

ADVANCED GCE

HUMAN BIOLOGY

Energy, Reproduction and Populations

F224

Candidates answer on the question paper.

OCR supplied materials:
None

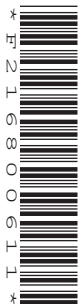
Other materials required:

- Electronic calculator
- Ruler (cm/mm)

Wednesday 22 June 2011

Morning

Duration: 1 hour



Candidate forename		Candidate surname	
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Centre number							Candidate number				
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INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. If additional space is required, you should use the lined page at the end of this booklet. The question number(s) must be clearly shown.
- Answer **all** the questions.
- Do **not** write in the bar codes.

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 **60**



Where you see this icon you will be awarded marks for the quality of written communication in your answer.

- 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.

Answer **all** the questions.

1 (a) Fig. 1.1 is a diagram of the human female reproductive system.

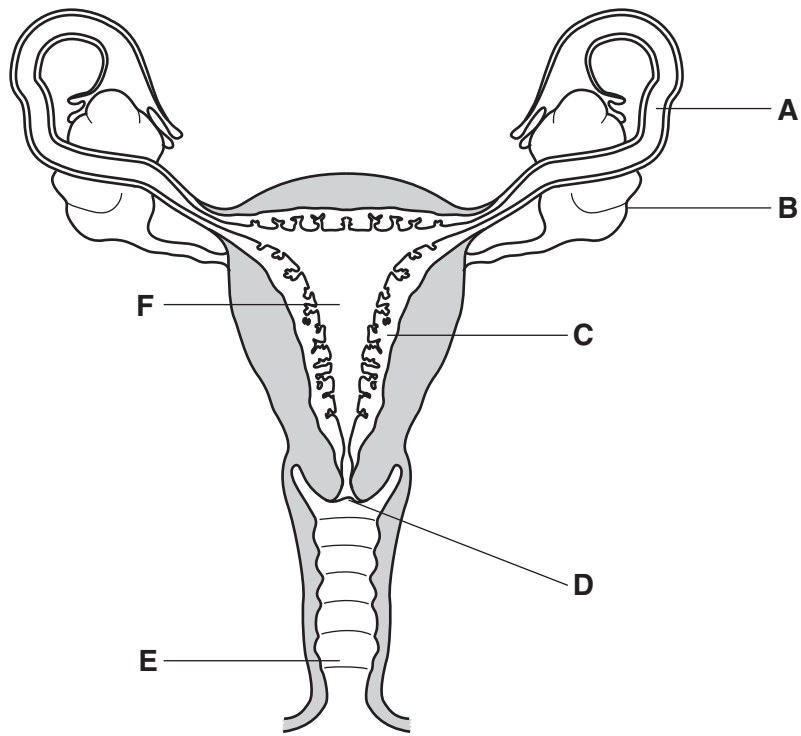


Fig. 1.1

(i) Name structures **A** and **B** in Fig. 1.1.

A..... [1]

B..... [1]

(ii) State which letter on Fig. 1.1 indicates the place where fertilisation usually occurs.

..... [1]

- (b) The placenta is an organ formed from fetal and maternal tissues. It allows the exchange of substances between the fetus and the mother during pregnancy.

Fig. 1.2 is a diagram of part of the human placenta.

