THIS IS A LEGACY SPECIFICATION

OCR
RECOGNISING ACHIEVEMENT

ADVANCED GCE

BIOLOGY

Growth, Development and Reproduction

2805/01

Candidates answer on the question paper

OCR Supplied Materials:
None

Other Materials Required:
- Electronic calculator
- Ruler (cm/mm)

Monday 26 January 2009
Morning

Duration: 1 hour 30 minutes

CUP/T60112

2805011

Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

INSTRUCTIONS TO CANDIDATES

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided, however additional paper may be used if necessary.

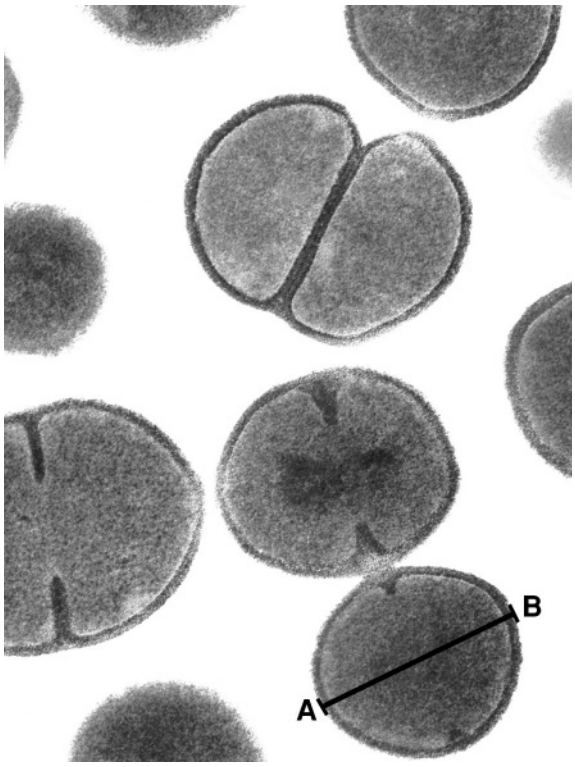
INFORMATION FOR CANDIDATES

- The number of marks is given in brackets **[ ]** at the end of each question or part question.
- The total number of marks for this paper is **90**.
- 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.
- This document consists of **20** pages. Any blank pages are indicated.

FOR EXAMINER'S USE		
Qu.	**Max.**	**Mark**
1	**11**	
2	**19**	
3	**18**	
4	**18**	
5	**14**	
6	**10**	
TOTAL	**90**	

Answer **all** the questions.

1 Fig. 1.1 is an electron micrograph of the bacterium *Staphylococcus aureus*.



× 21 250

Fig. 1.1

(a) Name the kingdom to which *S. aureus* belongs **and** describe **two** main features of this kingdom.

kingdom .....

main features .....

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

(b) Calculate the actual width of the bacterium along the line labelled **A** to **B** in Fig. 1.1.

Show your working. Express your answer to **two decimal places**.

Answer = ... μm **[2]**

(c) Describe how a bacterium reproduces.

You may use labelled diagrams in your answer.

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

(d) A mutant form of *S. aureus*, methicillin-resistant *Staphylococcus aureus* (MRSA), is resistant to most antibiotics.

Many people carry this bacterium on their skin without it causing any problems. However, it can cause serious infections in hospitals.

Suggest why infections with MRSA can be particularly serious in hospitals.

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

[Total: 11]

2 **(a)** In this question, one mark is available for the quality of use and organisation of scientific terms.

Fig. 2.1 shows a stage in the formation of pollen in the anther of *Lilium*.

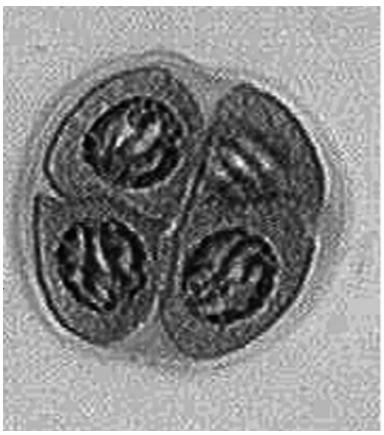

Fig. 2.1

Describe how the pollen develops from the stage shown in Fig. 2.1 **and** explain how these changes enable the pollen to carry out its function.

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..... **[7]**

Quality of Written Communication [1]

(b) Some crops, such as oil seed rape, *Brassica napus*, have been genetically modified (GM) so that they are resistant to a common weed killer.

Suggest the **advantage** to a farmer of a crop that is resistant to a common weed killer.

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

(c) Scientists in the United Kingdom have set up experiments to discover how easily the genes of GM oil seed rape could spread to a crop of non-GM oil seed rape.

In an experiment, the number of seeds that contained the gene for weed killer resistance in the **non-GM** crop was counted using transects.

The results are shown in Fig. 2.2.

