

OXFORD CAMBRIDGE AND RSA EXAMINATIONS**Advanced GCE****BIOLOGY**

Growth, Development and Reproduction

2805/01

Thursday

30 JANUARY 2003

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	18	
2	12	
3	14	
4	16	
5	14	
6	16	
TOTAL	90	

This question paper consists of 16 printed pages and 4 blank pages.

Answer all the questions.

- 1 (a) Complete the table to show **six** differences between oogenesis and spermatogenesis in humans.

feature	oogenesis	spermatogenesis
time of life cycle when process starts		
time of life cycle when process stops		
number of gametes produced from each germ cell		
number of polar bodies produced from each germ cell		
precise site of production within ovary or testis		
name of accessory cell involved		

[6]

- (b) (i) Explain how spermatogenesis increases genetic variation in the offspring.

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[4]

- (ii) Outline **two** advantages of producing genetically variable offspring.

1.
-
2.
- [2]

- (iii) Explain why it is necessary to have a meiotic phase in the life cycle of all **sexually** reproducing species.

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..... [2]

- (c) Freshly ejaculated sperm must undergo a process called capacitation before they can fertilise an oocyte.

Explain what happens during capacitation.

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..... [4]

[Total: 18]

- 2 Fig. 2.1 is a longitudinal section through the fertilised ovule of a flowering plant, to show the embryo.

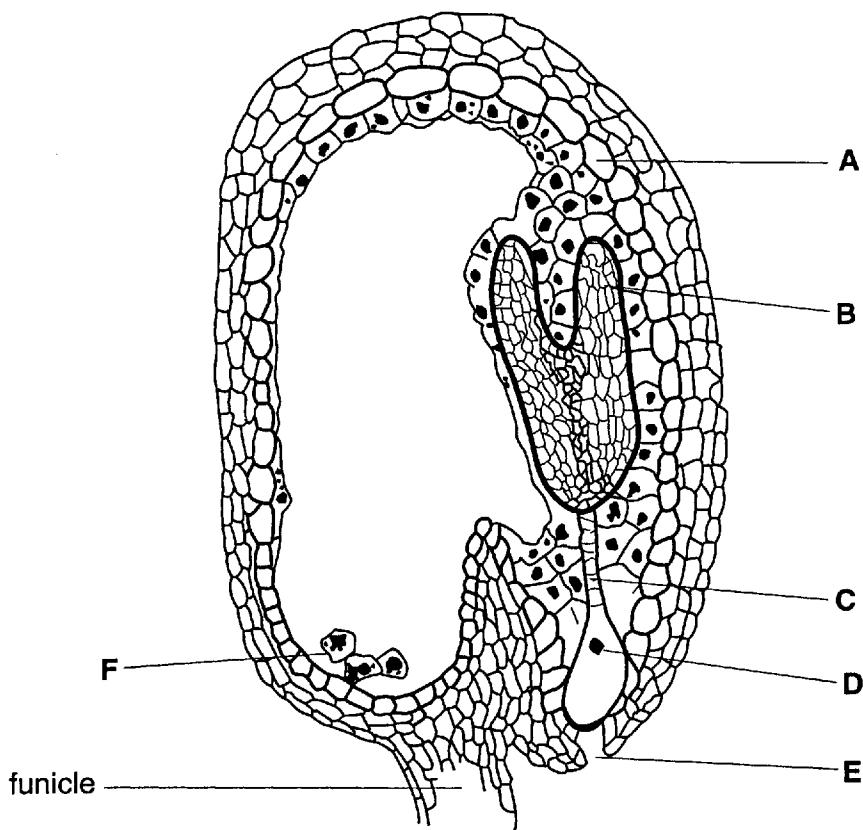


Fig. 2.1

- (a) State which of the letters on Fig. 2.1 indicates,

(i) a cotyledon

(ii) the suspensor

(iii) an antipodal cell

[3]

- (b) (i) In this question, one mark is available for the quality of written communication.

Outline how tissue from the embryo illustrated in Fig. 2.1 could be used to produce many more plants by tissue culture (micropropagation).