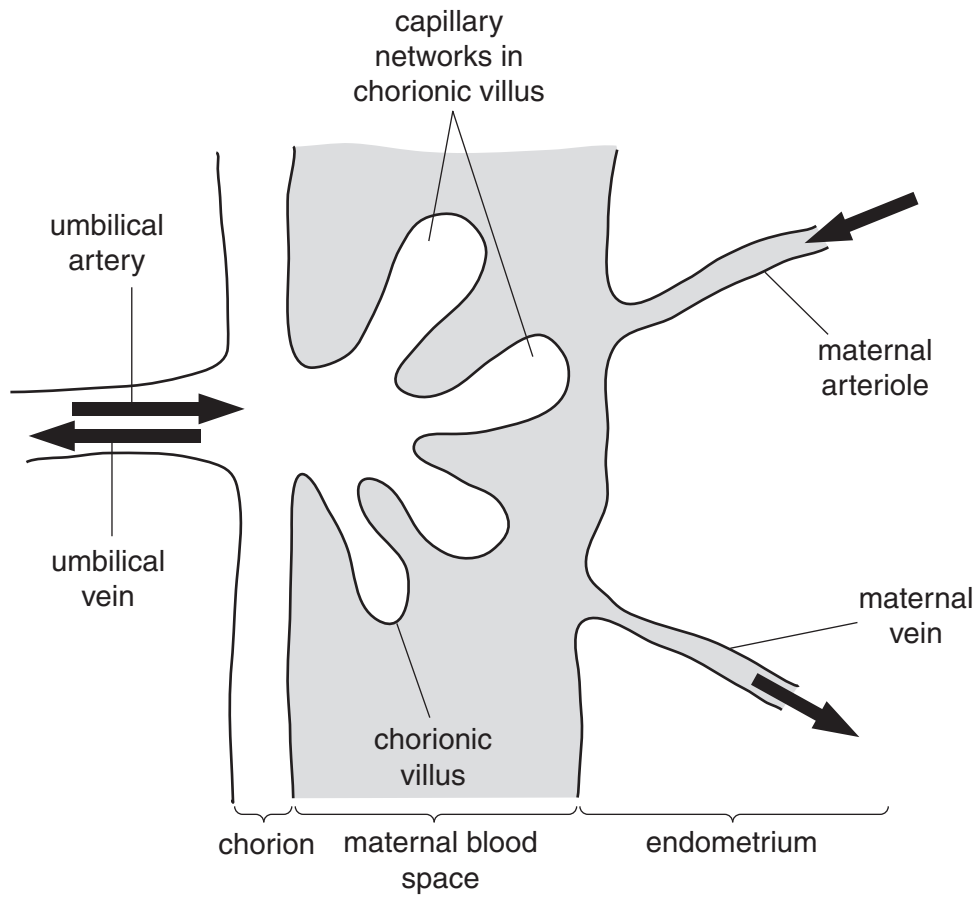


Fig. 1.2

- (i) Name **one** substance that passes from mother to fetus and **one** substance that passes from fetus to mother during pregnancy.

mother to fetus

fetus to mother [2]

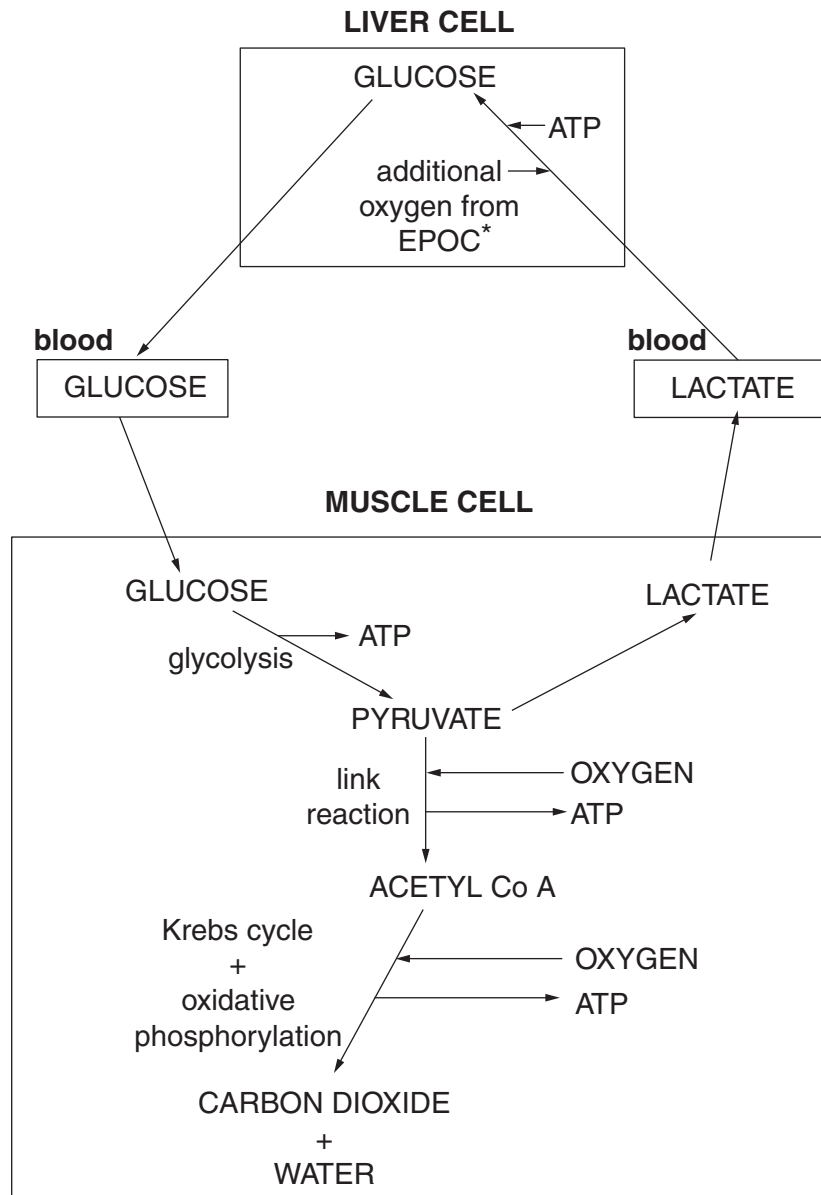
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QUESTION 2(a) STARTS ON PAGE 6

