UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

0551746194

BIOLOGY **5090/21**

Paper 2 Theory **October/November 2012**

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 a pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, highlighters, 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.
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.

For Examiner's Use	
Section A	
Section B	
Section C	
Total	

This document consists of **13** printed pages and **3** blank pages.

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Section A

For Examiner's Use

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

Write your answers in the spaces provided.

1 The urinary systems of a dog and of a human being are similar in structure and function. Fig. 1.1 shows the urinary system of a dog.

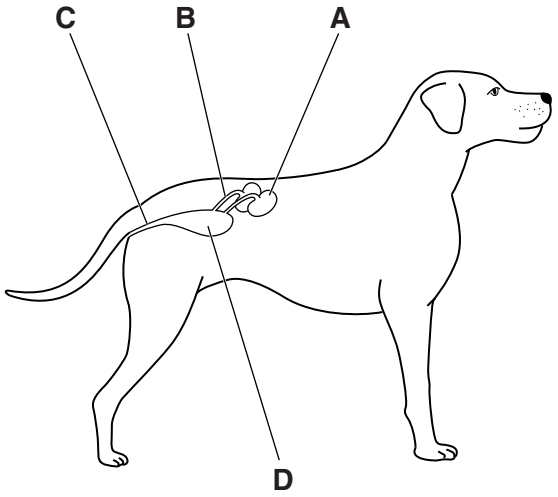


Fig. 1.1

(a) (i) Name the parts **A**, **B** and **C** in Fig. 1.1.

A .....

B .....

C ..... [3]

(ii) State the function of **D**.

..... [1]

(b) Fig. 1.2 shows the relationship between an alveolus and a blood capillary in the lung of a mammal. The arrows show the path taken by oxygen from inhaled air entering the blood during gas exchange.

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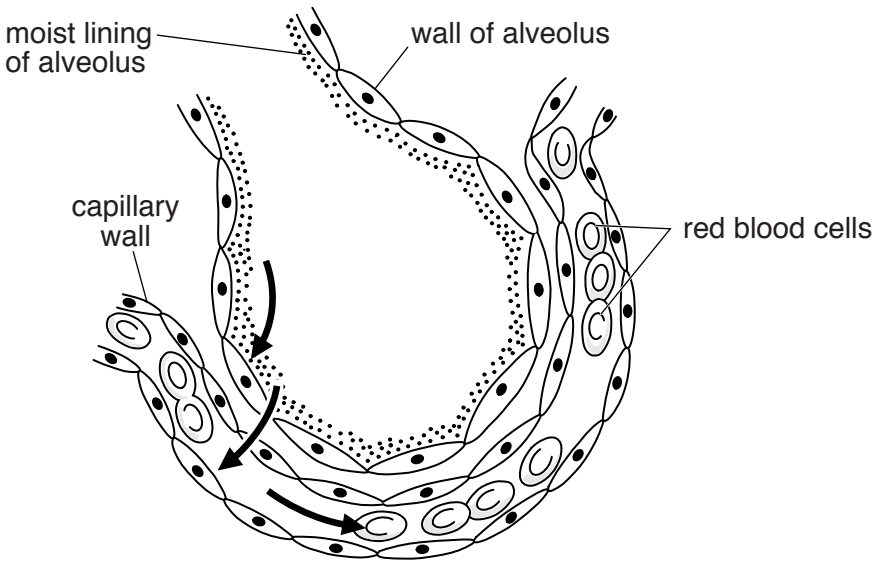


Fig. 1.2

(i) Draw **two** arrows on Fig. 1.2 to show the path taken by most carbon dioxide leaving the blood.

.....

.....

..... [2]

(ii) Explain why this movement of carbon dioxide is considered to be part of excretion.

.....

.....

..... [3]

(c) Hormones are also substances that need to be excreted from the body after they have carried out their functions.
Explain how this is done.

.....

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..... [2]

[Total: 11]

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2 **(a)** The graphs in Fig. 2.1 show the effect of changing pH on the rate of reactions controlled by two different enzymes found in the alimentary canal of a mammal.