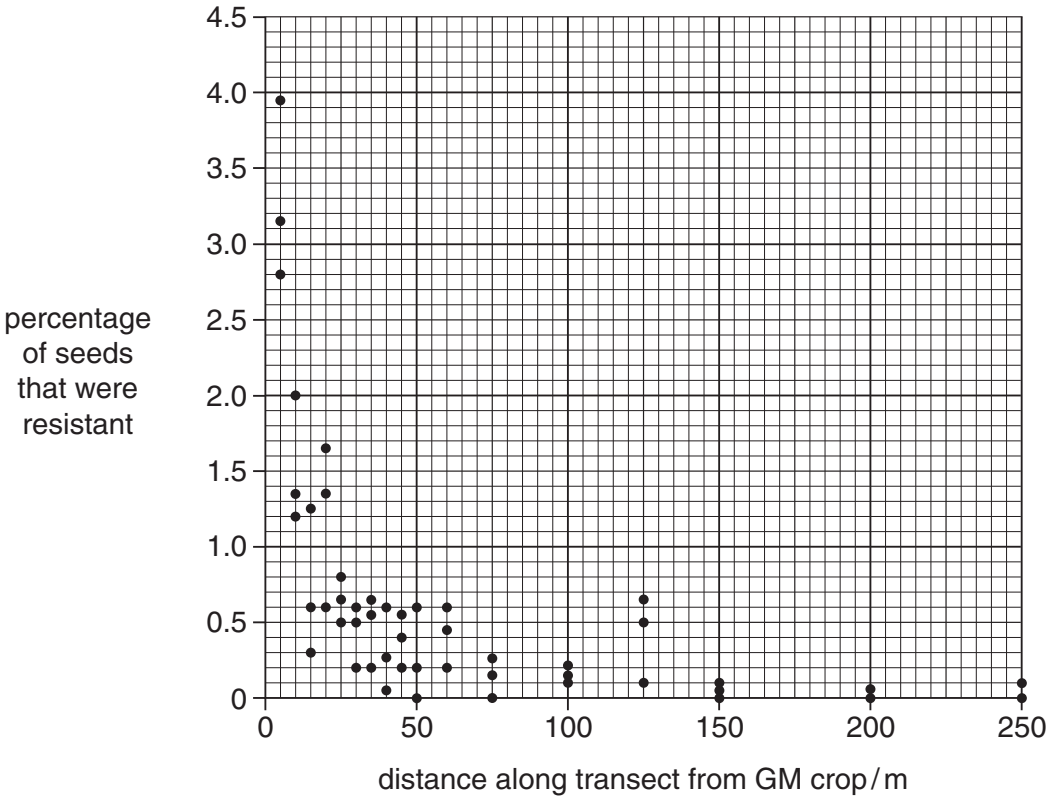

Fig. 2.2

(i) Describe the results of this experiment.

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

(ii) Explain how the results shown in Fig. 2.2 could have occurred.

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(iii) The data for this experiment were collected by using several transects.

Explain what is meant by a transect **and** explain why more than one transect was used in **this** experiment.

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[Total: 19]

3 **(a)** Explain briefly how the testes function as both endocrine organs **and** reproductive organs.

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There have been many attempts to develop an effective male contraceptive.

(b) A normal sperm count is 25-40 million per cm^3 of semen.

A male contraceptive was developed that reduced the sperm count to less than 4 million per cm^3 of semen.

25% of the men treated with this contraceptive did not regain a normal sperm count.

Suggest why less than 4 million sperm per cm^3 of semen will reduce the chance of fertilisation.

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

(c) A serious side-effect of this contraceptive was that 66 men, in a sample of 9000, experienced a life-threatening reduction in the potassium ion concentration of the blood.

(i) Calculate the percentage of men who had a low potassium ion concentration in their blood.

Show your working and give your answer to **two decimal places**.

Answer = ... % **[2]**

(ii) Suggest why a very low potassium ion concentration in the blood could be life-threatening.

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

(iii) State **another** serious side-effect of this contraceptive.

..... **[1]**

(d) A new male contraceptive is now being tested that is both 100% effective and has no side-effects.

The contraceptive contains a mixture of testosterone and progesterone given by injection every three months.

Suggest how **testosterone** injections could produce an effective contraceptive.

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[Total: 18]

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4 **(a)** Reproductive hormones are involved in premenstrual syndrome (also known as premenstrual tension) and the menopause.

(i) The table below shows some of the symptoms of these conditions.

Complete the table. Use a tick (✓) or a cross (✗) to show whether each symptom is characteristic of premenstrual syndrome, the menopause, or both.

The first one has been done for you.

symptom	premenstrual syndrome	menopause
depression	✓	✓
water retention or bloating		
mood swings		
night sweats		
loss of bone mass		
aches and pains		
hot flushes		

[6]

(ii) Describe the likely causes of premenstrual syndrome.