[6]

Quality of Written Communication [1]

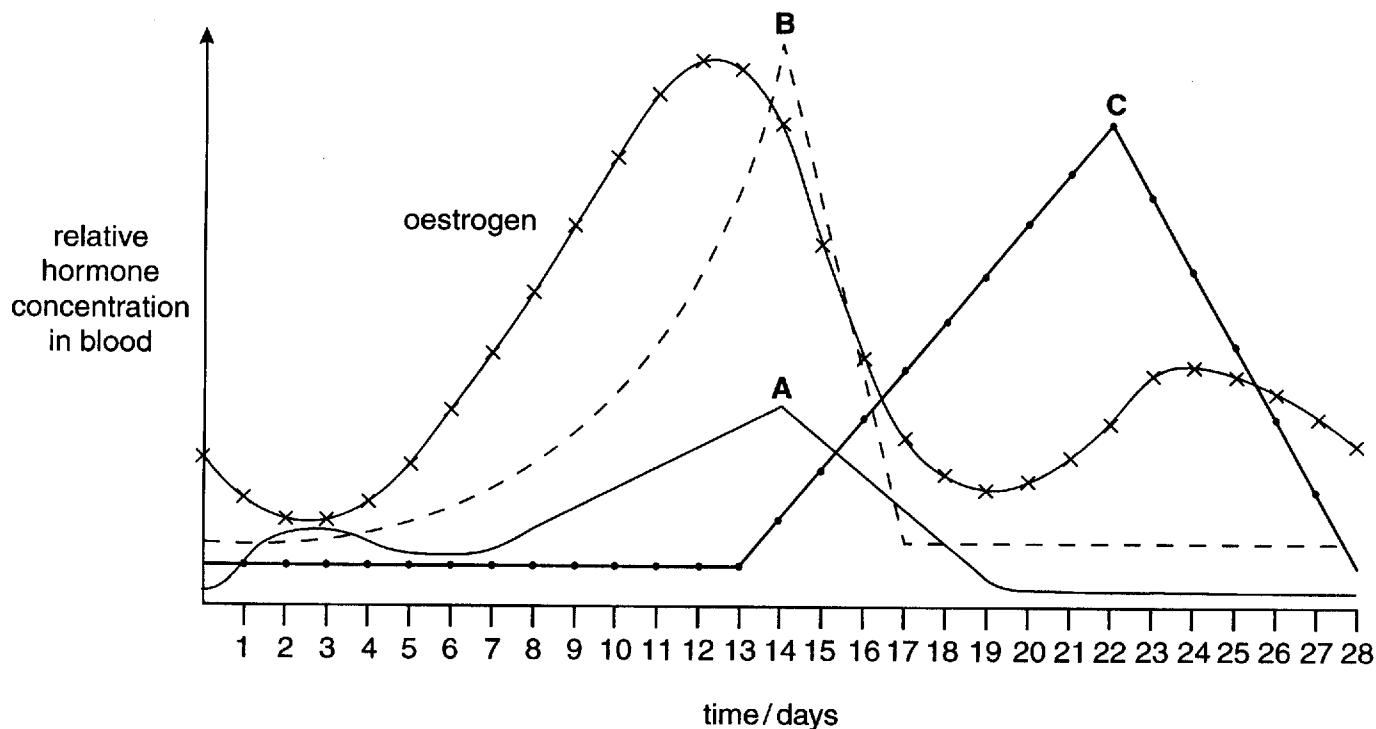
- (ii) Suggest how tissue culture (micropropagation) makes it easy to genetically engineer a plant species.

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[2]

[Total: 12]

- 3 (a) Fig. 3.1 shows the relative concentrations of oestrogen, progesterone, luteinising hormone (LH) and follicle stimulating hormone (FSH) in the blood of a non-pregnant female, during one menstrual cycle.

**Fig. 3.1**

Identify the hormones **A** to **C** and outline their functions in the menstrual cycle.

hormone **A**

functions

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.....

hormone **B**

functions

.....

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hormone **C**

functions

.....

..... [6]

- (b) 75% of adult patients admitted to hospital with asthma are women. The reason for this is not clear. Researchers have suggested that variations in oestrogen concentrations during the menstrual cycle may be a risk factor in the timing of asthma attacks in women. They collected data from 182 non-pregnant women under 47 years of age, who received treatment at casualty departments for acute asthma attacks. The data were collected over an eleven month period and are given in Table 3.1.

Table 3.1

phase of menstrual cycle / days	number of asthma attacks in group
5 – 11	36
12 – 18	43
19 – 25	18
26 – 4	85

- (i) Calculate the percentage of women who had an asthma attack between day 26 of one menstrual cycle and day 4 of the next. Show your working and give your answer to the nearest whole number.

Answer % [2]

- (ii) Describe the results shown in Table 3.1.

.....

 [2]

- (iii) With reference to Fig. 3.1 and Table 3.1, discuss the evidence that supports the suggestion that variations in oestrogen concentration are a risk factor in the timing of acute asthma attacks.

