OCR
RECOGNISING ACHIEVEMENT

OXFORD CAMBRIDGE AND RSA EXAMINATIONS
Advanced GCE

BIOLOGY 2805/01

Growth, Development and Reproduction

Thursday **20 JUNE 2002** Afternoon 1 hour 30 minutes

Candidates answer on the question paper.
Additional materials:
Electronic calculator
Ruler (cm/mm)

Candidate Name	Centre Number	Candidate Number

TIME 1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

- Write your name in the space above.
- Write your Centre number and Candidate number in the boxes above.
- Answer **all** the questions.
- Write your answers, in blue or black ink, in the spaces on the question paper.
- Read each question carefully before starting your answer.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [ ] at the end of each question or part question.
- You will be awarded marks for the quality of written communication where this is indicated in the question.
- You may use an electronic calculator.
- You are advised to show all the steps in any calculations.

FOR EXAMINER'S USE		
Qu.	Max.	Mark
1	11	
2	17	
3	18	
4	15	
5	15	
6	14	
TOTAL	90	

This question paper consists of 17 printed pages and 3 blank pages.

Registered Charity Number: 1066969
[Turn over

For Examiner's Use

Answer **all** questions.

1 The flowers of the white dead nettle, *Lamium album*, are heavily scented and form conspicuous clusters between the dark green leaves. Fig. 1.1 shows a half flower of the white dead nettle.

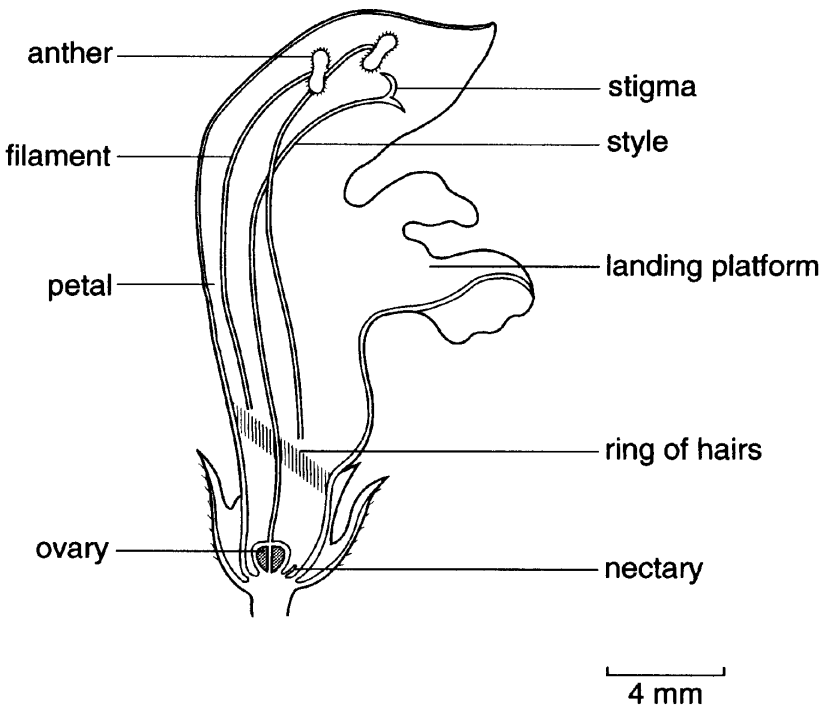

Fig. 1.1

(a) With reference to Fig. 1.1, describe how pollination occurs in flowers like the white dead nettle.

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For Examiner's Use

(b) State **three** advantages and **three** disadvantages of cross-pollination.

advantages

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disadvantages

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[Total : 11]

For Examiner's Use

2 **(a)** Explain **in detail** why seeds need water, oxygen and a suitable temperature before germination will occur. (*In this question, 1 mark is available for the quality of written communication.*)

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QWC [1]

[Turn over

Fig. 2.1 shows an absolute growth curve for broad bean plants.

