OCR
RECOGNISING ACHIEVEMENT

OXFORD CAMBRIDGE AND RSA EXAMINATIONS

Advanced GCE

BIOLOGY 2805/01

Growth, Development and Reproduction

Thursday **29 JANUARY 2004** 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 provided 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	17	
2	10	
3	15	
4	14	
5	17	
6	17	
TOTAL	90	

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

Registered Charity Number: 1066969
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For Examiner's Use

Answer **all** the questions.

1 Fig. 1.1 shows the position of a human fetus just before birth.

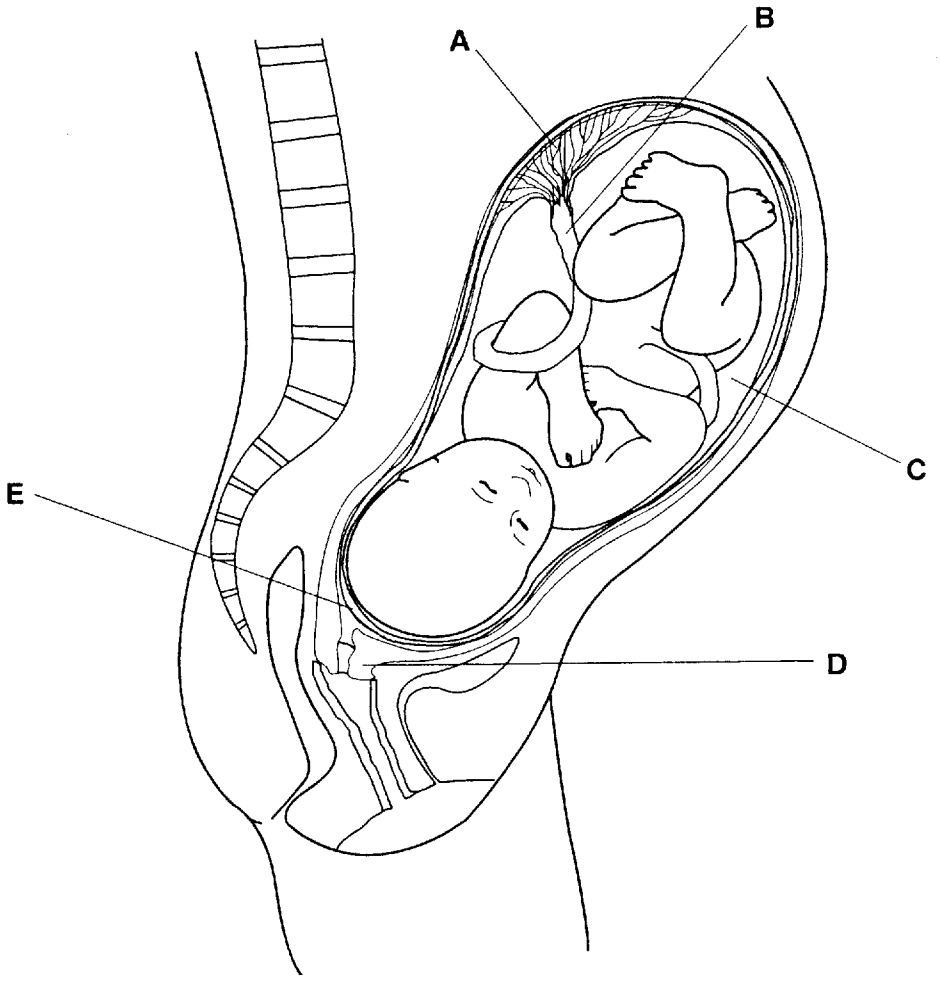

Fig. 1.1

(a) State which letter on Fig. 1.1 indicates

the amnion; .....

the cervix. ..... [2]

(b) Describe **two** ways in which the **fetus** may change the composition of the amniotic fluid during gestation.

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For Examiner's Use

(c) Explain **in detail** how the fetus obtains a supply of oxygen from the placenta.

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(d) Oxytocin and prolactin are hormones produced both during pregnancy and after the birth of the baby.

Describe the functions of these hormones during pregnancy and after the birth of the baby.

(i) oxytocin .....

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(ii) prolactin .....

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[Total: 17]

[Turn over

For Examiner's Use

2 **(a)** In this question, one mark is available for the quality of written communication.

Artificial propagation is an ancient method of increasing the numbers of a valued plant, such as a rose with an attractive colour. Today, artificial propagation of flowering plants is a multi-million pound business.

Describe **two** methods of artificial propagation in flowering plants that may be used to produce plants commercially.

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Quality of Written Communication [1]

(b) Explain how the genetic stability of plants is maintained when plants are propagated artificially.

