

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

BIOLOGY

Paper 3 Extended

0610/03

October/November 2006

Candidates answer on the Question Paper.
No Additional Materials are required

1 hour 15 minutesCandidate
Name
Centre
Number

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Candidate
Number

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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 THE BARCODE.

DO **NOT** WRITE IN THE GREY AREAS BETWEEN THE PAGES.

Answer **all** questions.

The number of marks is given in brackets [] at the end of each question or part question.

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1	
2	
3	
4	
5	
6	
Total	

This document consists of **15** printed pages and **1** blank page.



1 Fig. 1.1 shows five mammals.

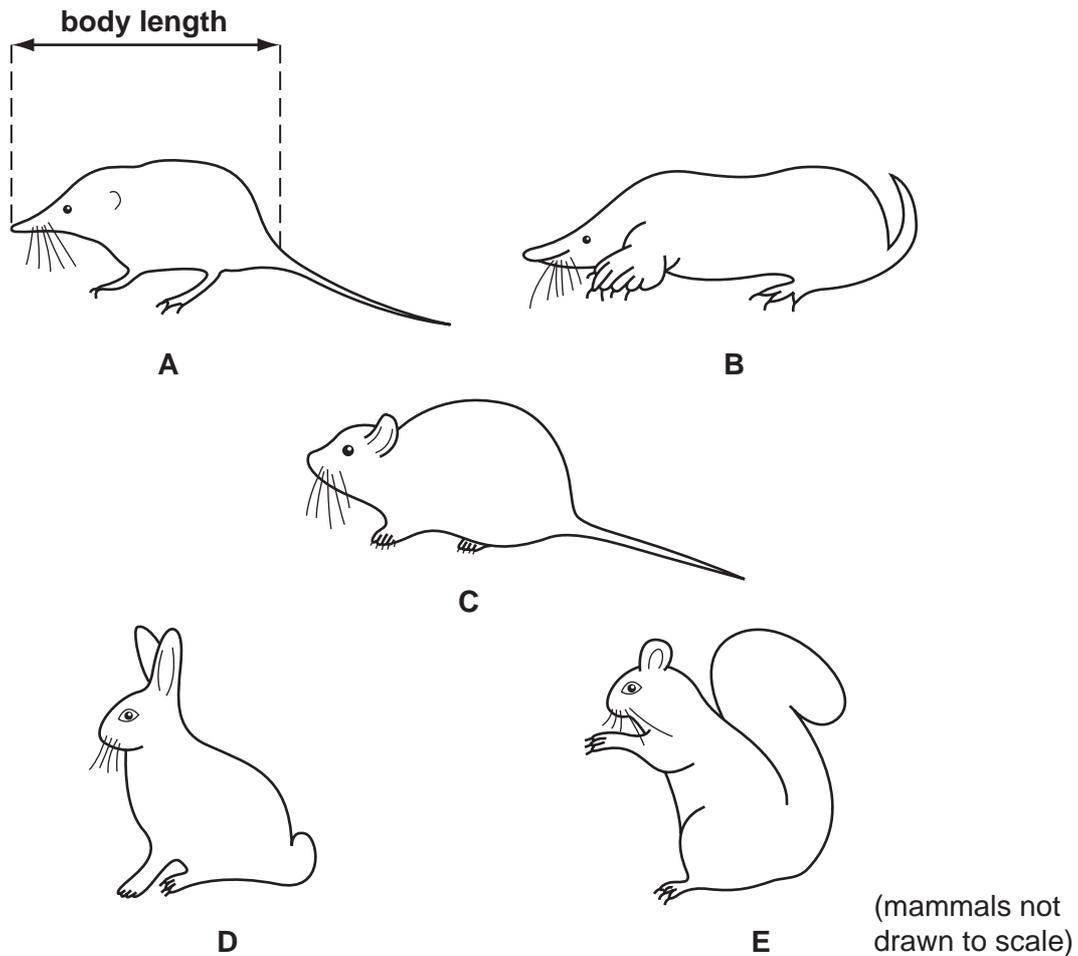


Fig. 1.1

(a) Use the key to identify each of these mammals. Write the letter for each mammal in Table 1.1.

