

OXFORD CAMBRIDGE AND RSA EXAMINATIONS

Advanced GCE

HUMAN BIOLOGY

2866

Energy, Control and Reproduction

Tuesday

21 JUNE 2005

Morning

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 black or blue 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	11	
2	19	
3	20	
4	12	
5	16	
6	12	
TOTAL	90	

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

Answer all the questions.

- 1 (a) The health of the eye is a convenient indication of the health of the body.

Fig. 1.1 shows a longitudinal section through the human eye.



Fig. 1.1

- (i) Name the structures labelled A and B.

A

B[2]

- (ii) Describe the function of the choroid layer.

.....

.....

.....[2]

(b) Suggest the likely effect on the retina of

(i) severe long-term hypertension (high blood pressure);

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

(ii) vitamin A deficiency.

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

(c) A bright light was shone into a student's eye. Fig. 1.2 shows the appearance of the eye before and after this occurred.

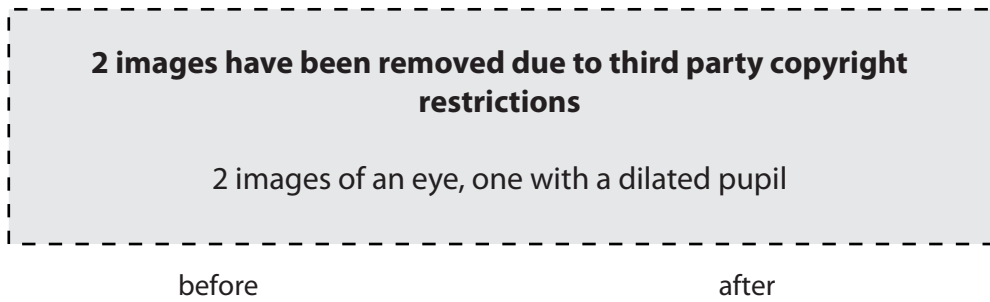


Fig. 1.2

Explain how the eye responds to bright light as shown in Fig. 1.2.

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

[Total: 11]

- 2 A computerised axial tomography (CT) scan can help with the diagnosis and treatment of brain injuries.

Fig. 2.1 shows a CT scan of the human brain.

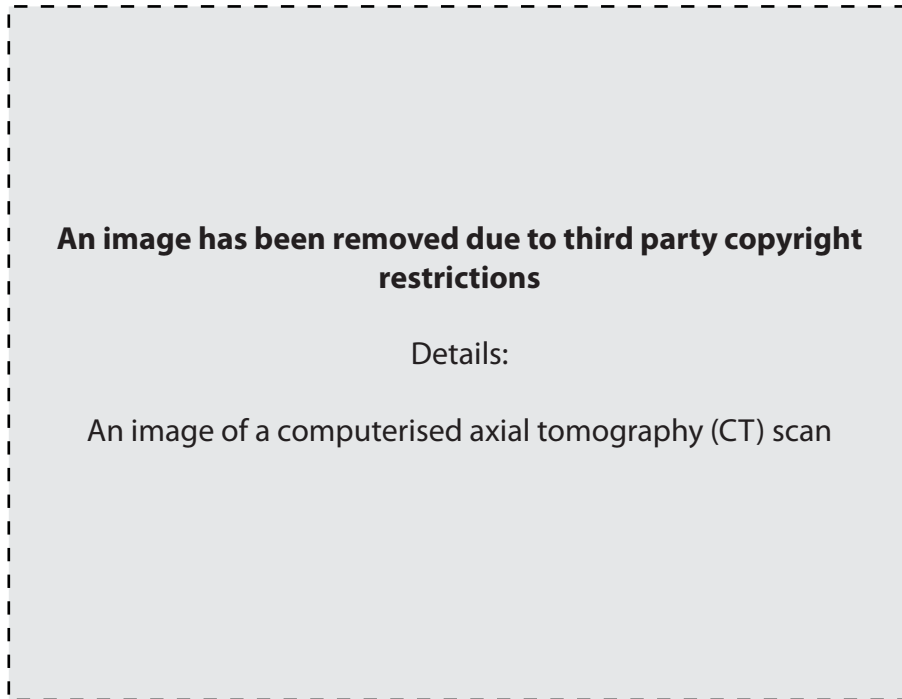


Fig. 2.1

- (a) (i) Name the structures A to C.
 - A
 - B
 - C [3]

- (ii) Outline how a CT scan works and how it could be used in the assessment of brain damage.
 -
 -
 -
 -
 -
 -
 -
 - [4]

(b) Describe how brain activity may be modified by diamorphine (heroin), in order to relieve severe pain in cancer patients.

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.....[3]

Question 2 is continued on page 6

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3 There are many **genetic** causes of infertility. As a result of these causes, fertilisation may be impossible or the foetus may not survive.

(a) Explain the meaning of the term *genetic cause*.

.....

.....

.....[2]

(b) Fig. 3.1 shows the karyotype of an individual with Turner's syndrome.

