UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

*3624412183*

**BIOLOGY** **5090/21**

Paper 2 Theory **October/November 2010**

**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** the questions including questions 6, 7 and 8 **Either** or 8 **Or**.
Write your answers in the spaces provided on the Question Paper.
Write an **E** (for Either) or an **O** (for Or) next to the number 8 in the Examiner's grid below to indicate which question you have answered.

You are advised to spend no longer than one hour on Section A and no longer than 45 minutes on Section B.
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 | |
| 6 | |
| 7 | |
| 8 | |
| Total | |

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


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## Section A

Answer **all** questions in this section.

Write your answers in the spaces provided.

**1** Fig. 1.1(a) shows a flower very shortly after it has opened and Fig. 1.1(b) shows the same flower when it is several days older.



**Fig. 1.1(a)**

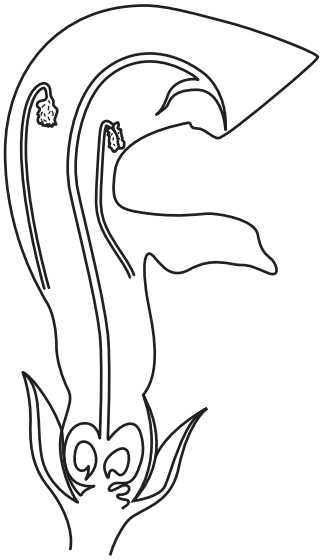


**Fig. 1.1(b)**

**(a)** On Fig. 1.1(b), label a filament and a sepal. [2]

**(b)** State two features of the flower in Fig. 1.1(a) that could have attracted the insect.

1. .....

2. ..... [2]

Using information in Fig. 1.1(a) and Fig. 1.1(b)

**(c)** **(i)** explain why flowers of this plant are rarely self-pollinated

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..... [4]

**(ii)** suggest how the insect brings about pollination in this species of plant.

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..... [5]

[Total: 13]

**2** Fig. 2.1 shows components of the faeces of a cow, an herbivorous mammal.

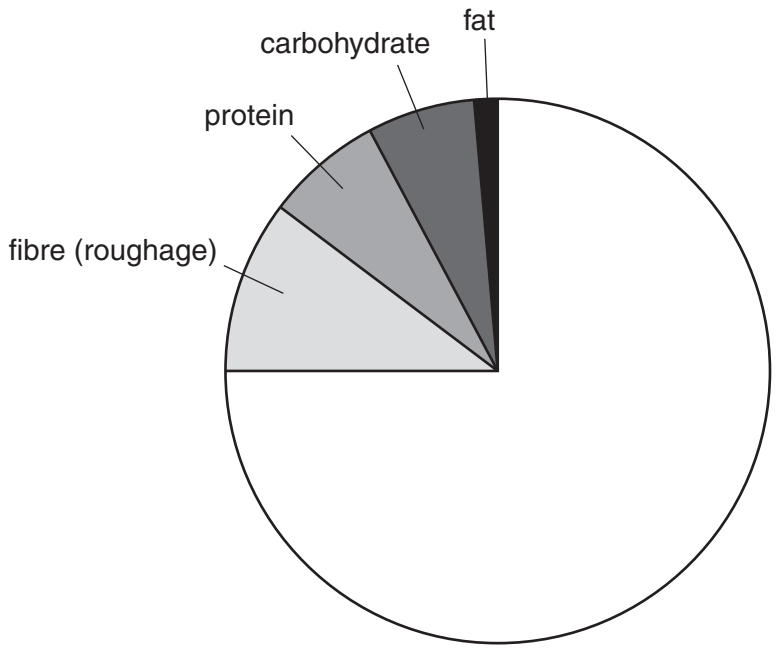



**Fig. 2.1**

**(a)** Name the component that makes up 75% of the faeces.

..... [1]

**(b)** Suggest what makes up a major part of the fibre in the faeces.

..... [1]

If used as a fertiliser, faeces will eventually increase the nitrates in the soil.

**(c)** Identify the component in faeces that is responsible for this increase in nitrates and describe its conversion into nitrates.

*component* ..... [1]

*how it is converted* .....