- | | |
|---|--------------------------------|
| 1 tail more than half that of body length | go to 2 |
| tail less than half that of body length | go to 4 |
| 2 ears at top of head, with thick tail | <i>Sciurus caroliniensis</i> |
| ears at side of head, with thin tail | go to 3 |
| 3 nose pointed, nose length longer than its depth | <i>Sorex araneus</i> |
| nose blunt, nose length shorter than its depth | <i>Clethrionomys glareolus</i> |
| 4 front legs as wide or wider than long | <i>Talpa europaea</i> |
| front legs longer than wide | <i>Oryctolagus cuniculus</i> |

Table 1.1

name of mammal	letter
<i>Clethrionomys glareolus</i>
<i>Oryctolagus cuniculus</i>
<i>Sciurus caroliniensis</i>
<i>Sorex araneus</i>
<i>Talpa europaea</i>

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[4]

(b) Fig. 1.2 shows a young deer feeding from its mother.

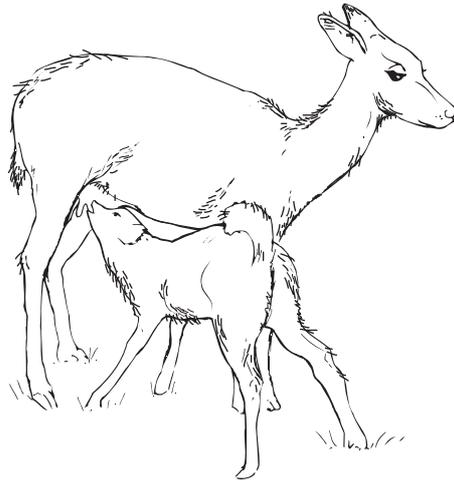


Fig. 1.2

State two features of the deer, visible in Fig. 1.2, that distinguish mammals from other vertebrates.

1

2 [2]

[Total: 6]

- 2 A human tooth was suspended in hydrochloric acid and left for 24 hours, as shown in Fig. 2.1. When the tooth was removed and washed, the lower part, to which the cotton was attached, was no longer hard, but soft and rubbery. After replacing the tooth in the acid for another 24 hours, the rest of the tooth was also soft.

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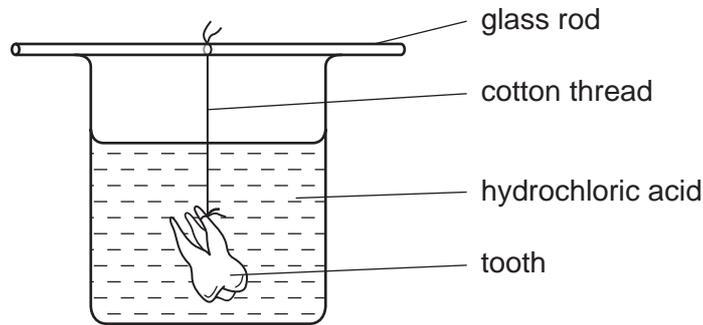


Fig. 2.1

- (a) (i) Name the part of the tooth to which the cotton was attached.

..... [1]

- (ii) Name the type of human tooth used in this experiment. State two reasons for your answer.

Type of tooth

Reason 1

.....

Reason 2

..... [3]

- (iii) With reference to tooth structure, suggest and explain why the lower part of the tooth became soft before the upper part.

.....

.....

.....

.....

..... [3]

Fig. 2.2 shows a tube of 'White Teeth' toothpaste.

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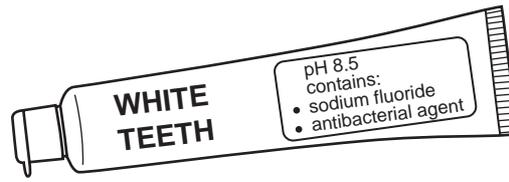


Fig. 2.2

(b) State and explain two reasons why regular brushing with this toothpaste would help to protect teeth from decay.

1

.....

.....

.....

2

.....

.....

..... [4]

(c) Brushing is not the only way of protecting teeth from decay.

State two other ways of maintaining healthy teeth.

1

.....

2

..... [2]

[Total: 13]

- (b) Soya beans and beef produced on the land are both good sources of protein. Table 3.2 shows the nutritional content of products made from soya and beef.

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Table 3.2

product	nutritional content per 100 g of product			
	energy / kJ	protein / g	saturated fat / g	fibre / g
corned beef	905	26.9	12.1	0.0
soya sausages	1128	19.0	2.1	2.0

- (i) Using data from Table 3.2, state and explain two reasons why soya sausages may be healthier than corned beef as a major item in the diet.

1

.....

.....

2

.....

..... [4]

- (ii) Soya beans are harvested from plants. Corned beef is produced from cattle that have fed on grass.

Explain why it is more energy efficient for humans to eat soya products as a source of protein than corned beef. Use the food chains involved to support your answer.

.....

.....

.....

.....

.....

.....