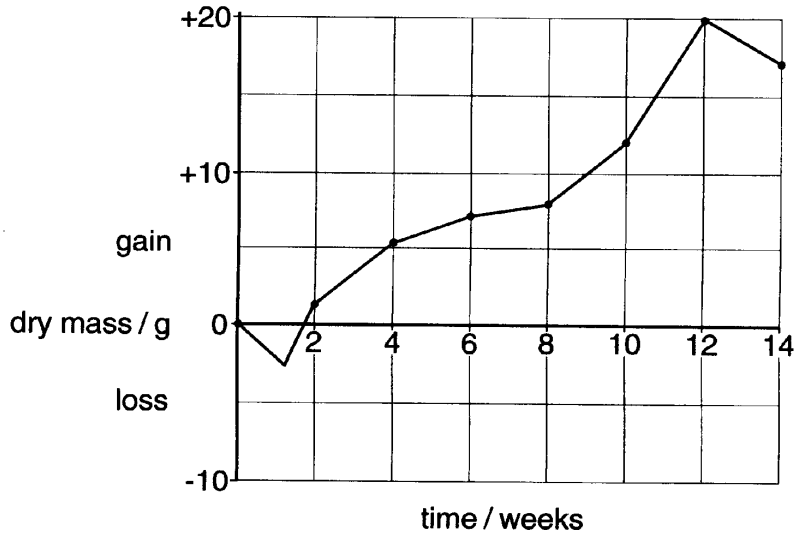

Fig. 2.1

(b) With reference to Fig. 2.1,

(i) explain how the investigation could have been carried out;

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(ii) explain why the dry mass falls during week 1;

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For Examiner's Use

(iii) calculate the mean rate of growth **per week** between week 8 and week 12 (show your working);

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answer .....[2]

(iv) suggest a reason why the dry mass falls after week 12.

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[Total : 17]

3 **(a)** Describe the changes that occur in the ovary during the menstrual cycle.

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(b) **(i)** State the site of production of gonadotrophin releasing hormone (GnRH) and explain how it reaches its target organ.

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[Turn over

For Examiner's Use

(ii) Describe the sequence of events from the release of GnRH to the production of mature sperm. (*In this question, 1 mark is available for the quality of written communication.)*

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QWC [1]

For Examiner's Use

(c) Outline the role of hormones in controlling the fertility of women.

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[Total : 18]

[Turn over

For Examiner's Use

4 **(a)** **(i)** Suggest **two** constituents of a suitable culture medium for cells.

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(ii) Suggest **two** advantages of using tissue culture.

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[2]

Experiments on human skin cells, grown in culture medium, have shown that two substances found in the tissue stimulate division and specialisation of the cells. These are two polypeptides called *epidermal growth factor* (EGF) and *transforming growth factor* (TGFα).

It is known that dividing and specialising skin cells in the skin itself produce mRNA that codes for TGFα. If EGF or TGFα are added to the culture medium, the skin cells are stimulated to produce TGFα themselves. The process is therefore controlled by positive feedback.

(b) With reference to the passage above,

(i) explain what is meant by *positive feedback;*

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(ii) outline the changes in skin cells, which may result from the presence of EGF in the culture medium;

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For Examiner's Use

(iii) suggest why EGF and TGFα are unlikely to be the only growth factors acting on the skin cells.

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(c) (i) Outline how a **named** animal (Kingdom Animalia) reproduces asexually.

name .....

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(ii) Suggest why mammals do not reproduce by asexual methods.

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[Total : 15]

For Examiner's Use

5 The human placenta acts as the gaseous exchange system, the digestive system and the excretory system for the fetus. This involves the exchange of a wide variety of solutes between the blood of the mother and that of the fetus.

(a) (i) Describe **four** different mechanisms by which **named** substances cross membranes in the placenta.

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(ii) Describe how the human placenta is adapted for efficient transport of substances.

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For Examiner's Use

(b) Explain why women are advised not to smoke during pregnancy for the sake of the fetus.