.....

.....

.....

.....

.....

..... [6]

**(d)** Explain why a mixture of faeces and urine is a better fertiliser than faeces alone.

.....

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..... [2]

[Total: 11]

**3** Fig. 3.1 shows the human digestive system.

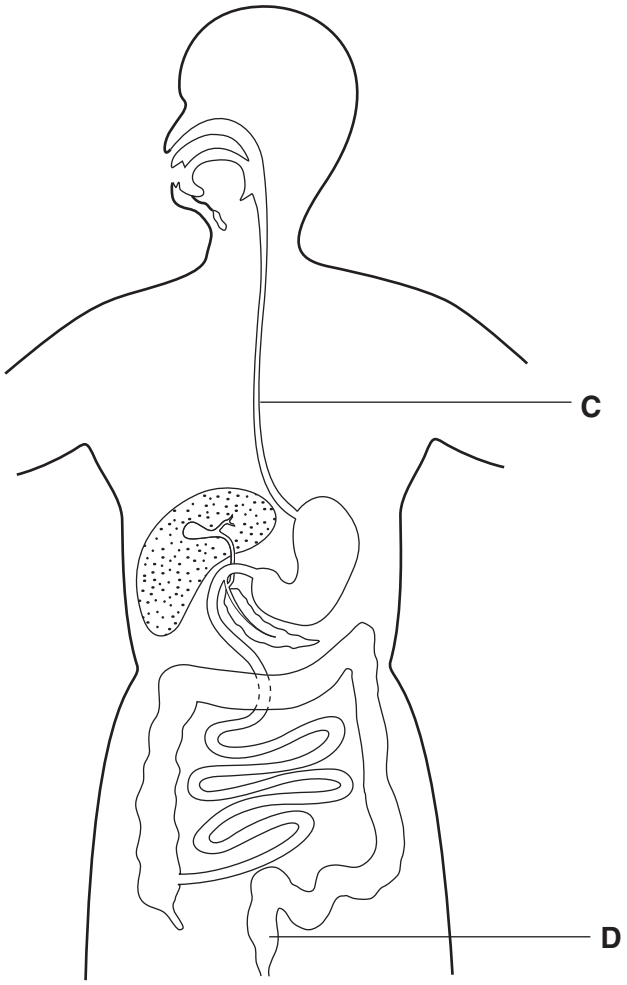



**Fig. 3.1**

**(a)** Identify parts **C** and **D** on Fig. 3.1.

**C** .....

**D** ..... [2]

**(b)** **(i)** Use a label line on Fig. 3.1, marked '**X**', to indicate where fat digestion begins. [1]

**(ii)** Explain your reasons for selecting this region.

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..... [4]

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**(c)** Adrenaline reduces the secretion of mucus in the body. Suggest why a person who suffers from stress may also suffer from damage to the lining of their stomach wall.

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..... [2]

[Total: 9]

**4** Fig. 4.1 shows the blood groups of the members of two families.

| | | Family 1 | | | | | Family 2 | | |
|---|---|---|---|---|---|---|---|---|---|
| blood groups of parents : | | **B** and **A** | | | | | **O** and **B** | | |
| blood groups of children: | | **A** | **O** | **AB** | **B** | | **B** | **AB** | **B** |
| child number | : | 1 | 2 | 3 | 4 | x | 5 | 6 | 7 |
| grandchild | : | | | | | 8 | | | |

**Fig. 4.1**

The alleles responsible for blood groups are $I^A$, $I^B$ and $I^o$.

**(a)** State the term used to describe the relationship between alleles $I^A$ and $I^B$.

..... [1]

**(b)** Identify, by number, which one of the children had been adopted by their family and could not be the genetic offspring of the parents. Explain your answer.

*child number* .....

*explanation* .....

.....

..... [2]

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**(c)** When children 4 and 5 grow up, they have a child of their own, child 8, as shown in Fig. 4.1. Using a genetic diagram, explain the possible genotypes and phenotypes of child 8.

