UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME	

CENTRE NUMBER						CANDIDATE NUMBER				

BIOLOGY **0610/33**

Paper 3 Extended **May/June 2011**

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 a pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
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	
1	
2	
3	
4	
5	
6	
Total	

This document consists of **17** printed pages and **3** blank pages.

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For Examiner's Use

1 The passage describes the feeding relationships between some of the organisms in an African grassland ecosystem.

The dominant grass species in the African grassland ecosystem are star grass and red oat grass. Star grass is eaten by antelope species, such as topi and Thomson's gazelle. Smaller animals such as mice and grasshoppers also feed on grass. Antelopes are eaten by predators such as cheetahs, lions and serval cats. Grasshoppers and mice are eaten by serval cats and tawny eagles. Ruppell's vulture feeds on dead mammals.

Fig. 1.1 shows part of the food web for this ecosystem.

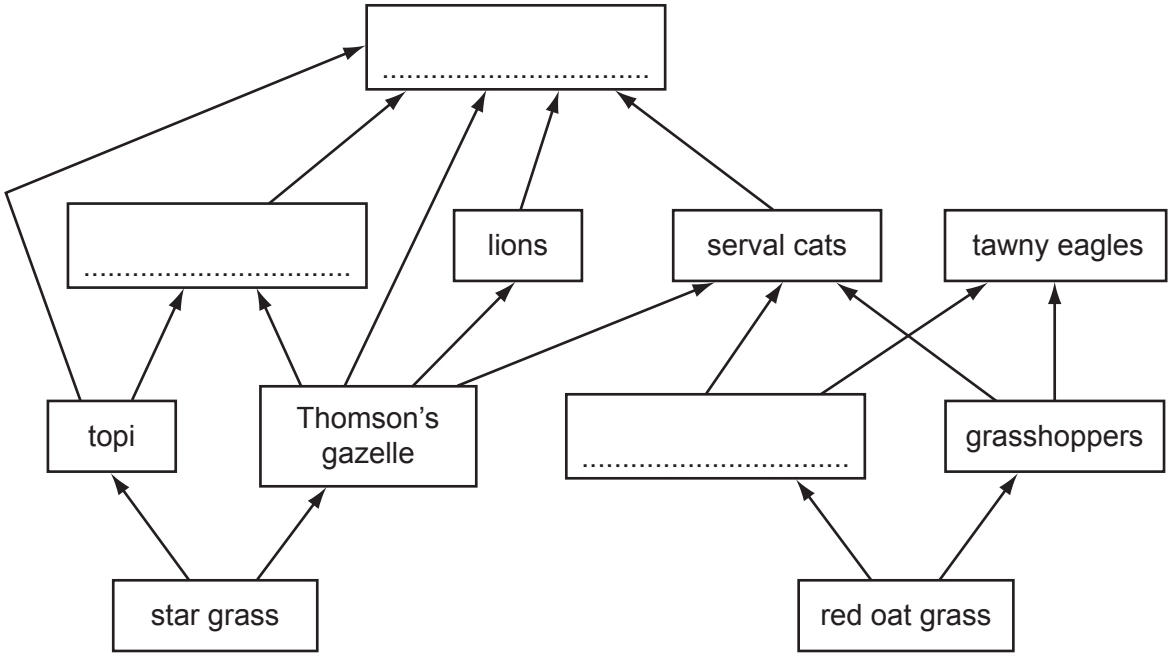

Fig. 1.1

(a) Complete the food web in Fig. 1.1 by writing the names of the organisms in the boxes.

Write your answers in the boxes in Fig. 1.1. [3]

(b) Name the trophic level of the following species:

star grass .....

topi ..... [2]

(c) **(i)** State the source of energy for the food web shown in Fig. 1.1.

..... [1]

(ii) State what happens to energy when it leaves an ecosystem, such as the African grassland.

..... [1]

For Examiner's Use

(d) Nutrients are recycled in ecosystems but energy is **not** recycled.

Explain why there are no more than four trophic levels in the ecosystem shown in Fig. 1.1.

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..... [3]

(e) Fish, such as salmon reared in fish farms, are fed on high protein food made from animals. When eating this food, these fish are feeding as secondary consumers.

Discuss the **disadvantages** of farming fish, such as salmon, for human food.

