

OXFORD CAMBRIDGE AND RSA EXAMINATIONS

Advanced GCE

BIOLOGY

2805/01

Growth, Development and Reproduction

Friday

23 JUNE 2006

Afternoon

1 hour 30 minutes

Candidates answer on the question paper.

Additional materials:

Electronic calculator

Ruler (cm/mm)

Candidate Name	Centre Number	Candidate Number												
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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	16	
2	12	
3	17	
4	17	
5	14	
6	14	
TOTAL	90	

This question paper consists of 20 printed pages, 4 blank pages and an insert.

Answer **all** the questions.

1 (a) The disease cholera is caused by the bacterium, *Vibrio cholerae*.

(i) Name the process by which *Vibrio cholerae* reproduces asexually.

..... [1]

(ii) Explain **two** advantages and **one** disadvantage of asexual reproduction to a pathogenic bacterium, such as *Vibrio cholerae*.

advantages

1

.....

2

.....

disadvantage

.....

..... [3]

The growth of a population of bacteria can be measured by counting the number of individual cells at regular intervals. Two counting methods can be used:

- **viable** count;
- **total** count.

A microbiology student used both methods to measure the growth of a population of *Escherichia coli*.

Fig. 1.1 shows the results using the **viable** count method.

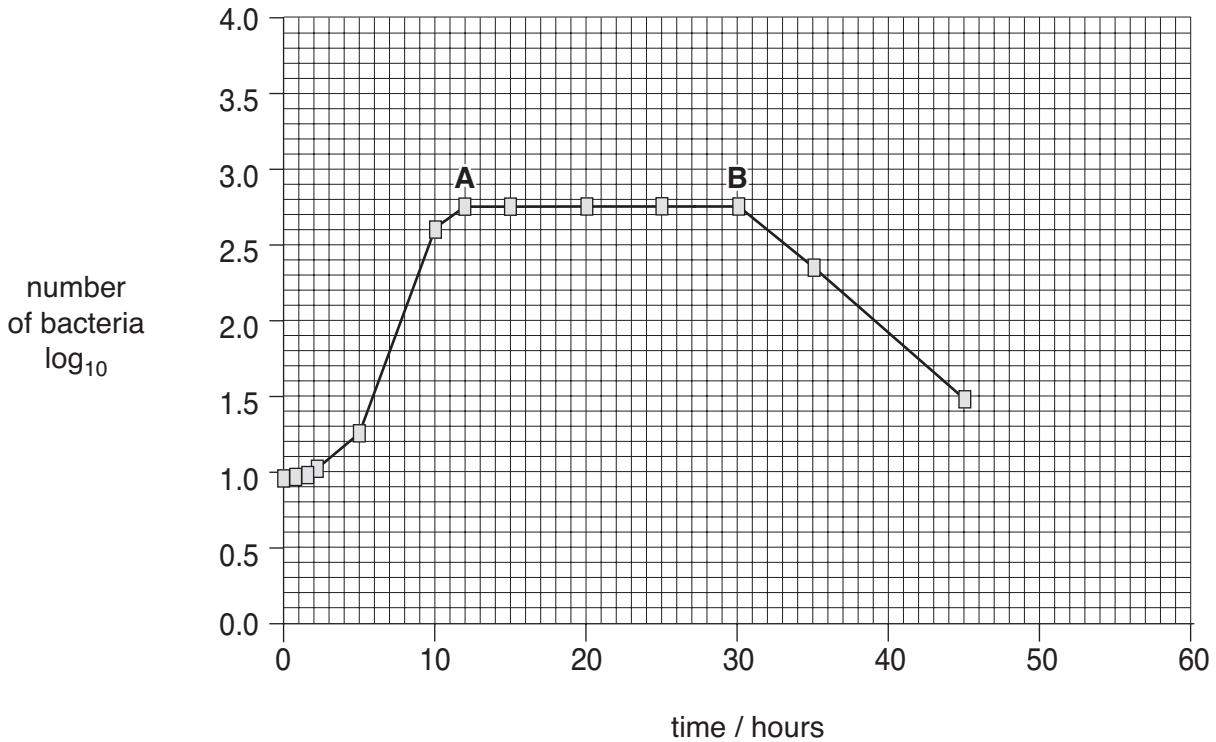


Fig. 1.1

(b) (i) Explain the shape of the viable count curve between points **A** and **B**.

