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| Centre Number | Candidate Number | Name |
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UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

BIOLOGY **5090/02**

Paper 2 Theory May/June 2006

1 hour 45 minutes

Additional Materials: Answer Booklet/Paper

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.

Sections 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 on the separate Answer Paper provided.
At the end of the examination,
1. fasten all your work securely together;
2. write an E (for Either) or an O (for Or) next to the number 8 in the grid below to indicate which question you have answered.

The number of marks is given in brackets [] at the end of each question or part question.
You are advised to spend no longer than one hour on Section A and no longer than 45 minutes on Section B.

| For Examiner's Use | |
|--------------------|--|
| Section A | |
| Section B | |
| 6 | |
| 7 | |
| 8 | |
| Total | |

Section A

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

Write your answers in the spaces provided.

- 1 Fig. 1.1 shows the cell membrane of an animal and a plant cell.

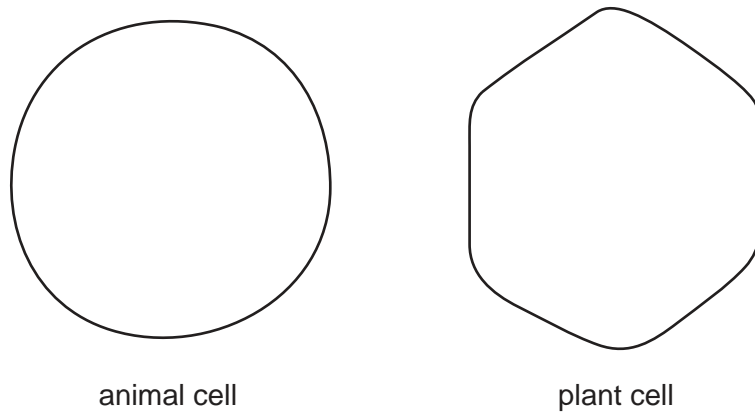


Fig. 1.1

- (a) On Fig. 1.1, draw and label
- (i) one other structural feature that is found in **both** cells,
 - (ii) **two** features found in a plant cell but **not** in an animal cell.

[3]

Table 1.1 shows the average amounts of protein, fat and carbohydrate found in some plant and some animal tissues (expressed as a percentage of the total mass).

Table 1.1

| | protein | fat | carbohydrate |
|----------------|---------|-----|--------------|
| plant tissues | 5 | 1 | 30 |
| animal tissues | 20 | 15 | 1 |

- (b) (i)** Explain why there is a high percentage of carbohydrate in the plant tissues.

.....
[2]

- (ii)** Name an animal tissue that would have much more than the 1% carbohydrate shown in Table 1.1. Explain your choice of tissue.

tissue.....
 explanation.....
[3]

- (iii)** Suggest reasons for the differences in the protein and in the fat content of the plant and animal tissues.

protein.....

 fat.....[3]

[Total: 11]

2 (a) (i) State the name for chemicals that are secreted by glands into the blood and that affect organs elsewhere in the body.

.....[1]

(ii) State the term used to describe the organs that are affected by these chemicals.

.....organs [1]

(b) Listed below are a number of responses shown by the human body:

- A the amount of saliva produced increases
- B the concentration of blood glucose falls
- C the concentration of blood glucose rises
- D the pupils become smaller
- E the rate of heart beat increases

Which two of these are responses to the release of adrenaline?

1.

2.[2]

(c) Fig. 2.1 shows the blood glucose concentrations of three different people, **G**, **H** and **I**, over a 48-hour period.

