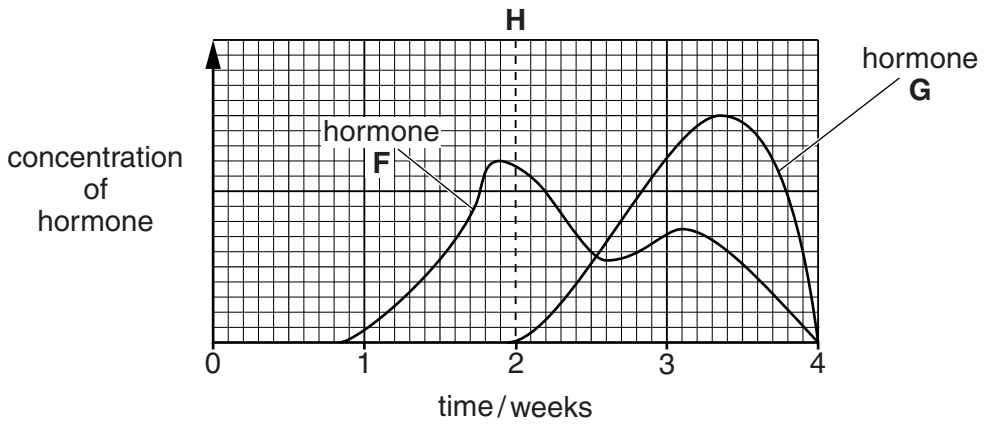


Fig. 3.1

(i) Name the hormones **F** and **G**.

F .....

G ..... [2]

(ii) State what occurs at time **H**. ..... [1]

(c) Fig. 3.2 shows the thickness of the same woman's uterus lining over a 4-week period.

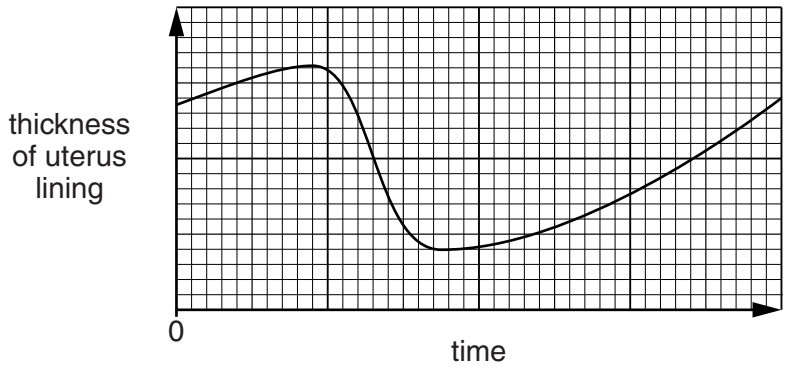


Fig. 3.2

The graph shown in Fig. 3.1 does not begin at the same time as the cycle shown in Fig. 3.2.

Indicate on Fig. 3.2, with a line labelled **J**, the stage shown by line **H** on Fig. 3.1, and explain your reason for choosing this point on the graph.

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[Total: 10]

4 Fig. 4.1 shows the effect of exercise on the concentration of oxygen in the blood and the concentration of lactic acid in the muscles of a healthy person over a 5-minute period.

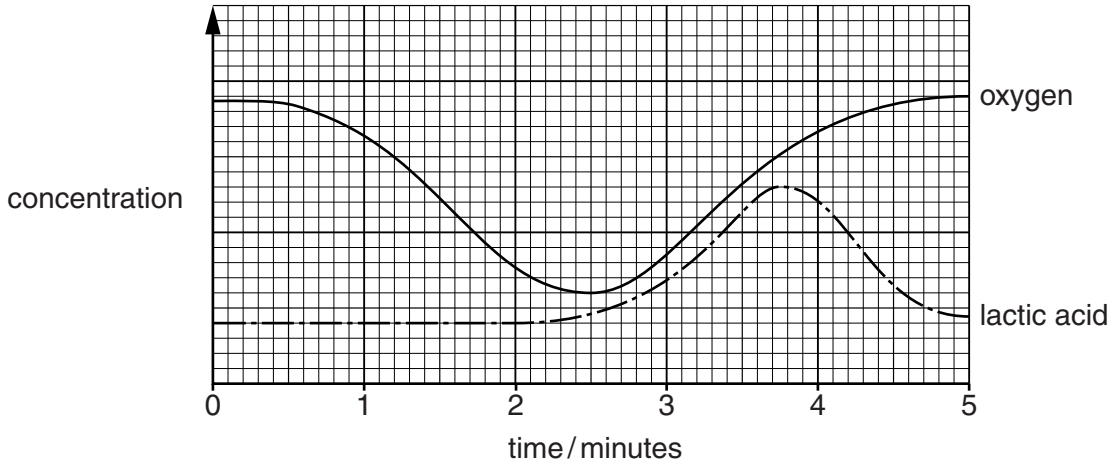


Fig. 4.1

(a) Use Fig. 4.1 to find the time at which the person started to exercise.

