



**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)

**Friday 25 June 2010
Afternoon**

Duration: 1 hour



Candidate Forename		Candidate Surname	
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Centre Number							Candidate Number				
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INSTRUCTIONS TO CANDIDATES

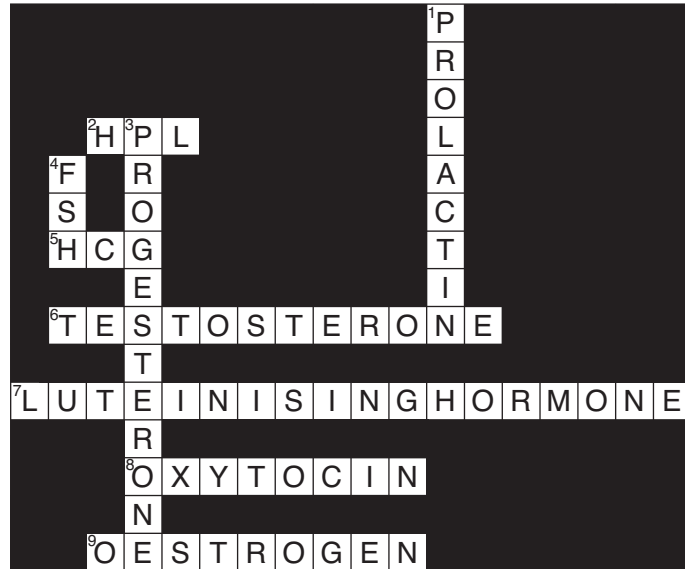
- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the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

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 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 **16** pages. Any blank pages are indicated.

Answer **all** the questions.

- 1 The theme of the completed crossword below is 'Functions of the Hormones of Human Reproduction'.



(a) Write a clue for each of the following crossword answers:

- (i) testosterone (6 across)

.....
 [1]

- (ii) prolactin (1 down).

.....
 [1]

(b) State which word or term in the crossword matches each of the following clues:

- (i) stimulates contraction of uterine muscles

..... [1]

- (ii) maintains uterine lining in the early stages of pregnancy.

..... [1]

(c) Which **two** female hormones can be used in the female contraceptive pill?

.....
 [2]

(d) State **one** other way by which contraceptive hormones can be administered to a woman **other than by taking a pill**.

..... [1]

[Total: 7]

2 (a) Myoglobin is a respiratory pigment that can combine with oxygen.

Myoglobin is found in muscle cells.

Fig. 2.1 shows a diagram of a molecule of myoglobin.

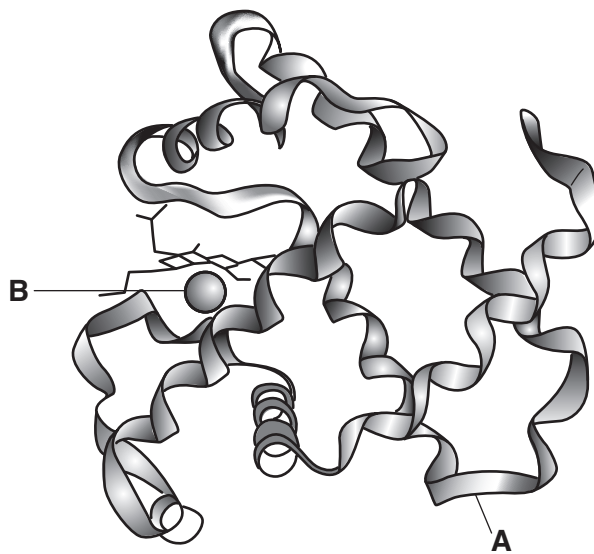


Fig. 2.1

Name structures **A** and **B** in Fig. 2.1.

A

B [2]

QUESTION 2(b) STARTS ON PAGE 4

(b) Fig. 2.2 shows oxygen dissociation curves for both myoglobin and haemoglobin.