.....

.....

.....

.....[2]

(ii) In Fig. 1.1, the log of the number of bacteria has been plotted.

State **one** reason for using a log scale to show the number of bacteria.

.....

.....[1]

(c) (i) On Fig. 1.1, sketch the curve that the student would have obtained, for the same population, using the **total** count method. [2]

(ii) Explain the shape of the curve that you have drawn.

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

(d) Bacteria can be grown in nutrient agar, which contains all the necessary nutrients for growth. These include amino acids used by the bacteria to synthesise proteins.

(i) Name the type of chemical reaction that occurs when bacteria synthesise proteins from amino acids.

.....[1]

(ii) Describe **three** ways in which proteins are necessary for the growth of bacteria.

1
.....
2
.....
3
.....[3]

[Total: 16]

2 Emergency oral contraception provides women with a method of preventing pregnancy following unprotected sexual intercourse.

Emergency contraceptive pills contain levonorgesterol, a hormone which is similar to the natural progesterone that women produce in their ovaries.

This form of oral contraception may prevent or delay ovulation.

(a) (i) Name the structure in the ovary that produces progesterone.

.....[1]

(ii) Explain how levonorgesterol prevents or delays ovulation.

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

(b) Outline **two** reasons why some people may have objections to the use of emergency oral contraception.

1
.....

2
.....[2]

- (c) Table 2.1 shows the relationship between the time from unprotected sexual intercourse to treatment, and the efficiency of emergency oral contraception.

Table 2.1

time from unprotected sexual intercourse to treatment / hours	percentage of potential pregnancies prevented
0 - 24	95
25 - 48	85
49 - 72	58

- (i) Emergency contraception is sometimes called the 'morning after pill'. Using Table 2.1, state why this name is inaccurate.

.....
[1]

- (ii) Data were collected from 1000 women who had been given emergency contraception between 25 and 48 hours after unprotected sexual intercourse.

Using information from Table 2.1, calculate the number of women that were likely to have become pregnant. Show your working.

Answer = [2]

- (iii) Suggest **one** reason why emergency oral contraception is **not** 100% effective.

.....
 [1]

- (d) The drug RU486 contains mifepristone, a progesterone antagonist. This antagonist blocks the action of progesterone. In low doses, RU486 can be used as an emergency contraceptive. In higher doses, it can be used to cause an abortion in early pregnancy.

Suggest how RU486 causes an abortion.

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

[Total: 12]

- 3 (a) During pregnancy, the metabolism of the mother changes to support the growing fetus.

The volumes of amniotic fluid and maternal blood were measured in a woman at different stages of pregnancy. The changes are shown in Table 3.1.

Table 3.1

stage of pregnancy / weeks	volume of amniotic fluid / cm ³	volume of maternal blood / cm ³
10	35	4100
20	260	4600
30	610	5200
40	820	5250

- (i) Describe the functions of the amniotic fluid during pregnancy.

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..... [3]

- (ii) Suggest why the volume of maternal blood must increase during pregnancy.

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..... [2]

- (iii) Suggest **one** effect **on the mother**, other than a gain in mass, of an increase in blood volume.

.....

..... [1]

(iv) Name **three** nutrients required in the diet for production of the extra maternal blood. Give reasons for your answers.

1

reason

.....

2

reason

.....

3

reason

..... [3]

- 4 (a) Fig 4.1, on an insert, shows a section through a seed of *Capsella bursa-pastoris* before germination.