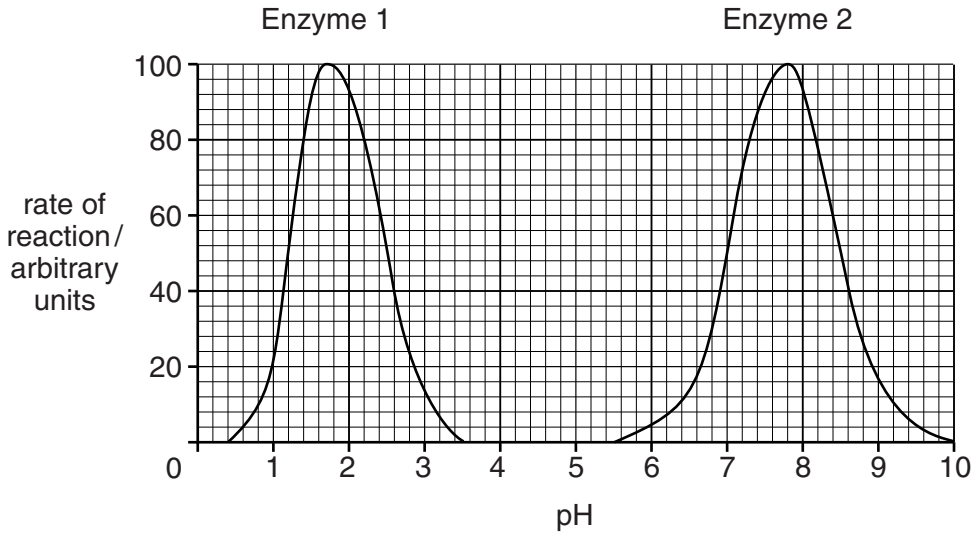


Fig. 2.1

(i) Explain what is meant by the term pH.

.....

..... [2]

(ii) Using the information in Fig. 2.1, state the rate of reactions controlled by Enzyme 2 at pH 7.

..... [1]

(iii) Suggest in which part of the alimentary canal Enzyme 1 is likely be active.

..... [1]

Give reasons for your suggestion.

.....

..... [2]

(b) Enzymes in the alimentary canal are involved in reactions that break down large molecules into small molecules, for example, starch into maltose.
Give an example in another, named part of the body, where small molecules are built up into larger ones.

named part of the body .....

small molecules .....

larger molecules .....
[3]

[Total: 9]

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3 Atmospheric air contains oxygen and carbon dioxide.

For Examiner's Use

(a) Complete table 3.1 to show the percentage of oxygen and carbon dioxide in inhaled and exhaled air.

Table 3.1

gas	% gas in air	
	inhaled air	exhaled air
oxygen		
carbon dioxide		

[2]

(b) (i) Explain how oxygen is used by a muscle cell.

.....

.....

..... [3]

(ii) Explain what happens in a muscle cell when oxygen is in short supply.

.....

..... [2]

(c) At high altitudes, oxygen is less available than it is at low altitudes.
Suggest modifications of the circulatory and respiratory systems that might help people that live for many years at high altitude.

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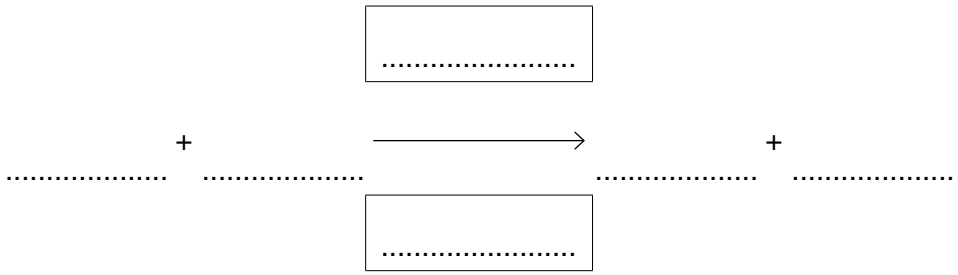
.....

..... [3]

[Total: 10]

4 **(a)** Complete the equation to summarise the process of photosynthesis.

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[2]

A young, green, leafy stem was placed in a clear glass beaker of water in bright light. Fig. 4.1 shows the stem 12 hours later.

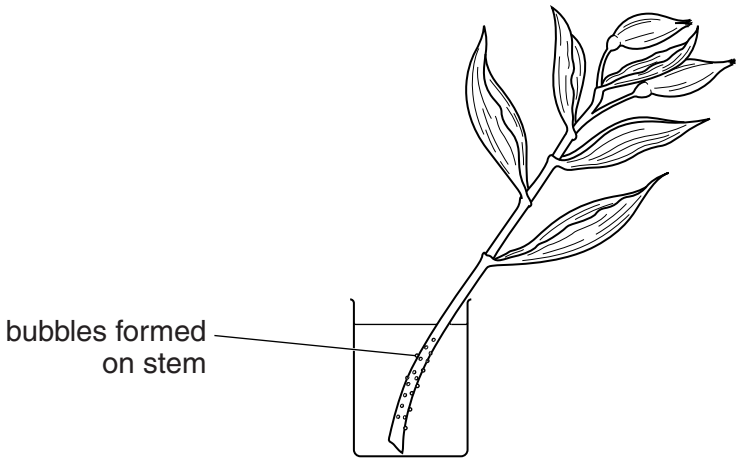


Fig. 4.1

(b) **(i)** Suggest two places where the bubbles could have come from.