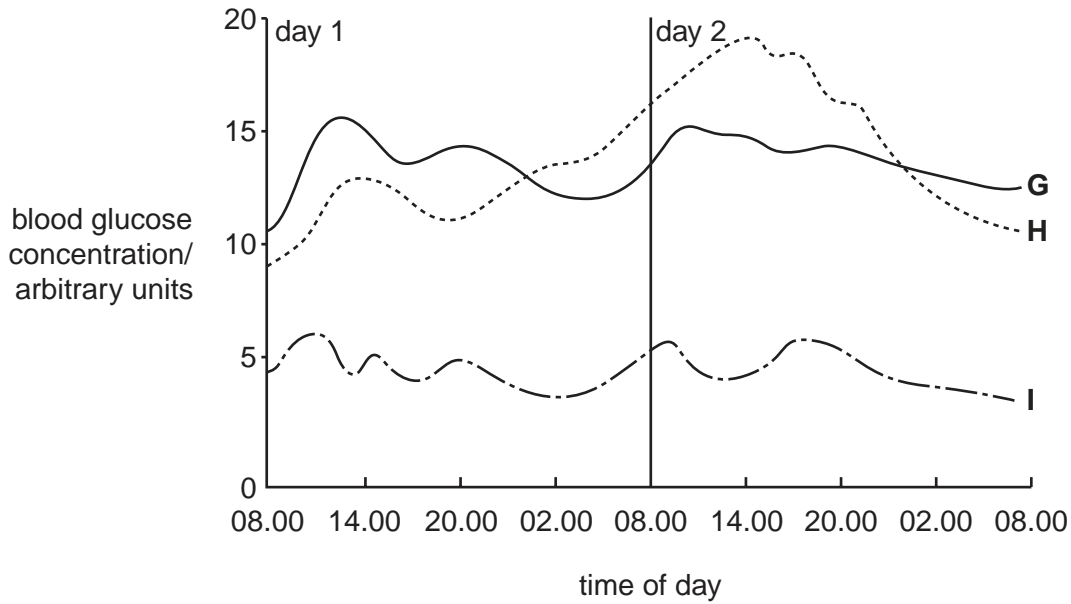


Fig. 2.1

Two of the people are diabetic. The pancreas of one of these produces small quantities of insulin. In the other, the pancreas produces no insulin. The third person is **not** diabetic.

Using the information in Fig. 2.1 and giving a reason for your answer in each case, identify

- (i) the person without diabetes
reason:
- (ii) the person who produces no insulin
reason: [4]

(d) Diabetes can be treated by injection of insulin. Insulin can now also be taken by breathing it in. Suggest how insulin taken by breathing it in enters the blood.

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

[Total: 11]

- 3 Fig. 3.1 shows a section through a flower and also what happens to some of its parts during the plant's life.