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[Total: 10]

For Examiner's Use

3 The female wood mouse, *Apodemus sylvaticus,* mates with several different males during the breeding season. This results in competition between the sperm of several different males to reach the female gamete.

Researchers found that after copulation, some sperm from each of the males formed 'trains'. Each 'train' contained several thousand sperm from the same male. Sperm that did not form trains moved up the female's reproductive tract singly.

During the investigation, samples of sperm were collected from male wood mice and placed in an *in vitro* fertilisation medium of varying viscosity. The speed of movement of the sperm that formed trains was measured at each viscosity and compared with the speed of sperm that did not form trains. The results of this investigation are shown in Fig. 3.1.

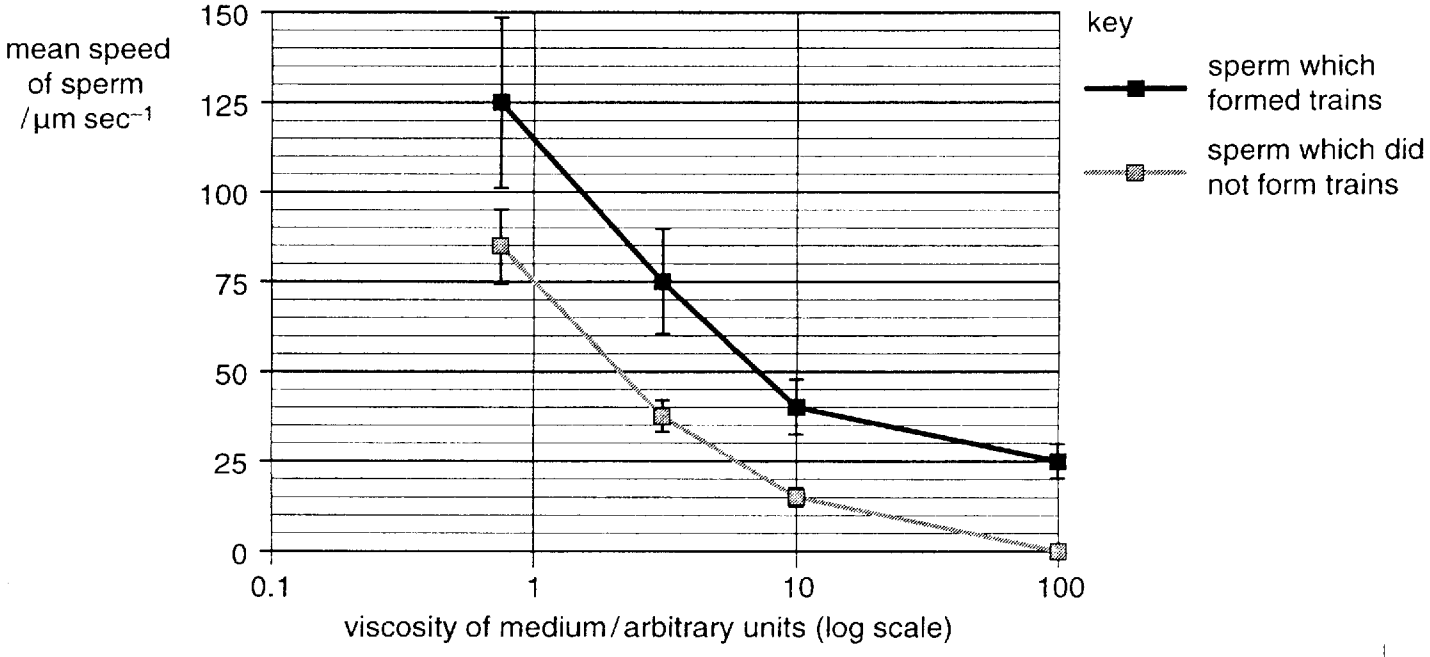

Fig. 3.1

(a) (i) Explain why the researchers measured the speed of the sperm that did not form trains.

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(ii) Suggest why the error bars have been included in Fig. 3.1.

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(iii) Calculate the percentage difference in the mean speed of movement of the sperm that form trains, when compared with the mean speed of the sperm that do not form trains, at a viscosity of 10 arbitrary units. Show your working.

Answer .....% [2]

As the trains of sperm approach the female gamete, the sperm separate and the majority undergo a premature acrosome reaction.

(b) Describe the **normal** sequence of events during the acrosome reaction in the reproductive tract of the **human** female.

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[Turn over

For Examiner's Use

(c) Explain how the formation of sperm trains and the premature acrosome reaction of the majority of the sperm **may have evolved** in the wood mouse.