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..... [3]

[Total: 13]

For Examiner's Use

2 Fig. 2.1 shows a person sitting in a room. A thermometer shows the temperature of the room.

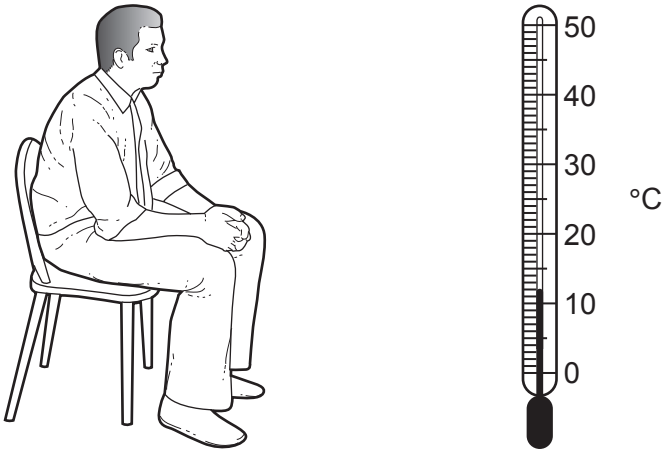

Fig. 2.1

(a) Give three uses of energy in the body of the person in Fig. 2.1.

1. .....

2. .....

3. ..... [3]

(b) Name the process carried out by the person in Fig. 2.1 that releases energy.

..... [2]

(c) The person leaves the room and runs very fast for 200 m. When the person stops running, his breathing rate and his heart rate remain high.

Explain why the person's breathing rate and heart rate remain high after the run.

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..... [4]

For Examiner's Use

(d) There are changes in the skin at the beginning of the run and during the run. These changes involve the blood vessels and the sweat glands.

Describe what happens to the blood vessels and sweat glands at the beginning of the run and during the run.

Explain why these changes happen.

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..... [5]

[Total: 14]

For Examiner's Use

3 Male and female sex hormones control the development of secondary sexual characteristics.

Table 3.1

sex hormones		testosterone	oestrogen
site of production		…….....	…….....
secondary sexual characteristics	1	…….....	…….....
	2	…….....	…….....

(a) Complete Table 3.1.

Write your answers in the boxes in Table 3.1. [3]

(b) Some women do not release eggs. The hormone FSH is used in fertility treatment for such women.

Name the organs in the female body responsible for the following:

(i) production of FSH,

..... [1]

(ii) release of eggs.

..... [1]

For Examiner's Use

(c) Fig. 3.1 shows changes in the concentration of FSH and three other hormones in the blood during one menstrual cycle.

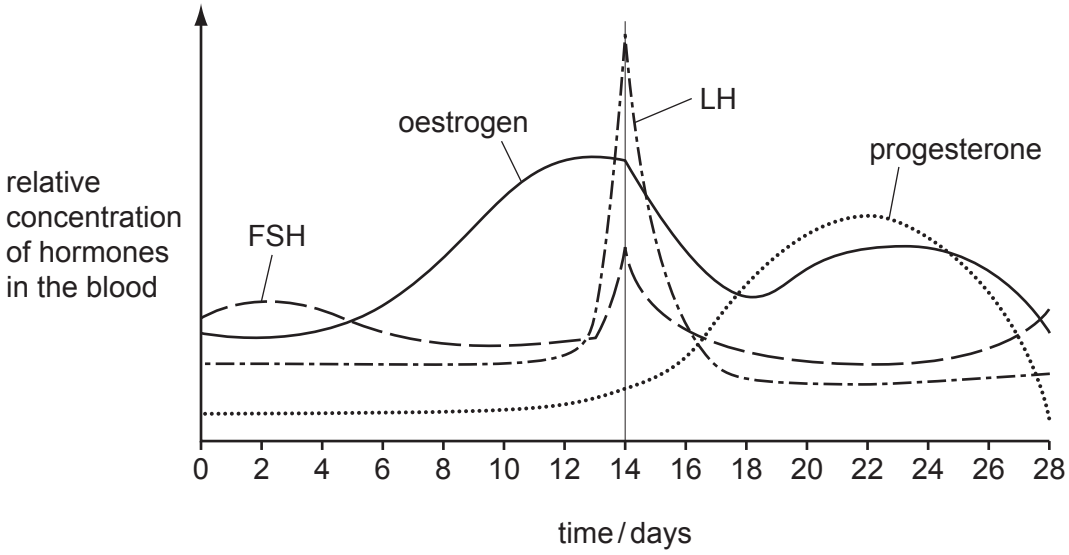

Fig. 3.1

(i) Describe the changes in the concentration of FSH during one menstrual cycle.