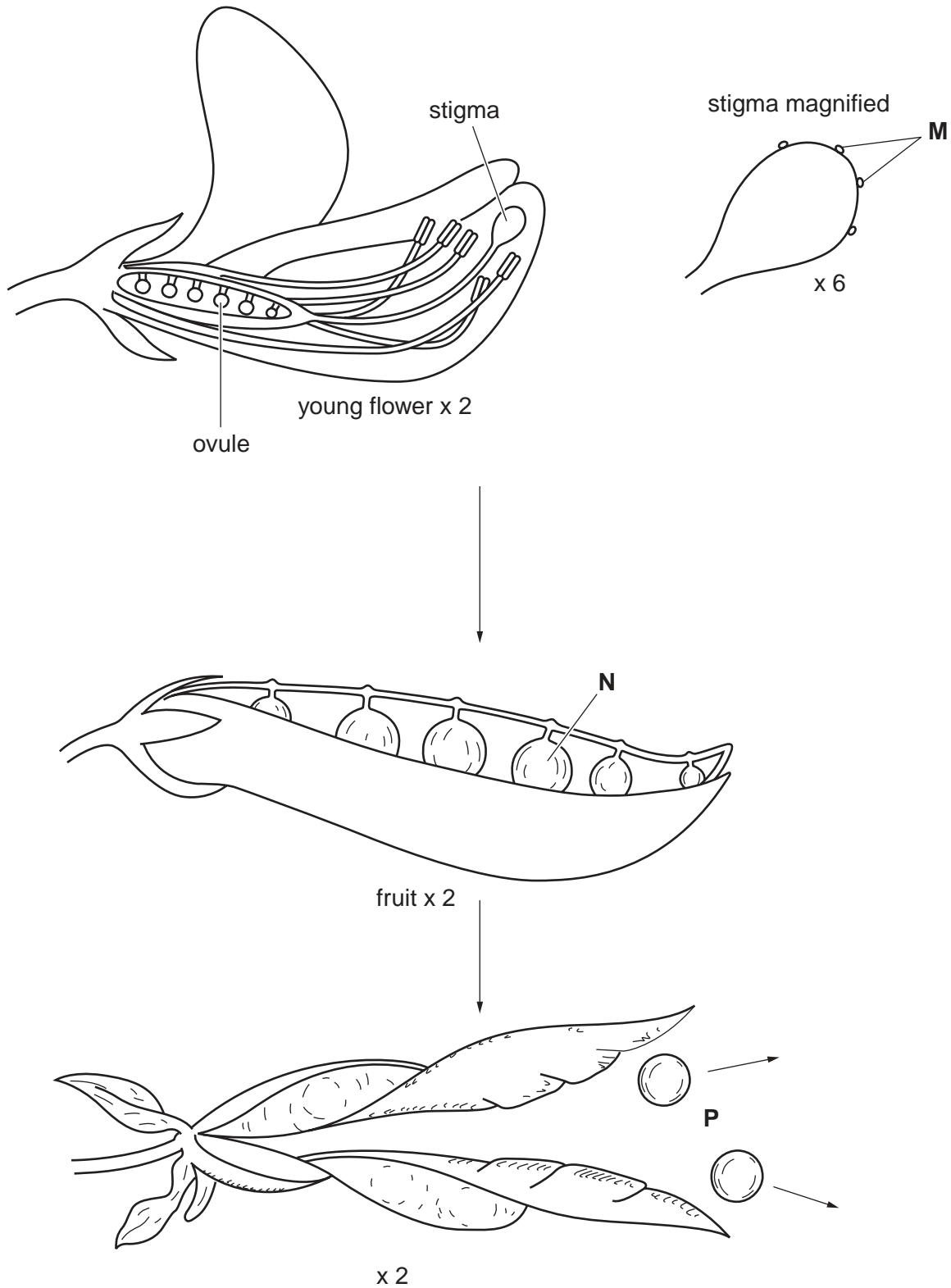


Fig. 3.1

(a) Identify structures **M**.

.....[1]

(b) Structures **M** have come from another flower. Describe how structures **M** have been transferred and become attached to this stigma.

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

(c) Describe what happens to the ovule inside the young flower for it to develop into structure **N** inside the fruit.

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

(d) Name the process occurring at **P**.

.....[1]

[Total: 8]

- 4 Fig. 4.1 shows the average sweating rates of a person over a 4-hour period under different conditions.