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[Total: 15]

4 **(a)** Data were collected at an antenatal clinic to discover whether the quantity of alcohol and sweets consumed by mothers during pregnancy had any effect on the mass of their babies at birth. The results of this investigation are shown in Fig. 4.1 **A** (mean mass of alcohol consumed per day) and in Fig. 4.1 **B** (mean mass of sweets consumed per day).

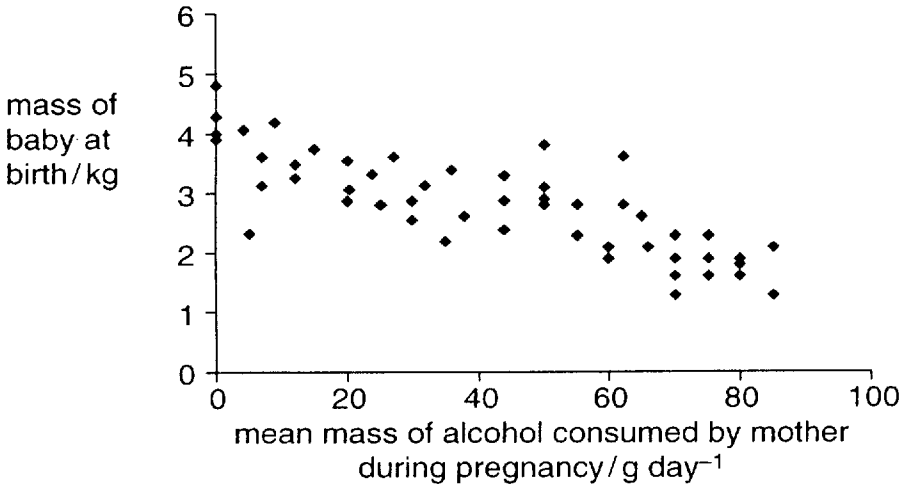

Fig. 4.1 A

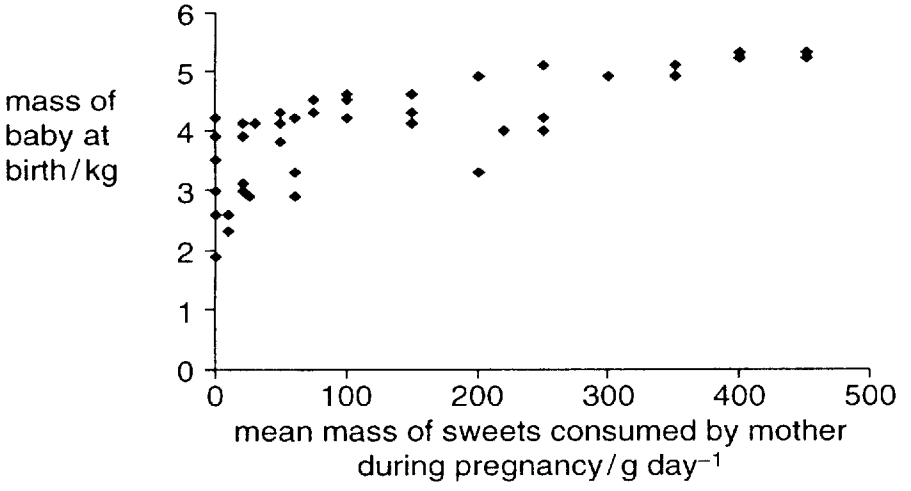

Fig. 4.1 B

Using the data collected at the antenatal clinic,

(i) describe and explain the trend shown in **Fig. 4.1 A**;

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For Examiner's Use

(ii) describe and explain the trend shown in **Fig. 4.1 B**.

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(b) (i) Explain why women may need to increase their intake of vitamin A during pregnancy but **not** their intake of vitamin D.

vitamin A .....

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vitamin D .....

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(ii) Explain why some substances cross the placenta, but others do not.

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[Total: 14]

[Turn over

5 (a) (i) Explain what is meant by the term *absolute growth.*

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(ii) Explain why an absolute growth curve does **not** give an accurate indication of the true rate of growth.

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(b) The masses of five adolescent girls, measured eighteen months before their first menstrual period and eighteen months after their first menstrual period, are shown in Table 5.1.

Table 5.1

girl	mass eighteen months before first menstrual period / kg	mass eighteen months after first menstrual period / kg
P	34.1	52.7
Q	33.5	51.6
R	36.4	50.1
S	34.2	53.1
T	33.3	50.6
mean	34.3	51.6

For Examiner's Use

(i) Calculate the percentage increase **per year** in the mean mass of the girls. Show your working.

Answer.....% increase y^{-1} [2]

(ii) Girl **R** was the heaviest of the five girls eighteen months before her first menstrual period, but **not** eighteen months afterwards.