- 2 (a) During a sporting event an athlete may have to carry out not only aerobic respiration but also anaerobic respiration to produce sufficient ATP.

Fig. 2.1 outlines both these processes in a muscle cell and shows how a liver cell is linked to the processes.



* EPOC = Excessive Post-exercise Oxygen Consumption

Fig. 2.1

You may refer to Fig. 2.1 in answering questions (i) to (vi).

- (i) State **one** use of glucose in the liver cell **apart from** maintaining the blood glucose concentration.

.....
 [1]

- (ii) Anaerobic respiration is less efficient than aerobic respiration.

Explain the meaning of the term *less efficient* as applied to **anaerobic** respiration.

.....

 [2]

- (iii) Complete the table below to indicate the precise locations of glycolysis, the link reaction, Krebs cycle and oxidative phosphorylation within the muscle cell.

process	precise location
glycolysis	
link reaction	
Krebs cycle	
oxidative phosphorylation	

[4]

- (iv) In the muscle cell, glucose is phosphorylated at the start of glycolysis.

Suggest why this phosphorylated glucose does not diffuse out of the muscle cell into the blood.

.....

 [1]

(v) State what is meant by *Excessive Post-exercise Oxygen Consumption (EPOC)*.

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

(vi) Oxygen is required in the metabolic pathways involved in the conversion of lactate to glucose.

Suggest **two** further uses of the additional oxygen from EPOC.

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

(b) Aerobic exercise, such as regular swimming, can have benefits on the body.

Discuss the **long-term** benefits of regular aerobic exercise on the muscles **and** on the cardiovascular system.



In your answer you should use the appropriate technical terms, spelt correctly.

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- 3 (a) The sperm count or sperm density in a sample of semen has been decreasing in men in the UK for the last 70 years.

Fig. 3.1 shows the mean decrease in sperm density between 1935 and 1995.