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..... [3]

(ii) Explain the role of FSH in the control of the menstrual cycle.

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..... [3]

[Total: 11]

For Examiner's Use

4 The four o'clock plant, *Mirabilis jalapa*, can have flowers of three different colours as shown in Fig. 4.1.

Fig. 4.1

(a) A student crossed some crimson-flowered plants with some yellow-flowered plants (cross 1). She collected the seeds and grew them. All of the plants that grew from these seeds had orange-red flowers.

Complete the genetic diagram to explain the result of cross 1.

parental phenotypes	crimson flowers	·	yellow flowers
parental genotypes	$\mathbf{A^C A^C}$	·	$\mathbf{A^Y A^Y}$
gametes	.....	+	.....
offspring genotype		.....	
offspring phenotype		.....	

[3]

For Examiner's Use

(b) The student then carried out three further crosses as shown in Table 4.1.

Table 4.1

	cross	genotypes of offspring
2	offspring of cross 1 × offspring of cross	
3	offspring of cross 1 × crimson-flowered plant	
4	offspring of cross 1 × yellow-flowered plant	

Complete Table 4.1 by writing the genotypes of the offspring of crosses **2**, **3** and **4**, using the same symbols as in the genetic diagram in **(a)**.

Write the genotypes in Table 4.1.

You may use the space below for any working.

[3]

(c) Flower colour in *M. jalapa* is not an example of the inheritance of dominant and recessive alleles.

Explain how the results of the crosses show that these alleles for flower colour are **not** dominant or recessive.

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..... [3]

Flowers from *M. jalapa* were cross-pollinated.

For Examiner's Use

(d) Explain the difference between self-pollination and cross-pollination.

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..... [2]

(e) Some species of plants are self-pollinated.

Discuss the long-term effects of self-pollination on the evolution of these plants.

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..... [4]

[Total: 15]

For Examiner's Use

5 Australia has added fluoride to much of its drinking water since 1953. Other countries, such as Chile, do not add fluoride to their drinking water.

(a) Outline the arguments for **and** against the addition of fluoride to public drinking water.

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..... [3]

Studies of the relationship between sugar consumption, tooth decay and fluoridation of drinking water have been carried out. Data was collected on tooth decay in 12 year-old children in Australia and Chile.

Fig. 5.1 shows changes in sugar consumption in Australia and Chile between 1970 and 2006.

Fig. 5.2 shows changes in tooth decay in the same countries over a similar time period.

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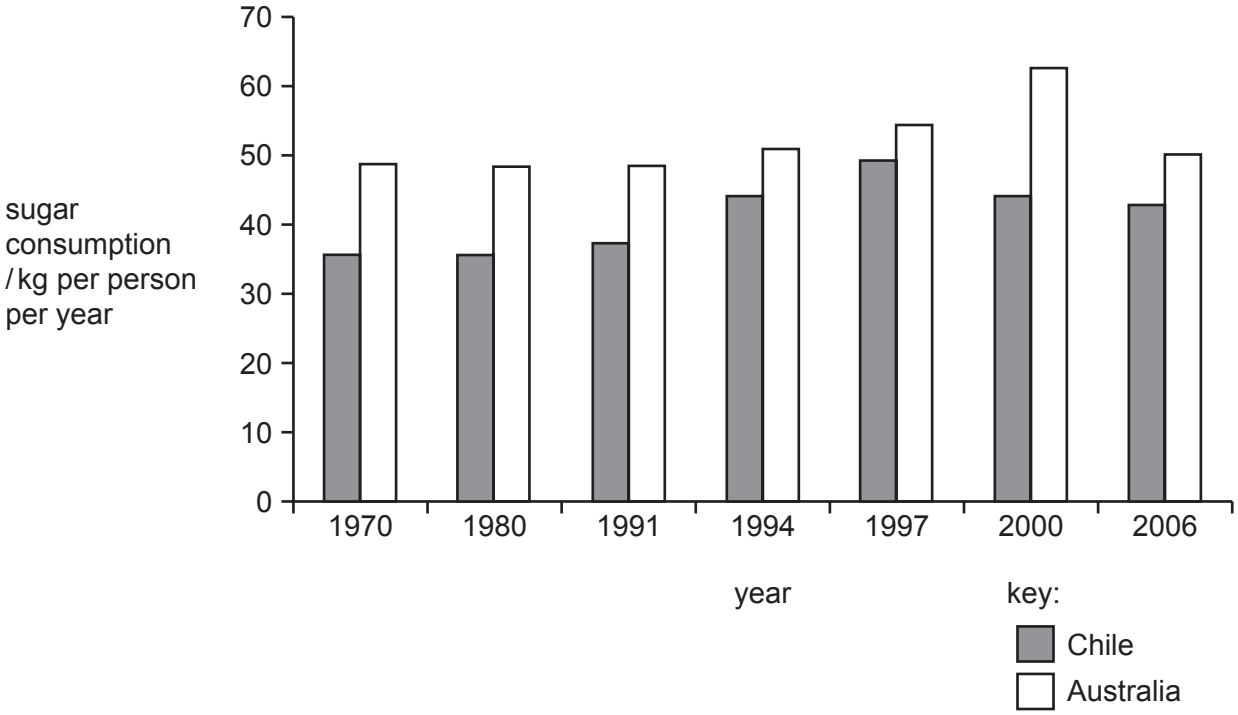