Suggest **two** possible reasons why girl **R** did not grow as fast as the other girls.

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Turn over for the rest of Question 5

For Examiner's Use

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

Explain the functions of the anterior pituitary gland **and** the functions of the thyroid gland in human growth and development.

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Quality of Written Communication [1]

[Total: 17]

6 **(a)** The formation of gametes in a flowering plant is shown in Fig. 6.1.

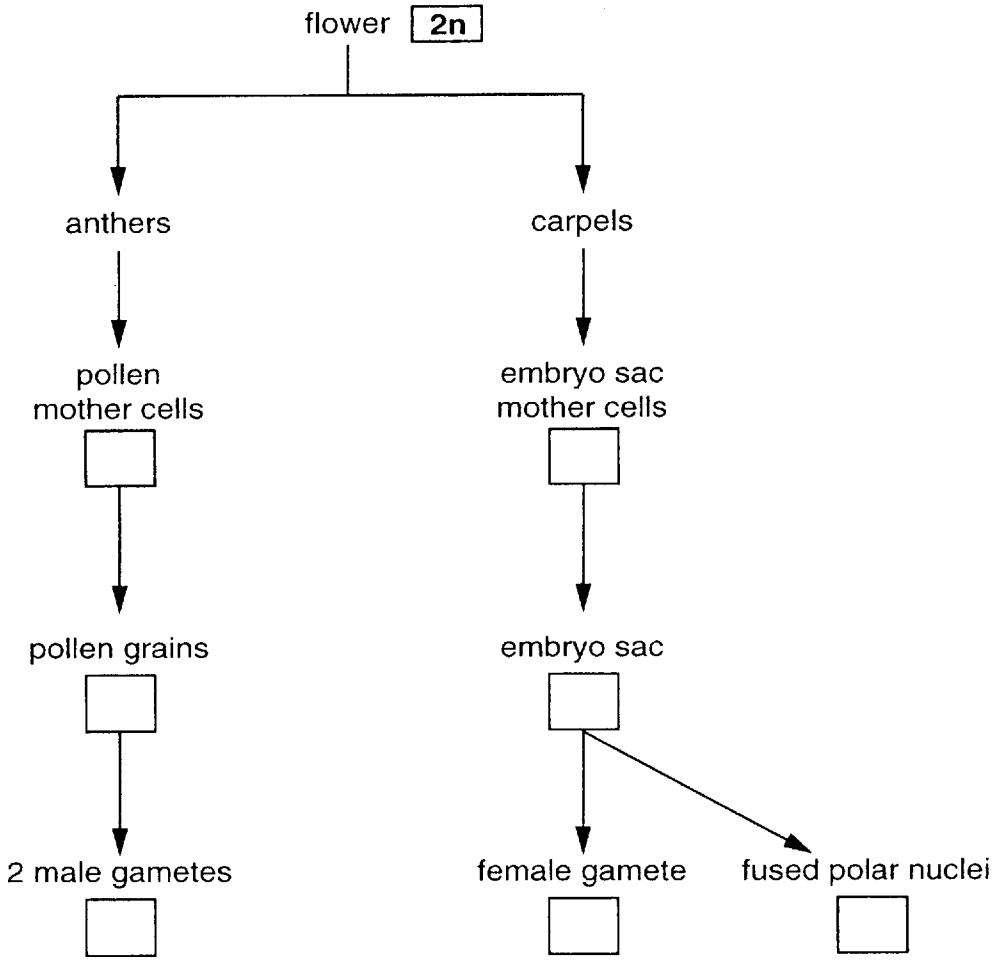

Fig. 6.1

(i) Complete Fig. 6.1, by writing **n** or **2n** in the boxes, to indicate the number of sets of chromosomes present at each stage. [3]

(ii) Describe how the two male gametes are produced from the pollen mother cell.

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For Examiner's Use

(iii) Explain the functions of the two male gametes.

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(iv) Explain the difference between pollination and fertilisation.

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The concentration of pollen grains in the air over the United Kingdom is routinely measured throughout the year. The origin of the pollen is then identified.

In 1998, the data collected over the previous ten years were processed so that a leaflet could be produced that indicated the concentration of each type of pollen in the air throughout a typical year. It was found that grasses produced the most pollen.

(b) Explain why a large amount of pollen is produced by grasses.

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Turn over for the rest of Question 6

(c) Leaflets giving information on pollen counts and the type of pollen in the air throughout the year are made available to

- people with hay fever and asthma
- doctors
- hospitals.

Explain why this information about pollen is useful.

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[Total: 17]

END OF QUESTION PAPER