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[Total : 15]

6 Thyroxine is formed by first synthesising a large protein molecule containing iodine, called thyroglobulin. This is stored in the follicles of the thyroid gland. When the thyroid gland is stimulated to produce thyroxine, the secretory cells take up small amounts of thyroglobulin by pinocytosis. Thyroglobulin is then hydrolysed to release two types of thyroxine molecules, T_3 and T_4. The physiologically active form of thyroxine is T_3.

(a) (i) Suggest why thyroxine is stored as thyroglobulin.

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(ii) Write a word equation to show the result of hydrolysing thyroglobulin.

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(iii) Explain what is meant by the term 'physiologically active form of thyroxine'.

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Fig. 6.1 illustrates the action of thyroxine in the nucleus of its target cell.

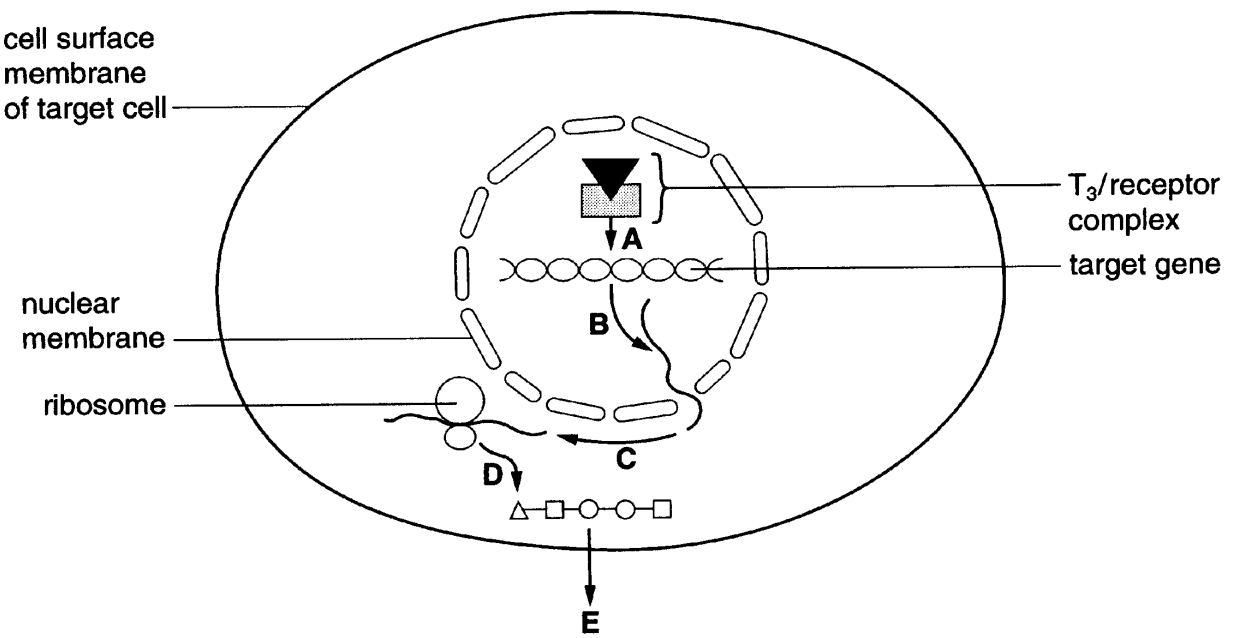

Fig. 6.1

For Examiner's Use

(b) (i) Describe how thyroxine recognises its specific receptor.

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(ii) With reference to Fig. 6.1, outline the sequence of events from stages **A** to **E**.

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Question 6 continues on the next page.

The relationship between the concentration of iodine in the thyroid gland and the iodine excreted in the urine is usually relatively constant. Variations from this constant indicate that the thyroid gland is not working properly. Thyroid activity can be measured by feeding the patient a measured dose of radioactive iodine solution and measuring the percentage of the administered dose in the thyroid and the urine every six hours. The results of an investigation on two patients, **X** and **Y**, are shown on Fig. 6.2.