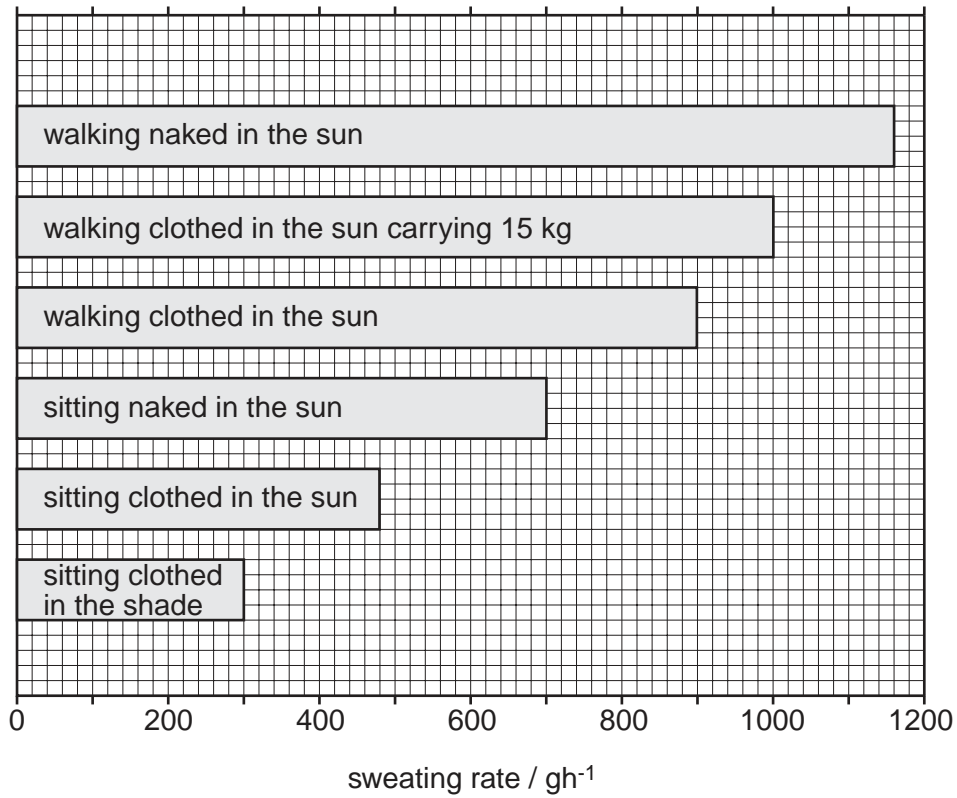


Fig. 4.1

- (a) State two ways **other than by sweating** in which a person might lose water.

1.

2. [2]

(b) State and explain how the rates of sweating shown in Fig. 4.1 are **different** for the person when they are

(i) walking and sitting,

.....
.....

(ii) clothed and unclothed,

.....
.....

(iii) in the sun and in the shade.

.....
.....

[6]

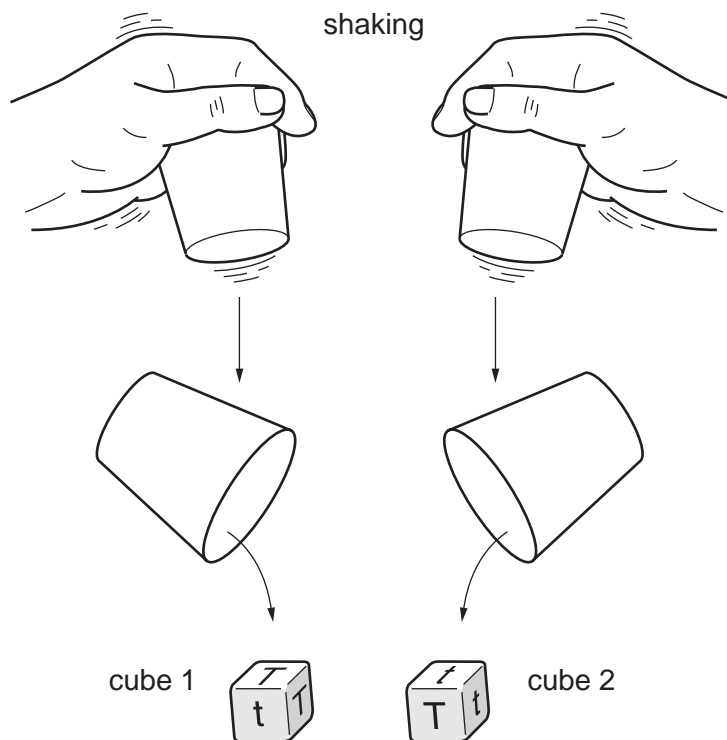
(c) Suggest an explanation for the effect that carrying 15 kg has on the person's rate of sweating.

.....
.....

[2]

[Total: 10]

- 5 Fig. 5.1 shows a method used by a student to understand how characteristics are inherited when two plants of species X are crossed. Both cubes had three of their faces marked with the letter T and three with the letter t.



In this example, the letters appearing on the upper faces are **Tt**.

Fig. 5.1

The student shook each container and then tipped both cubes out at the same time and recorded the letters appearing on the upper faces of the cubes.