..... [1]

(b) Name the process that causes the change in oxygen concentration during the first 2 minutes on Fig. 4.1.

..... [1]

(c) Suggest and explain how each of the two curves on Fig. 4.1 might be different if the person suffered from emphysema.

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[Total: 7]

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5 Fig. 5.1 shows a decaying tooth.

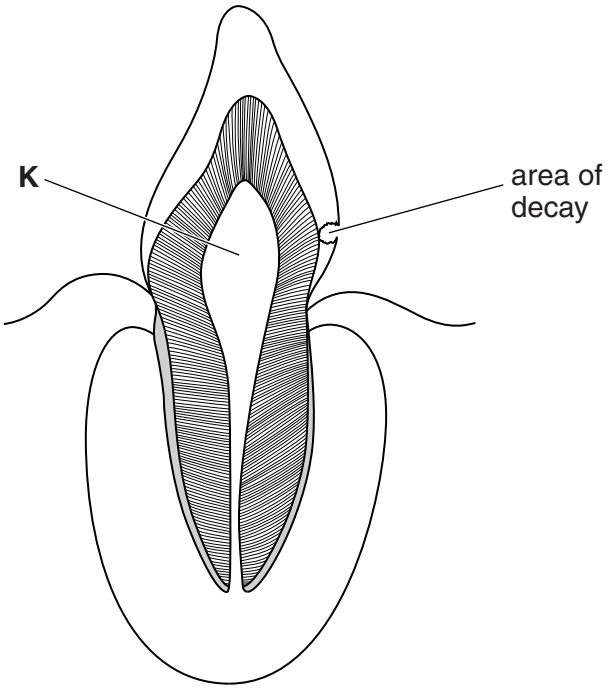


Fig. 5.1

(a) Name the type of tooth shown. ..... [1]

(b) Name **two** structures that are found in region **K**.

1 .....

2 ..... [2]

(c) Explain the causes of the decay shown in Fig. 5.1.

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..... [4]

(d) Two different regions were studied to see the effect of fluoridation of drinking water on the mean number of decayed teeth in children living in those regions.

In region **L**, the percentage of children drinking fluoridated water gradually increased over a 30-year period. In region **M**, no fluoride was added to the drinking water over the same period.
Table 5.1 shows the mean number of decayed teeth per child in each region. It also shows the percentage of children drinking fluoridated water in region **L**.

Table 5.1

date	region **L**		region **M**
	percentage	mean number	mean number
1970	28	3.9	2.1
1980	32	3.3	1.9
1990	38	2.7	1.8
2000	60	1.2	1.6

(i) State the effect of adding fluoride to the water supplies in region **L**.

..... [1]

(ii) Suggest **three** possible reasons for the results shown for children in region **M**.

1 .....

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2 .....

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3 .....

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[3]

[Total: 11]

Section B

Answer **both** questions in this section.

Write your answers in the spaces provided.

6 **(a)** Describe the two forms of variation found within a natural population.

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(b) Explain how variation is important for the long-term survival of the species.

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[Total: 10]

7 Describe the similarities and differences in structure and function of root hairs and villi.

(a) similarities

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..... [4]

(b) differences

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[Total: 10]

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Section C

Answer **either** question 8 **or** question 9.

Write your answers in the spaces provided.

8 **(a)** **(i)** Explain how meiosis is involved in the formation of gametes.

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..... [2]

(ii) Explain how two plants, one with red flowers and one with white flowers, can produce seeds that will grow into plants with either red or white flowers in the ratio of 1:1.

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(b) Suggest how two plants, of a different species, one with red and one with white flowers, could produce seeds that will grow into plants with pink flowers.

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..... [2]

[Total: 10]

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[Turn over

9 **(a)** Describe the path taken by a molecule of carbon dioxide, and the processes in which it is involved, from the moment it leaves the atmosphere until it forms part of a starch molecule in a leaf.

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(b) Explain how a lack of magnesium in the soil in which a plant is growing may reduce the formation of starch in a leaf.

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..... [3]

[Total: 10]

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