Fig. 5.1

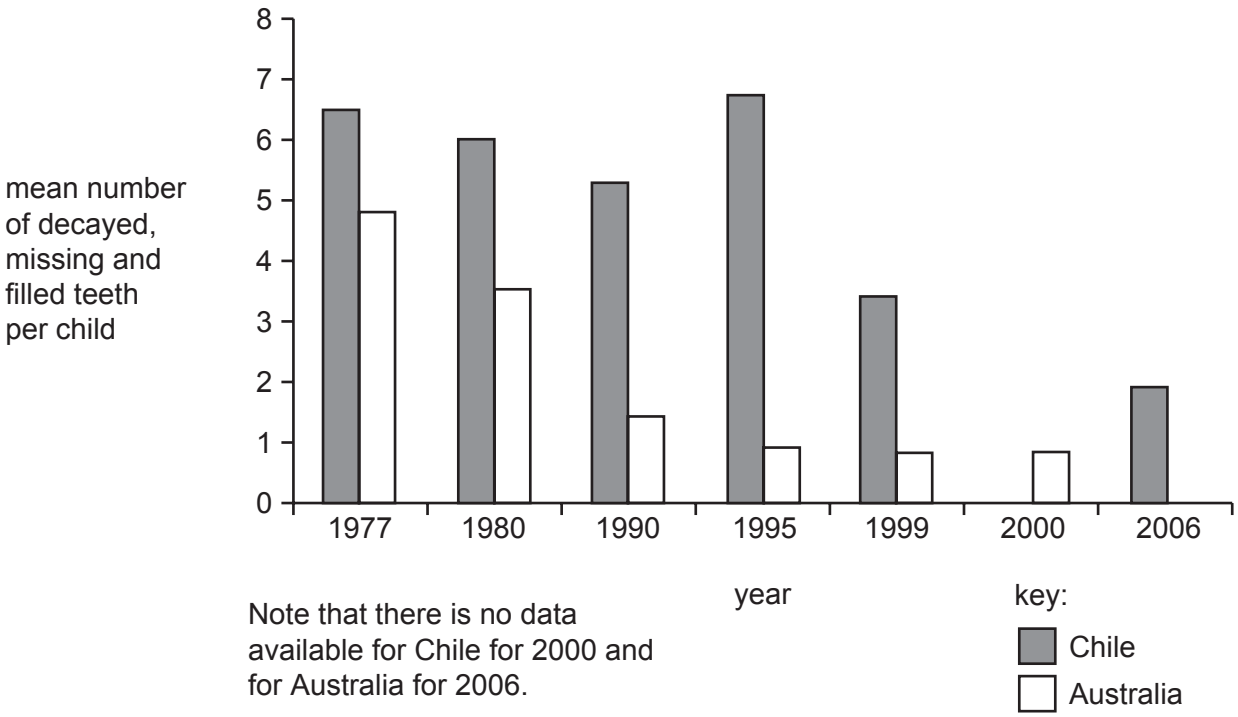

Fig. 5.2

For Examiner's Use

(b) Describe the changes in sugar consumption and tooth decay in Australia and Chile between 1970 and 2006.

sugar consumption .....