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 [2]

- (iv) The data shown in Table 3.1 were analysed using the χ^2 test and the probability of obtaining these results was <0.01 ($p<0.01$).

Explain the meaning of this probability.

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[2]

[Total: 14]

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PLEASE TURN OVER FOR QUESTION 4

- 4 Fig. 4.1 shows the growth in numbers of a population of microorganisms. The data were collected using the total (direct) count method.

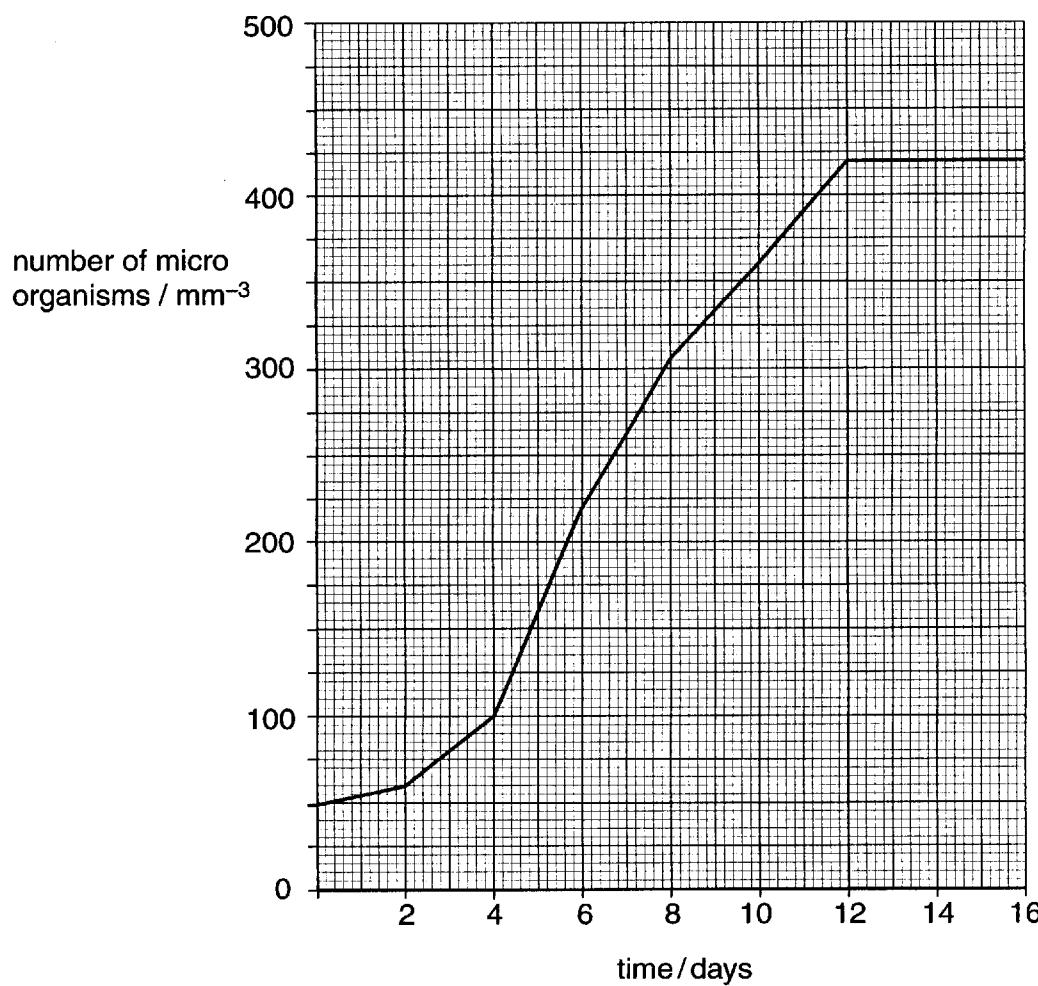


Fig. 4.1

- (a) (i) Describe how you would collect the data shown in Fig. 4.1.

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[4]

- (ii) State **two** sources of error when collecting data on the growth of a population of microorganisms.

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..... [2]

- (iii) Give an explanation for the stationary phase between days 12 and 16.

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..... [4]

- (iv) Calculate the relative growth rate of the population between day 6 and day 8.
Show your working.

Answer day^{-1} [2]

- (b) Describe how a prokaryote divides.

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..... [4]

[Total: 16]

- 5 (a) Describe **two** different methods of contraception which **do not** involve the use of hormones.

1

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2

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..... [4]

- (b) In this question, one mark is available for the quality of written communication.

Outline the ethical issues raised by abortion.