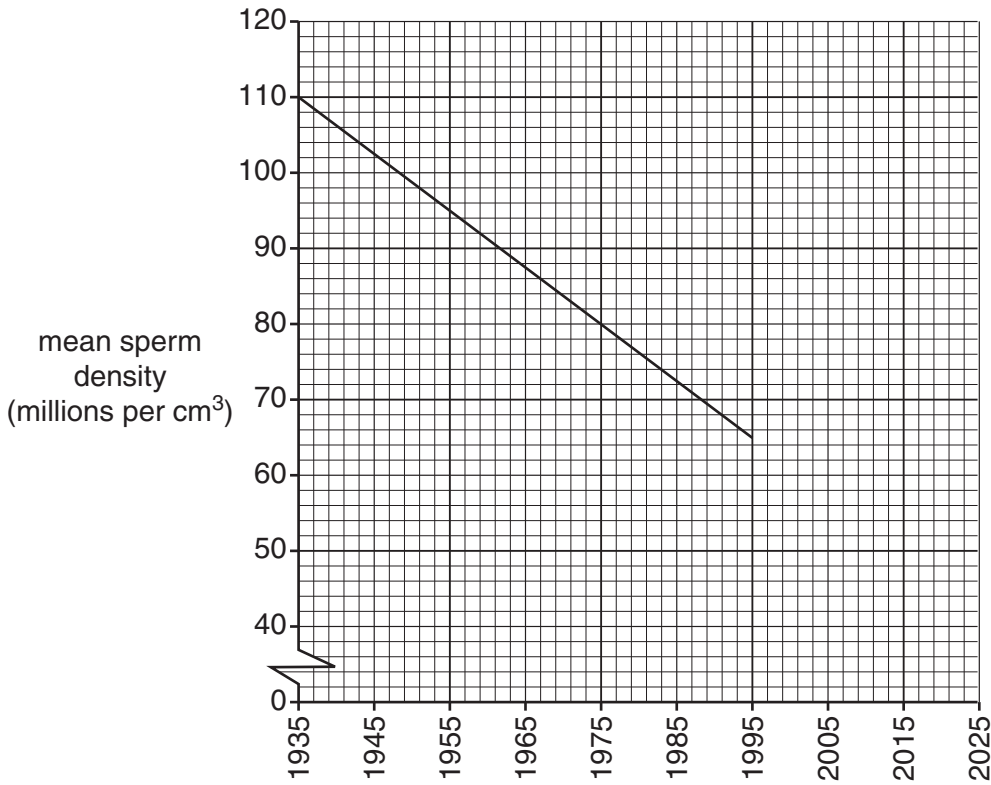


Fig. 3.1

- (i) Calculate the mean yearly decrease in sperm density between the years 1935 and 1995.

Show your working.

Answer = millions per cm³ per year [2]

- (ii) Use Fig. 3.1 to estimate the mean sperm count of men in the year 2015.

Answer = millions per cm³ [1]

(iii) Suggest possible reasons for this decrease in sperm density.

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..... [3]

(b) Fertile men can be encouraged to donate sperm to enable childless couples to have children. The sperm from these donors are stored in sperm banks. At various times in the future, the donated sperm may be used in artificial insemination.

(i) Describe how sperm are stored in sperm banks.

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..... [2]

(ii) Donor sperm and semen have to be screened before they are stored in sperm banks.

Suggest what the sperm and semen may be screened for.

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..... [2]

(iii) Some men have their sperm harvested and stored for future use with their own partners.

Suggest a situation where a man may be offered the option of having his sperm harvested and stored for future use.

.....

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..... [1]

[Total: 11]

13
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QUESTION 4 STARTS ON PAGE 14

- 4 The respiratory quotient (RQ) is used to determine the type of respiratory substrate, such as carbohydrate or lipid, which an organism may use at any one time.

A respirometer can be used to measure the oxygen uptake of yeast in order to calculate the RQ.

Fig. 4.1 is a diagram of a respirometer.