.....

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.....

.....

tooth decay .....

.....

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.....

..... [4]

(c) The peaks for sugar consumption and tooth decay in 12 year-old children in Chile occurred at about the same time. It has been suggested that an increase in sugar consumption in children caused an increase in tooth decay.

Explain how an increase in sugar consumption may cause tooth decay.

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..... [4]

For Examiner's Use

(d) Fig. 5.1 shows that sugar consumption in these two countries is similar. Fig. 5.2 shows the changes in tooth decay in 12 year-old children.

Suggest explanations for the similarities **and** differences in tooth decay in 12 year-old children in Australia and Chile.

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..... [3]

[Total: 14]

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Question 6 begins on the next page.

For Examiner's Use

6 Fig. 6.1 shows a leaf and a flower of *Helleborus orientalis*.

Fig. 6.1

(a) *H. orientalis* is a dicotyledonous plant.

State three features **visible** in Fig. 6.1 that show it is a dicotyledonous plant.

1. .....

2. .....

3. ..... [3]

Fig. 6.2 is a photograph of a section through a leaf of *H. orientalis*.

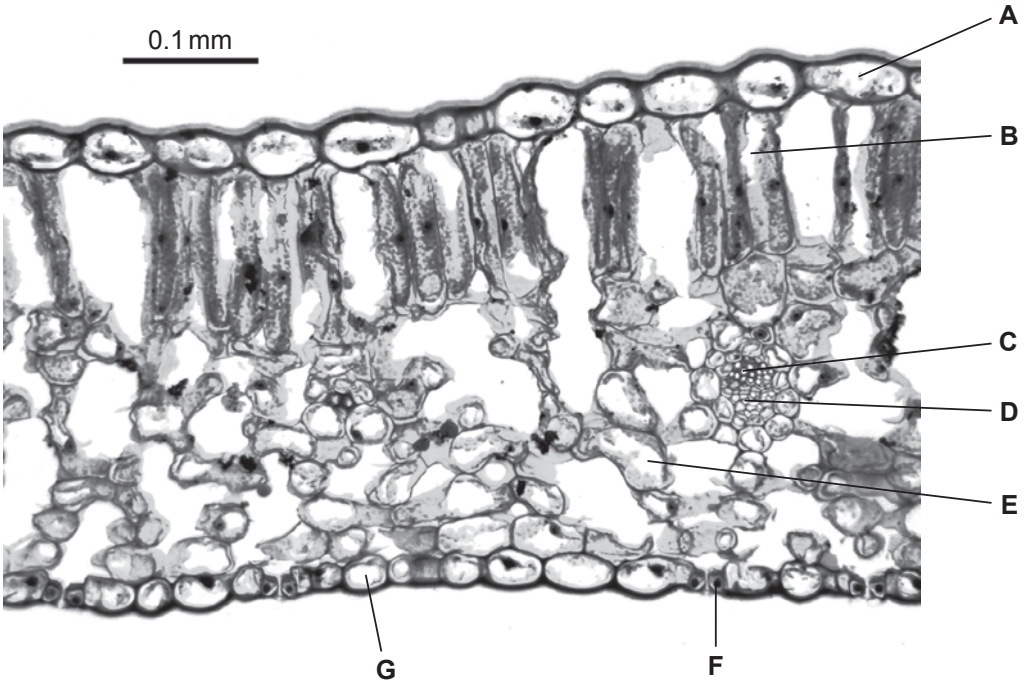

Fig. 6.2

For Examiner's Use

(b) Complete the table, using ticks (✓), to show the cells that carry out photosynthesis.

cell	cells that carry out photosynthesis
A	
B	
C	
D	
E	
F	
G	

[2]

(c) Explain how two features of leaves, **visible** in sections such as that shown in Fig. 6.2, are adaptations for efficient photosynthesis.

1. .....

.....

.....

2. .....

.....

..... [4]

For Examiner's Use

(d) During the period when *H. orientalis* is photosynthesising at a fast rate, substances are transported through the plant in the phloem from sources to sinks.

(i) Name **two** substances that are translocated from a source to a sink.

.....

..... [2]

(ii) For these substances state the source and **two** possible sinks.

source .....

sink 1 .....

sink 2 ..... [2]

[Total: 13]

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