[4]

[Total: 7]

**5** Fig. 5.1 shows the rate of water uptake and of water loss for a plant over a 24-hour period.

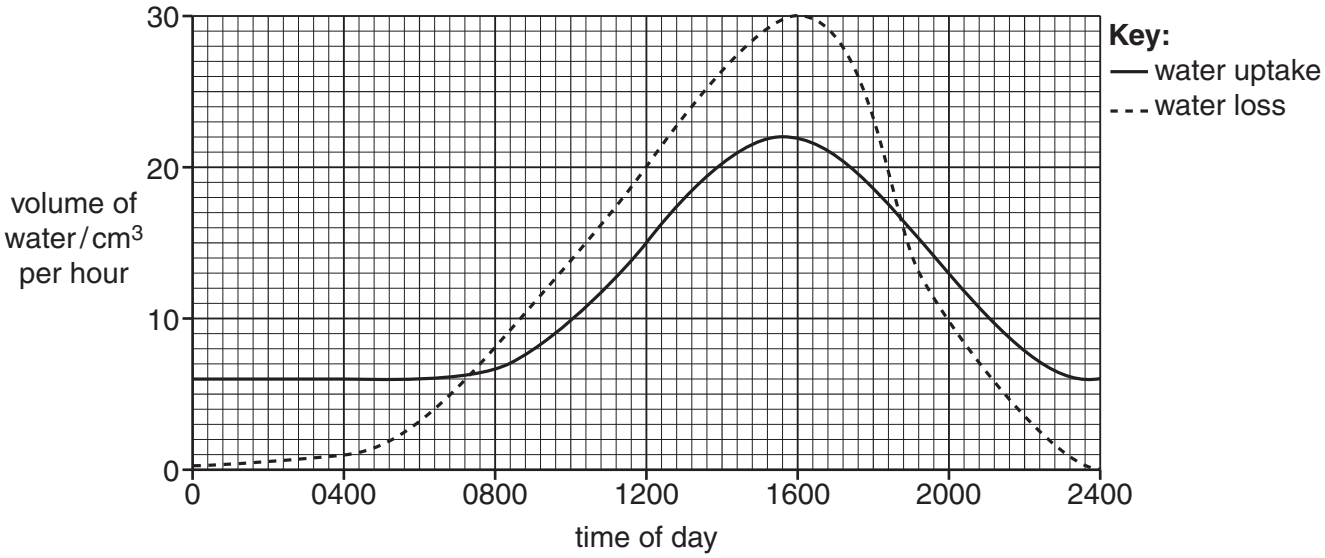



**Fig. 5.1**

**(a)** Determine the rate of water uptake at 1200 hours. ..... [1]

**(b)** **(i)** Name the cells through which water is absorbed from the soil.

..... [1]

**(ii)** Name the cells between which water vapour passes to the atmosphere.

..... [1]

**(c)** **(i)** State three uses of water within a plant between midnight and 0400 hours.

1. .....

2. .....

3. ..... [3]

**(ii)** State two additional uses of water between 0800 and 1900 hours.

1. .....

2. ..... [2]

**(d)** Explain what may happen to the plant between 1400 and 1800 hours.

.....

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..... [2]

[Total: 10]

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## Section B

Answer **all** the questions, including questions 6, 7 and either 8 **Either** or 8 **Or**.

Write your answers in the spaces provided.

**6** **(a)** Explain how chromosomes are involved in the process of inheritance.

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..... [5]

**(b)** Explain why a kidney transplant from a member of the same family is more likely to be successful than from someone who is unrelated.

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..... [5]

[Total: 10]

**7** A person is stung on the hand by an insect and automatically withdraws their hand rapidly.

**(a)** Describe the part played by the nervous system in this action.

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..... [7]

**(b)** Explain why the heart then beats faster.

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..... [3]

[Total: 10]

**8** **Either** With reference to photosynthesis,

**(a)** Explain what is meant by the term *limiting factors.*

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..... [5]

**(b)** Describe the ways in which a plant obtains its oxygen for respiration.

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..... [5]

[Total: 10]

**8** **Or** With reference to a human being, explain

**(a)** what is meant by a *cell*

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..... [3]

**(b)** how tissues and organs work together in the circulatory system.

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..... [7]

[Total: 10]

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