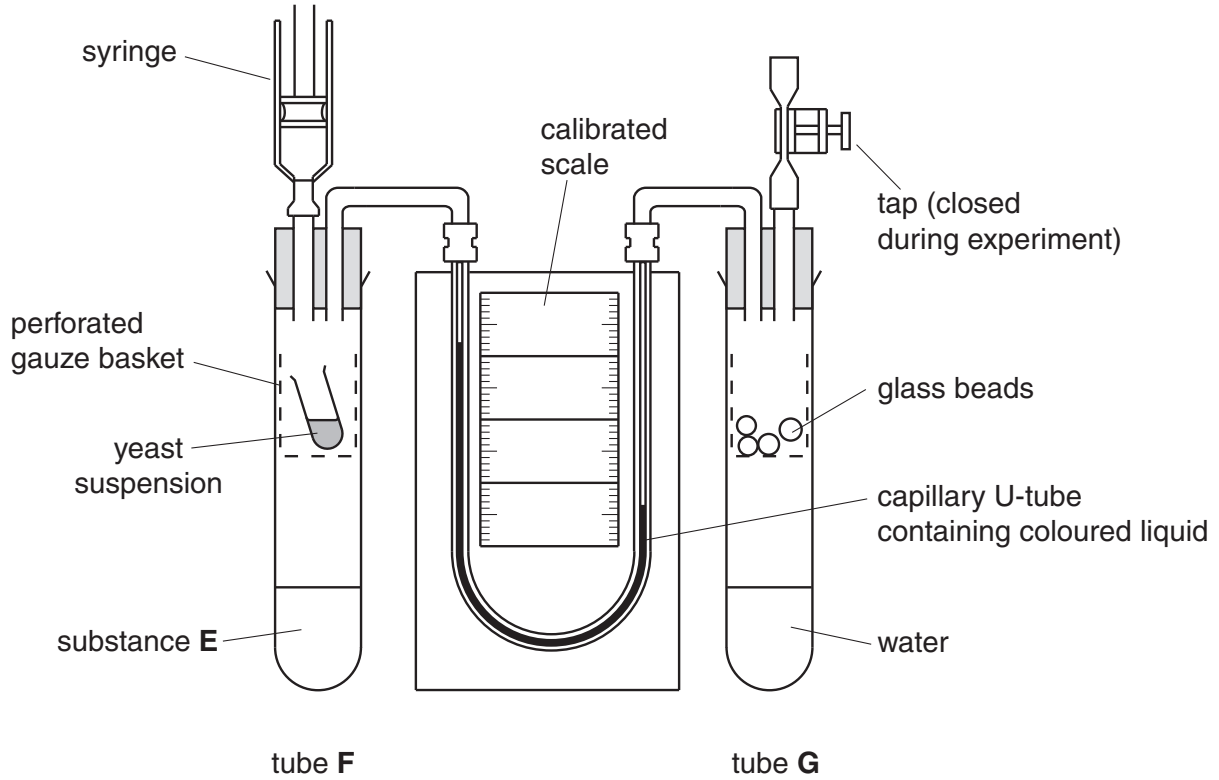


Fig. 4.1

- (a) Name substance **E** and state its function.

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..... [2]

(b) Describe the role of the lichens and mosses on the bare rock.

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..... [2]

(c) Suggest how process **K** shown in Fig. 5.1 could be caused.

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..... [2]

QUESTION 5(d) STARTS ON PAGE 18

(d) An increase in plant biomass is largely due to photosynthesis.

Fig. 5.2 shows the increase in stored energy in the form of biomass of plants during succession.

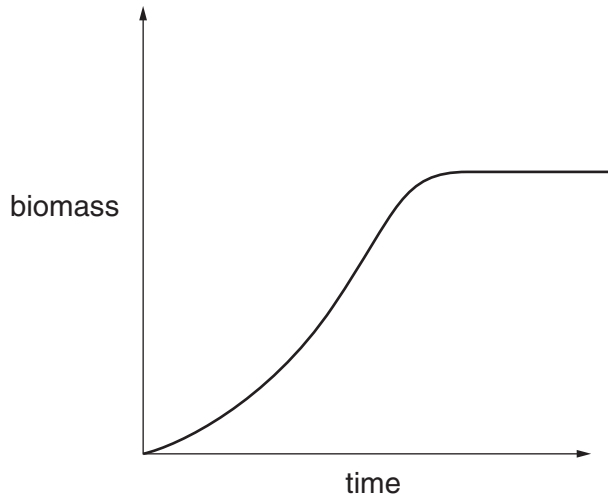


Fig. 5.2

- (i) What structure within the chloroplast is responsible for the absorption of light energy?
..... [1]
- (ii) Name the **two** products of the light-dependent stage that are used in the **light-independent** stage.
.....
..... [2]
- (iii) Suggest why the graph in Fig. 5.2 reaches a plateau.
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..... [1]

[Total: 11]

- 6 The numbers of different species of animals and plants that are threatened with extinction are recorded in a document known as the Red List.

The Red List shows that 21% of all mammal species and 33% of all amphibian species are under threat of extinction. Unless action is taken to conserve species on the Red List, the end result could be a decrease in global biodiversity.

- (a) Explain the meaning of the term *biodiversity*.

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..... [2]

- (b) Some species may have uses in the future. Some scientists believe that this is one good reason for maintaining biodiversity.

Outline the **economic** reasons for maintaining biodiversity.

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..... [3]

[Total: 5]

END OF QUESTION PAPER

ADDITIONAL PAGE

If additional space is required, you should use the lined page below. The question number(s) must be clearly shown.

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