[9]

Quality of Written Communication [1]

[Total: 14]

- 6 Radish plants store food in swollen roots. Some radish plants were grown in an experimental plot at varying distances from a thick hedge. The radishes were harvested after three weeks and the following were determined:

- mean total dry mass
- mean dry mass of the shoots
- mean dry mass of the roots.

The results of this investigation are shown in Fig. 6.1.

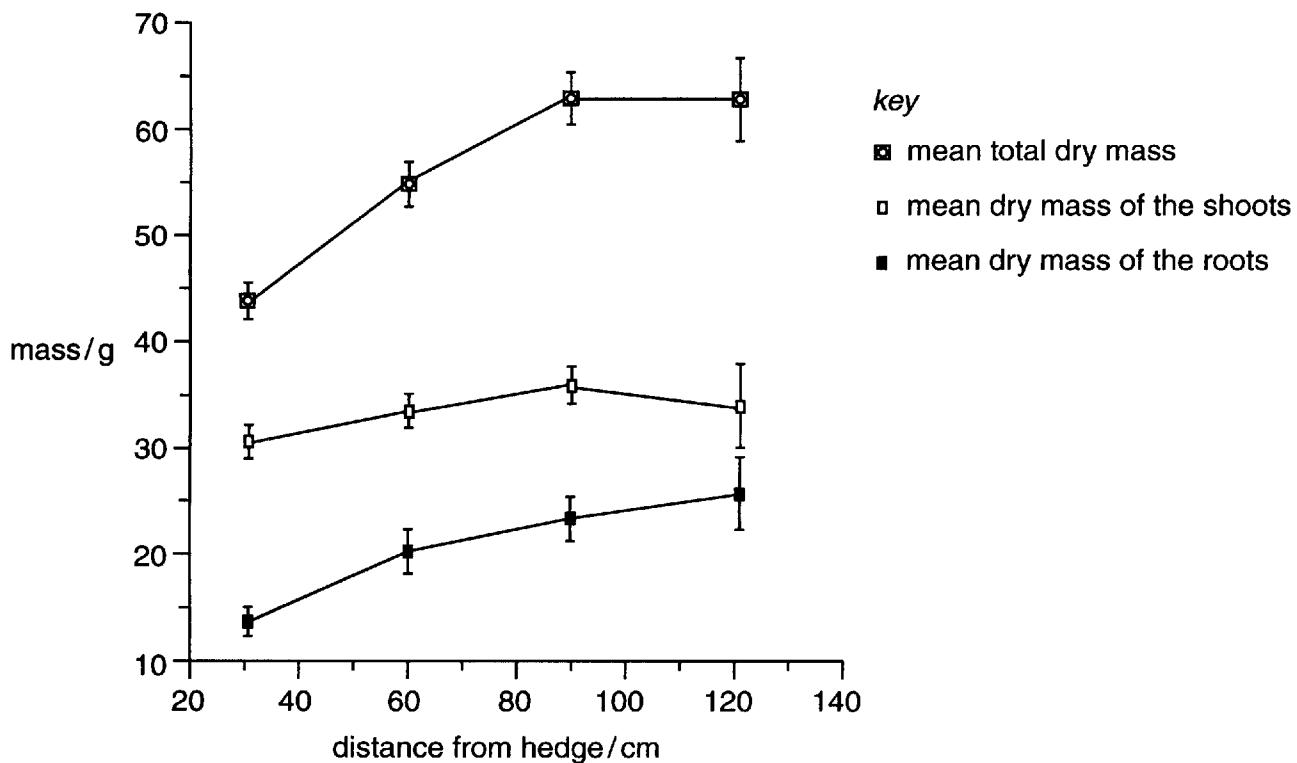


Fig. 6.1

- (a) Radishes divide their synthesised food between providing energy and raw materials for growth of the shoot, and storing food in the root.
- (i) Using the data in Fig. 6.1, describe how the growth of the radish plants changes, as distance from the hedge increases.
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[4]

- (ii) Explain the possible effects of the hedge on the growth of the radish plants.

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..... [3]

- (iii) Outline the processes involved in increasing the mass of the root.

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..... [3]

- (b)** The control of flowering in some plants involves phytochrome.

Describe the role of phytochrome in the flowering of **short day plants**.

[6]

[Total: 16]

Copyright Acknowledgements:

Question 3. Table 3.1 © Data adapted from Archives of Internal Medicine 1996; 156:1837/40.

Question 6. Fig. 6.1 © Graph from Journal of Biological Education Summer 2000 Vol 34 Number 3 p162 Institute of Biology.

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