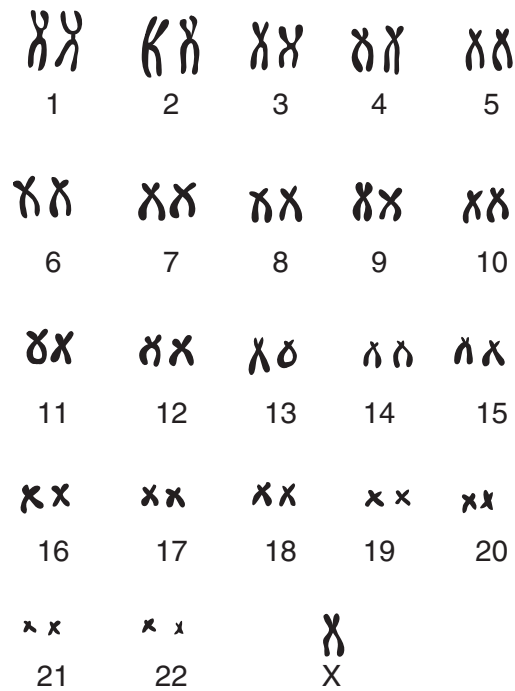


Fig. 3.1

(i) Explain why this individual has Turner's syndrome.

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.....[2]

(ii) Comment on the fertility of this individual giving reasons for your answer.

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.....[3]

Question 3 is continued on page 10.

(c) One of the most common causes of infertility in women is infection with genital chlamydia, caused by the bacterium *Chlamydia trachomatis* .

- Chlamydia is the most common sexually transmitted disease in the United Kingdom.
- Chlamydia may cause pelvic inflammatory disease (PID).
- One in five women who develop PID become infertile.
- A large proportion of infections with *Chlamydia trachomatis* remain undiagnosed.

Fig. 3.2 shows the number of cases of genital chlamydia, diagnosed at clinics in the United Kingdom, from 1995 – 2001.



Fig. 3.2

(i) Suggest a suitable treatment for infection with *C. trachomatis* . Give a reason for your answer.

.....

.....[2]

(ii) Suggest why the data for men are also included in the number of diagnoses of genital chlamydia shown in Fig. 3.2.

.....

.....[1]

- 4 The efficiency of respiration has a direct effect on energy levels and health.

Fig. 4.1 shows an electron micrograph of a mitochondrion.



Fig. 4.1

- (a) (i) Name the structures A to C.

A

B

C

[3]

- (ii) Calculate the width of the mitochondrion between the points marked X and Y. Show your working.

Answer = μm [2]

5 The energy to maintain metabolism is carried in the cells as ATP.

(a) Fig. 5.1 shows the diagrammatic structure of ATP.

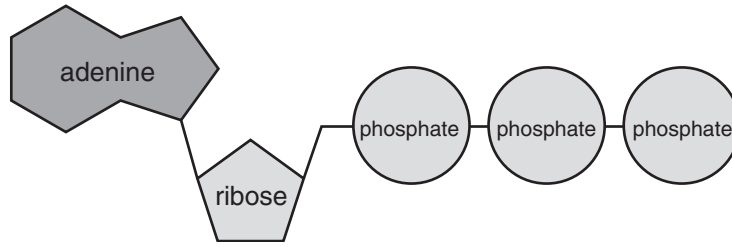


Fig. 5.1

(i) Draw a ring on Fig. 5.1, around the part of the ATP molecule that could be described as a nucleotide. [1]

(ii) ATP is described as the main energy carrier in the cell.

State **two metabolic** processes in humans that require the use of ATP.

1.
.....

2.
.....[2]

(iii) Explain why green plants are necessary to provide humans with enough ATP for their metabolic processes.

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.....[3]

- (b) (i) • When one molecule of glucose is used as a respiratory substrate in aerobic respiration, it can yield 32 molecules of ATP per molecule of glucose.
- Each molecule of ATP yields 30.6 kJ of energy when it is hydrolysed to ADP during metabolic processes.
- When one molecule of glucose is oxidised fully, it yields 2 880 kJ of energy.

Calculate the percentage efficiency of aerobic respiration when one molecule of glucose is used as a respiratory substrate. Show your working.

Answer =% [2]

- (ii) Suggest what happens to the energy in the human body which is **not** incorporated into the ATP molecule.

.....
[1]

- (c) In recent years, some athletes have been banned from competition for using unacceptable methods to enhance performance.

- (i) Describe **two** of these methods **and** for each, outline how it enhances performance.

1.

[4]

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.....[8]

Quality of Written Communication [1]

(b) Explain the **importance** of meiosis in the life cycle of a human.

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

[Total: 12]

END OF QUESTION PAPER

Copyright Acknowledgments:

Fig. 1.1 Atlas of Histology Freeman and Bracegirdle © 1966 2nd Edition 1967 Heinemann Educational Books Ltd

Fig. 3.2 HIV/STI Division PHLS Communicable Disease Surveillance Centre 5th June 2002

Fig. 4.1 atropos.as.arizona.edu/aiz/teaching/a204/lecture21.html

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