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

(iii) Explain why symptoms of premenstrual syndrome do not occur when the menstrual cycle stops at the menopause.

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

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

The average age for the onset of menopause in the western world is 51 years.

Table 4.1 shows the comparative risk of coronary heart disease (CHD) in pre-menopausal and post-menopausal women of the same age.

Table 4.1

	incidence of CHD per 1000 women	
age of women /years	pre-menopausal women	post-menopausal women
up to 39	0.8	2.0
40-44	0.9	3.7
45-49	2.0	3.9
50-54	3.4	6.4

Table 4.2 below shows the effect of hormone replacement therapy (HRT) on the incidence of non-fatal and fatal heart attacks in post-menopausal women.

A large sample of post-menopausal women was divided into two groups.

- Group 1 was treated with tablets containing the hormones used in HRT.
- Group 2 was treated with tablets containing **no** hormones.

Table 4.2

	incidence per 1000 person years	
	group 1	group 2
non-fatal heart attack	23.1	24.7
fatal heart attack	15.5	14.2

Study all the data in Table 4.1 **and** Table 4.2.

Discuss whether or not the following statements are supported by the data.

- Hormonal changes at the menopause increase the risk of coronary heart disease (CHD) and heart attacks.
- The risk of heart attacks could be reduced by the use of HRT.

You will gain credit if you use data from the tables in your answer.

hormonal changes

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risk of heart attacks

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Quality of Written Communication [1]

[Total: 18]

5 Fig. 5.1 shows a human embryo before implantation.

Fig. 5.1

(a) (i) Cells from the embryo shown in Fig. 5.1 could be cloned.

Suggest why these cells are suitable for this process.

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..... **[1]**

(ii) The cloning of human embryonic cells raises ethical issues.

Describe **two** ethical issues associated with this procedure.

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

(iii) Identical twins have the same genotype.

Explain how identical twins may occur.

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

(b) The embryo continues to grow before it implants in the uterus.

(i) Describe how the embryo grows **before** implantation.

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

(ii) By the time the implanted embryo is eight weeks old it has developed into a fetus.

Describe how the cells of the embryo, such as those shown in Fig. 5.1, develop into fetal cells.

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

(iii) Human chorionic gonadotrophin (hCG) is produced by the outer layer of the embryo.

Explain the importance of hCG in maintaining pregnancy.

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[Total: 14]

6 Fig. 6.1 is a diagram of the human placenta.

It shows the surfaces across which substances are exchanged between the mother and the fetus.

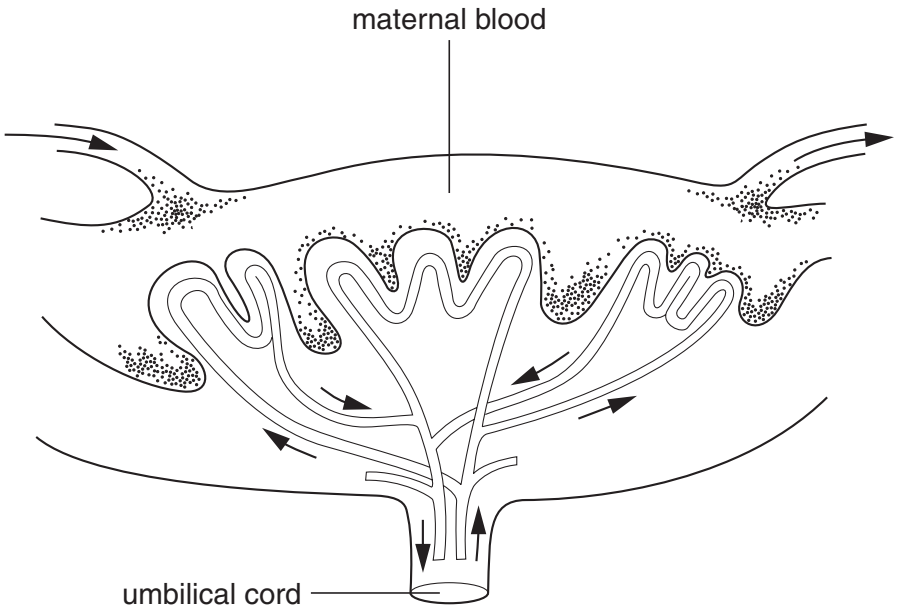

Fig. 6.1

Table 6.1 shows some of the substances that are exchanged between the mother and the fetus.

In each case complete the table by:

- stating the method used to transport the substance across the placental membranes
- describing the transport mechanism across the placental membranes.

The first one has been done for you.

Table 6.1

substance exchanged	method used	description of transport mechanism across the placental membrane
water	osmosis	Partially permeable membranes in capillaries and chorionic villi, with a water potential gradient across them. Water moves down a water potential gradient.
glucose		
antibodies		
calcium ions		

[10]

[Total: 10]

END OF QUESTION PAPER

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