Name the structures labelled X to Z.

X

Y

Z [3]

The Millennium Seed Bank Project is an international plant conservation project. Its aim is to prevent the extinction of about 24 000 plant species.

- (b) Suggest **two** benefits of preventing extinction of plant species.

1

.....

2

..... [2]

- (c) When seeds are received at the seed bank, they are dried. Removal of water prevents the seeds from germinating during storage.

Describe the functions of water in the germination of seeds.

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.....

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..... [4]

- (d) (i) At intervals during storage, samples of seeds are removed and tested for their ability to germinate. The seeds of some species do not germinate as they are dormant.

Describe the advantages of seed dormancy to flowering plants.

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..... [3]

- (ii) Seeds that do not germinate during tests are exposed to different factors that break dormancy.

Describe the role of gibberellins in breaking dormancy.

.....

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.....

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.....

..... [3]

- (iii) Describe **two** other methods that could be used to break dormancy.

1

.....

2

..... [2]

[Total: 17]

- 5 (a) In this question, one mark is available for the quality of spelling, punctuation and grammar.

Hypothyroidism is caused by a thyroid deficiency. Symptoms of hypothyroidism include lowered metabolic rate, decreased heart rate and increased body mass.

A man with these symptoms was given a four day course of thyroxine. His basal metabolic rate (BMR), pulse rate and body mass were measured at intervals during the treatment and over the next 20 days.

The results are shown in Fig. 5.1, A, B and C.

A graph has been removed due to third party copyright restrictions

Details: A graph showing the BMR measured at intervals during the treatment and over the next 20 days

A graph has been removed due to third party copyright restrictions

Details: A graph showing the pulse rate measured at intervals during the treatment and over the next 20 days

- (b) Prolonged exposure to low external temperatures causes an increase in thyroxine production, leading to an increase in BMR and an increase in body temperature.

Explain how exposure to low external temperatures causes increased thyroxine production.

You may use the space below for a flow chart if it helps your answer.

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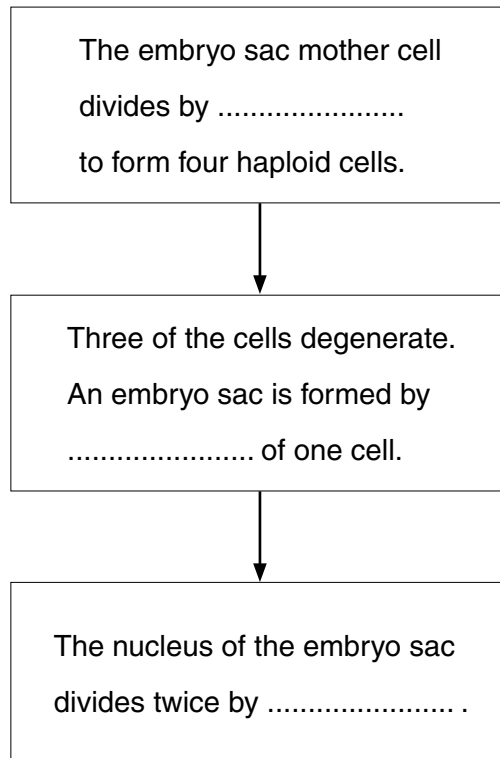
.....

[5]

[Total: 14]

- 6 (a) The flow chart in Fig. 6.1 shows three stages in the development of the ovule of a flowering plant.

Complete the flow diagram in Fig. 6.1 by filling in the names of the processes.



[3]

Fig. 6.1

Question 6 continues on the next page.

- (b) Fig.6.2 shows part of an ovule of *Lilium*. The ovule has passed through the three stages of development shown in Fig.6.1. The nucleus of the embryo sac has divided twice.



Fig.6.2

- (i) State the number of sets of chromosomes in the nuclei of the cells labelled P and Q.

P

Q [2]