The student tipped both cubes out a total of 405 times.

- (a) (i) Complete Table 5.1 to show the results obtained.

Table 5.1

| letters appearing on the upper faces of the cubes | tt | TT | Tt |
|---|-----------|-----------|-----------|
| number of times each pair of letters appeared | 98 | | 202 |

[1]

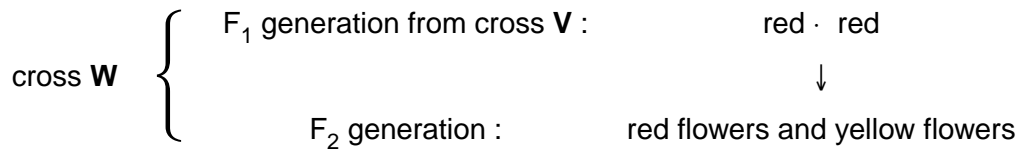
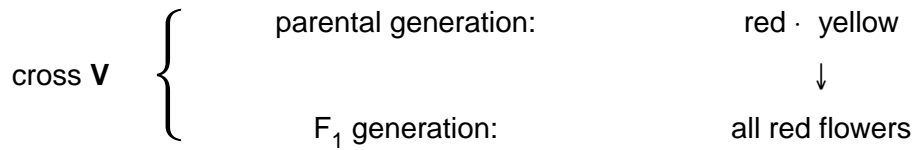
- (ii) State what the letters on the faces of the cubes represent.

.....[1]

- (iii) State the reason for shaking the containers.

.....[1]

(b) In living plants of species **X**, items **T** and **t** control flower colour. The genetic diagrams below show a sequence of crosses (**V** and **W**) between plants of species **X**, some with red flowers and some with yellow flowers.



Using the information in **Table 5.1** and crosses **V** and **W**,

(i) state which colour is dominant and which of cross **V** and cross **W** could produce the results seen in Table 5.1

dominant colour,

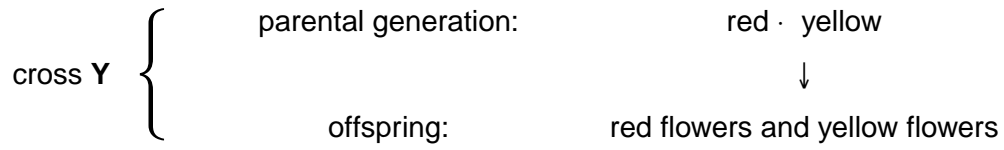
cross.[1]

(ii) Explain why you chose this cross.

.....

.....[1]

- (c) (i) Using the letters **T** and **t**, draw a full genetic diagram for another cross, **Y**, between plants of species **X** shown below.



[4]

- (ii) In the method shown in Fig. 5.1, the student put **T** on three faces and **t** on the other three faces of each cube, so that cube 1 had **T, T, T, t, t, t** and cube 2 **T, T, T, t, t, t**.

State what letters the student should write on the faces of each cube to represent the cross in **(c)(i)**.

cube 1

cube 2

[1]

[Total: 10]

Section B

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

Write your answers on the separate answer paper provided.

- 6 (a) Describe how the action of enzymes can be explained by the 'lock and key' hypothesis. [5]
- (b) Describe and explain the effect of a gradual increase in temperature on an enzyme-controlled reaction. You should refer to the 'lock and key' hypothesis. [5]

[Total: 10]

- 7 (a) Describe the use of antibiotics for the treatment of diseases. [3]
- (b) Describe how antibiotics may be manufactured on a large scale. [7]

[Total: 10]

Question 8 is in the form of an **Either/Or** question. Answer only question 8 **Either** or question 8 **Or**.

- 8 **Either** Explain the importance of
- (a) chlorophyll and [4]
- (b) root hairs [6]
- to a plant.

[Total: 10]

- 8 **Or** Explain the importance of
- (a) haemoglobin and [4]
- (b) villi [6]
- to a human being.

[Total: 10]

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