1 .....

2 ..... [2]

(ii) Tests proved that the bubbles contained oxygen. Explain how they appeared on the side of this green stem.

.....

.....

.....

.....

..... [3]

(c) Explain the benefits to other organisms of having submerged water plants in a pond ecosystem.

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.....

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..... [3]

[Total: 10]

5 Fig. 5.1 shows a palisade cell from the leaf of a flowering plant.

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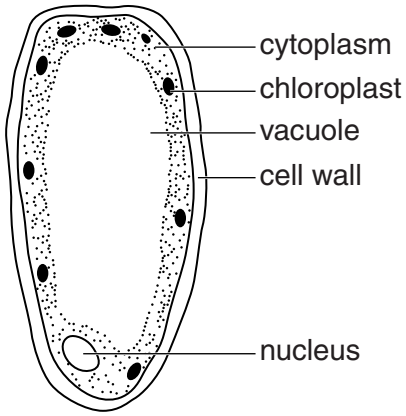


Fig. 5.1

(a) State **three** ways in which this cell differs from a fungal hypha.

palisade cell	fungal hypha
1.	....
2.	....
3.	....

[3]

Fig. 5.2 shows the apparatus used to produce 5 dm^3 of red wine from grape juice.

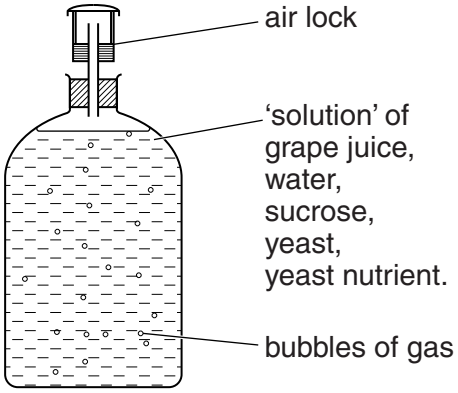


Fig. 5.2

(b) State an equation for the chemical process by which the alcohol is produced.

..... [2]

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(c) Suggest a suitable temperature to ensure a good yield of alcohol.

..... [1]

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Table 5.1 shows the rate of bubble release and the concentrations of sugar and alcohol in the grape juice over the first 10 days.

Table 5.1

time /days	number of bubbles per hour	concentration of sugar/grams per dm^3	concentration of alcohol/%
1	60	200	0.0
2	40	150	0.0
3	20	100	0.0
7	2	50	0.5
10	1	30	2.0

(d) (i) State the process that was occurring from day 1–3 to produce the bubbles of gas.

..... [1]

(ii) Explain why alcohol started to be produced only after several days.

.....

.....

..... [2]

(iii) When the alcohol content reached 15%, no further bubbles were produced. Suggest why the alcohol content could not increase further.

.....

..... [1]

[Total: 10]

Section B

For Examiner's Use

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

Write your answers in the spaces provided.

6 Aphids are insects that feed by piercing the phloem of soft, young shoots. Aphids then use their sharp, hollow mouthparts for sucking up their nutrition from the plant.

(a) Explain why phloem is more suitable for this purpose than any other plant tissue.

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..... [3]

(b) Suggest and explain the effect on the plant shoot of a large number of aphids feeding at the same time over a period of several weeks.

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..... [7]

[Total: 10]

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7 **(a)** Explain the differences between *mitosis* and *meiosis*. Your explanation should include references to where the processes occur and why they occur.

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..... [5]

(b) Explain how it is possible that parents with different blood groups are able to produce **only** children with blood groups **different** from themselves.

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..... [5]

[Total: 10]

Section C

For Examiner's Use

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

Write your answers in the spaces provided.

8 **(a)** Explain what is meant by *double circulation*.

.....

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..... [3]

(b) Describe the composition and the importance of plasma in the circulatory system.

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..... [7]

[Total: 10]

For Examiner's Use

9 **(a)** Describe fertilisation in each of the following.

(i) a human

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.....

(ii) a flowering plant

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..... [7]

(b) Explain the **disadvantages** of self-fertilisation to a flowering plant.

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..... [3]

[Total: 10]

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