..... [4]

[Total: 17]

- 4 Fig. 4.1 shows the change in percentage of disease-causing bacteria that were resistant to the antibiotic penicillin from 1991 to 1995.

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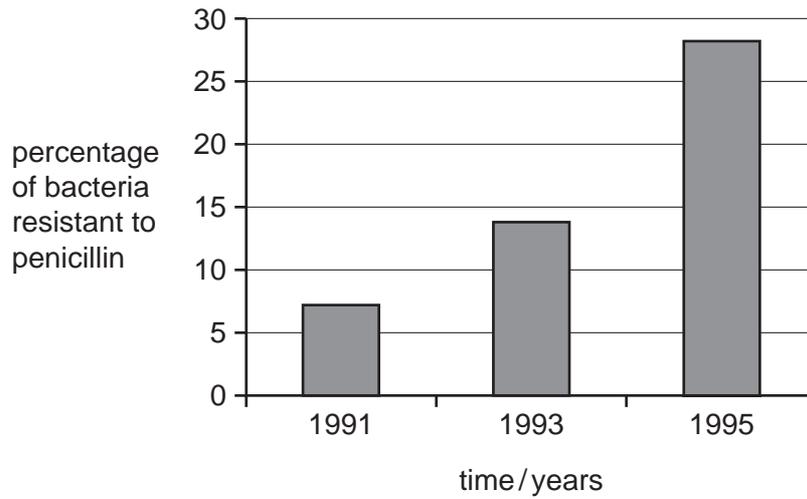


Fig. 4.1

- (a) (i) Describe the change in the percentage of bacteria resistant to penicillin between 1991 and 1995.

.....
.....
..... [2]

- (ii) Explain how a population of antibiotic-resistant bacteria can develop.

.....
.....
.....
.....
.....
.....
..... [4]

(b) Although bacteria can cause disease, many species are useful in processes such as food production and maintaining soil fertility.

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(i) Name **one** type of food produced using bacteria.

..... [1]

(ii) Outline the role of bacteria in maintaining soil fertility.

.....
.....
.....
.....
..... [3]

(c) Bacteria are also used in genetic engineering.

Fig. 4.2 outlines the process of inserting human insulin genes into bacteria using genetic engineering.

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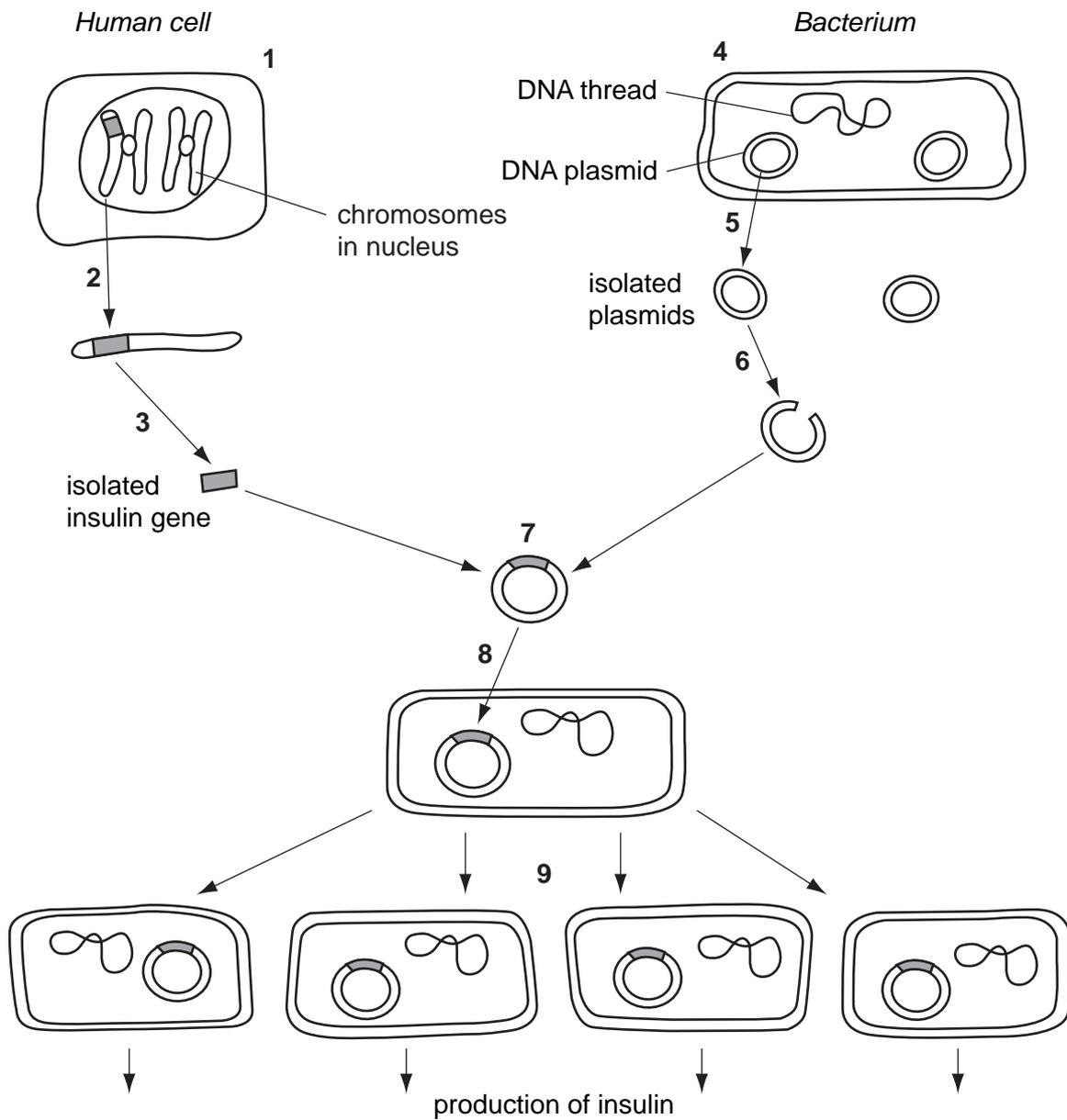