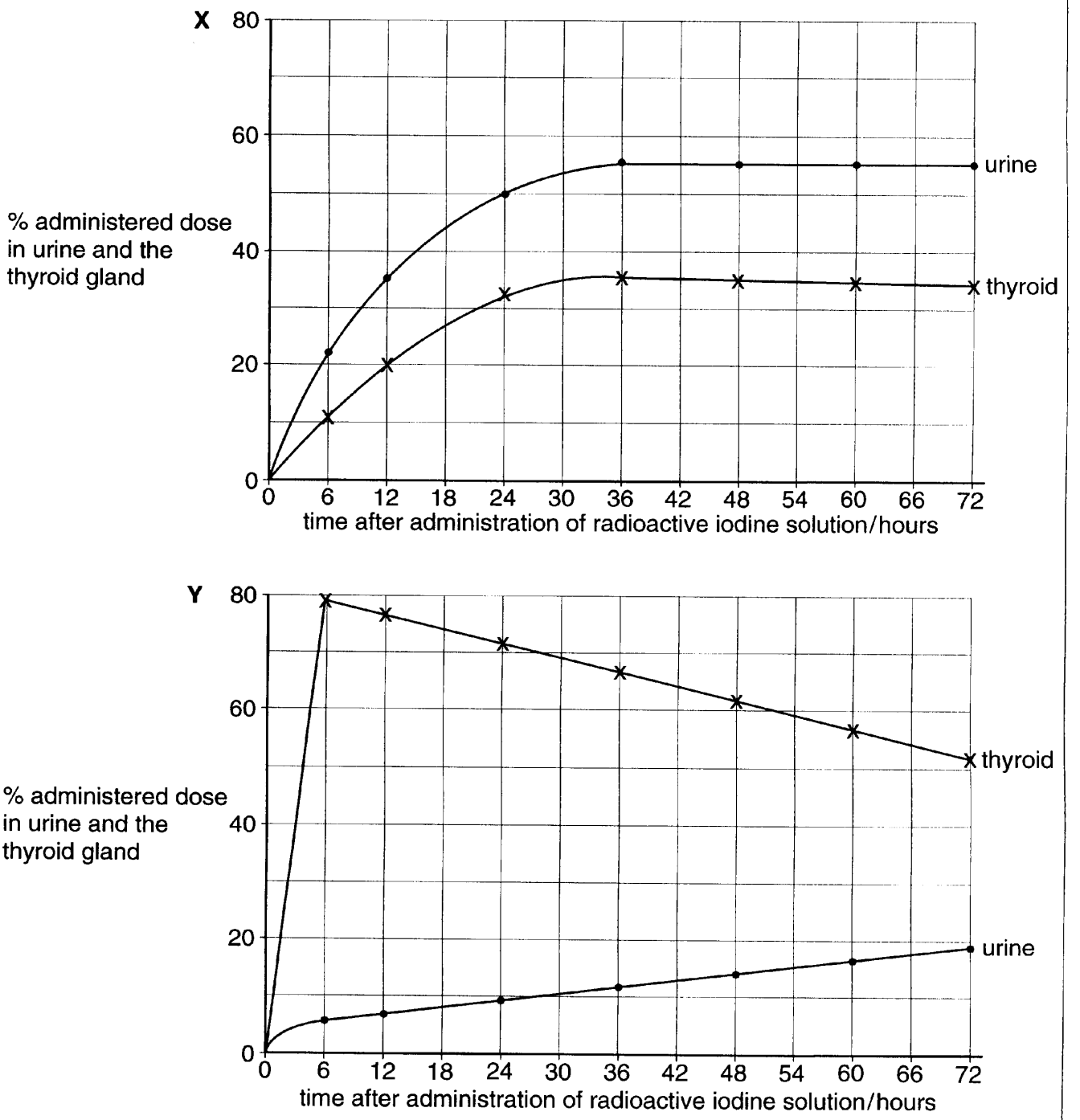

Fig. 6.2

For Examiner's Use

(c) Describe and explain the difference in the percentage of the administered dose appearing in the thyroid gland and the urine, between patients **X** and **Y**, at 6 hours after giving the patients radioactive iodine solution.

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[Total : 14]