Fig. 4.2

Complete the table below by identifying **one** of the stages shown in Fig. 4.2 that matches **each** description.

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description of the stage	number of the stage
the plasmids are removed from the bacterial cell
a chromosome is removed from a healthy human cell
plasmids are returned to the bacterial cell
restriction endonuclease enzyme is used
bacterial cells are allowed to reproduce in a fermenter

[5]

[Total: 15]

- 5 (a) A typical dicotyledonous leaf contains a number of different types of cells, including: **guard cells**, **palisade mesophyll**, **spongy mesophyll** and **upper epidermal** cells.

Using the types of cells listed above, complete the table by

- (i) writing the types of cells in the order that sunlight passes through them,
 (ii) stating the proportion of chloroplasts in each of the types of cells. Use the terms **none**, **some** and **many**.

type of cell	number of chloroplasts

[3]

Stomatal pores are surrounded by pairs of guard cells. When the stomata are closed the rate of photosynthesis is affected, due to a limiting factor.

- (b) (i) Write a balanced equation, **using chemical symbols**, for the process of photosynthesis.

..... [2]

- (ii) Define the term *limiting factor*.

.....

.....

..... [2]

- (iii) State the factor that limits photosynthesis when the stomata are closed.

..... [1]

(c) Vascular bundles, containing xylem and phloem tissue, are situated in the leaf.

(i) Describe the structure of xylem tissue.

.....
.....
.....
..... [3]

(ii) State the functions of xylem and phloem.

Function of xylem
.....
Function of phloem
..... [4]

(d) Some plants close their stomata during the hottest part of the day, despite the effect on photosynthesis. Suggest what benefit this might be to the plants.

.....
..... [1]

[Total: 16]

6 Fig. 6.1 shows a side view of the female reproductive system.

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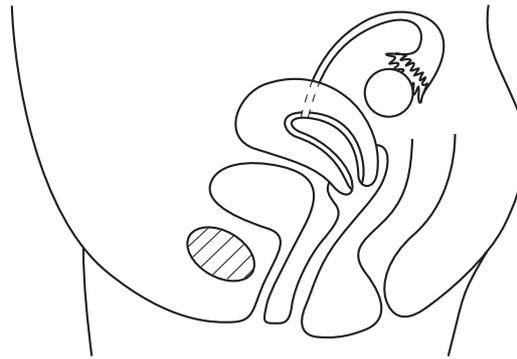


Fig. 6.1

(a) Using **label lines** and the **letters** given, label the following on Fig. 6.1.

- S. where the penis is inserted during sexual intercourse
- D. where a diaphragm (cap) would be placed to prevent pregnancy
- M. where an ovum matures
- F. where an ovum would be fertilised
- E. where an embryo would become implanted [5]

(b) Explain how

(i) the ovum passes down to the uterus,

 [2]

(ii) the structure of a sperm enables it to reach the ovum,

 [2]

(iii) a zygote has a diploid number of chromosomes,

 [2]

(iv) the level of a hormone which prevents menstruation remains high during pregnancy, even after the corpus luteum has broken down.

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.....
.....
..... [2]

[Total: 13]

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