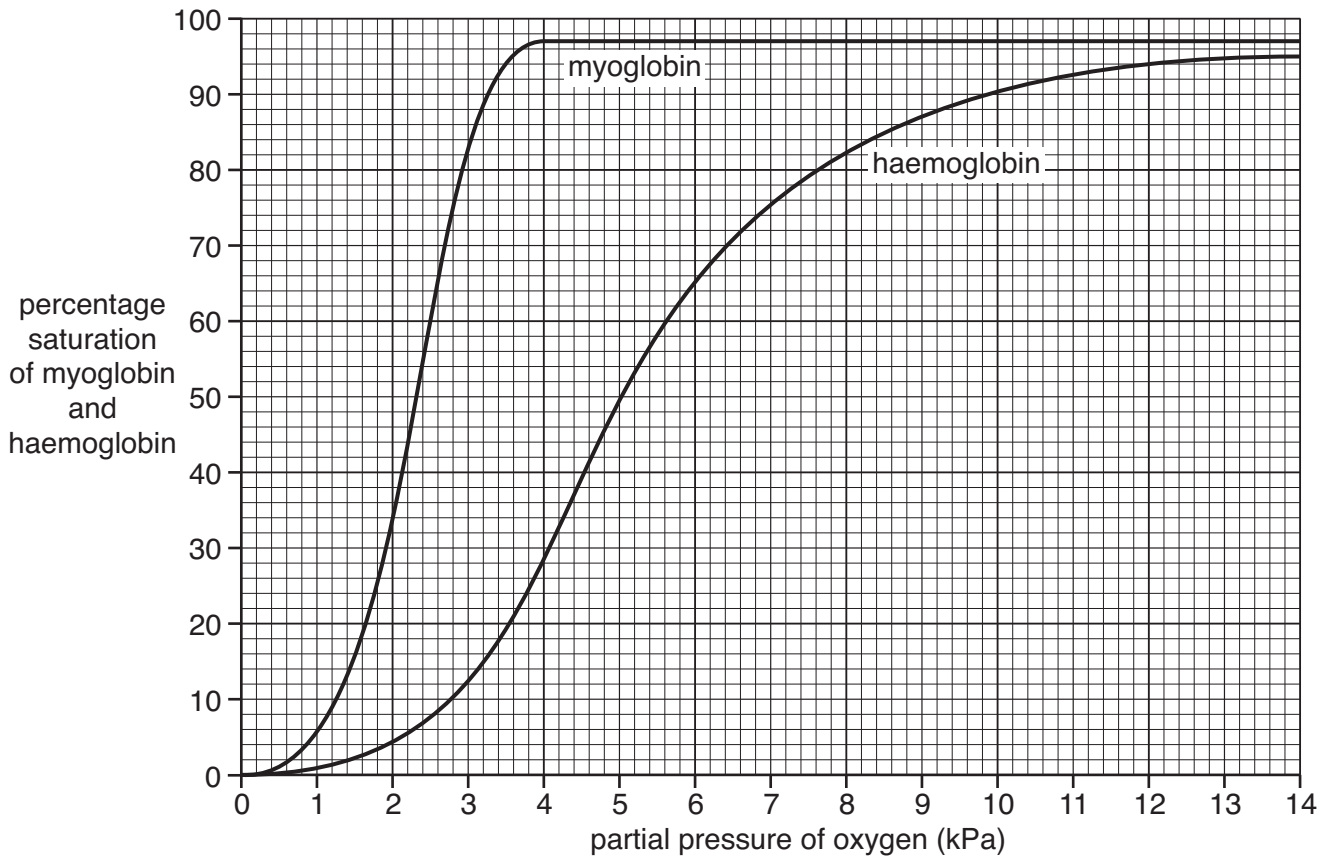


Fig. 2.2

- (i) Calculate the decrease in percentage saturation of both myoglobin and haemoglobin between 4 kPa and 2 kPa partial pressure of oxygen.

Answer for myoglobin =

Answer for haemoglobin = [1]

- (ii) State a location in the human body where the percentage saturation of haemoglobin in the blood will be almost 100%.

..... [1]

(iii) Describe **and** explain the **significance** of the difference in affinity for oxygen between myoglobin and haemoglobin.

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

(c) Iron is an important element in the structure of both myoglobin and haemoglobin.

A rare disease called haemochromatosis (HC) results in there being an overload of iron in the blood. This build up of iron is toxic to the body and may cause liver, heart or pancreatic disease.

- One form of HC is hereditary.
- Intake of dietary iron does not differ significantly between men and women.
- In the 16 to 45 year age range, men show symptoms of HC earlier than women.

(i) Suggest why men show symptoms of hereditary HC at an earlier age than women.

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

(ii) A man who is known to have HC decides not to risk having children.

State **two** methods of contraception that he could use.

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

[Total:11]

3 (a) Erythropoietin (EPO) is a hormone that controls the oxygen carrying capacity of blood in humans by stimulating the production of more red blood cells (erythrocytes).

(i) High altitude can stimulate an increase in the secretion of EPO.

Suggest why a high altitude can lead to increased EPO secretion.

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

(ii) State the organ responsible for producing and releasing EPO.

..... [1]

(iii) Altitude training is one way of improving athletic performance. A banned substance, recombinant erythropoietin (RhEPO), is sometimes used to enhance athletic performance.

Outline the **biological disadvantages** of an athlete using RhEPO.

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

4 (a) Hepatocytes (liver cells) detoxify the blood.

Alcohol can be toxic. To prevent this, hepatocytes oxidise the alcohol into a less toxic substance. This process involves the reduction of NAD.

The relationship between the concentration of NAD in the hepatocytes and the concentration of alcohol in the blood is shown in Fig. 4.1.

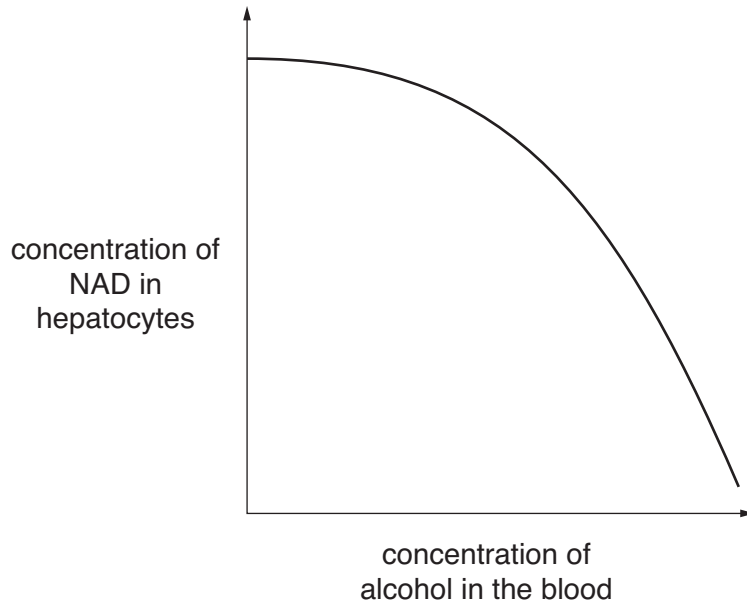


Fig. 4.1

(i) Describe the relationship shown in Fig. 4.1.

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

(ii) Using Fig. 4.1, suggest **two** respiratory processes that may be affected by an increased concentration of alcohol in the blood.

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

5 *In vitro* fertilisation (IVF) is used to treat infertility.

A survey carried out on several IVF clinics in 2003 investigated the chance of having a multiple birth as a result of IVF treatment.

Fig. 5.1 summarises the results of this survey.

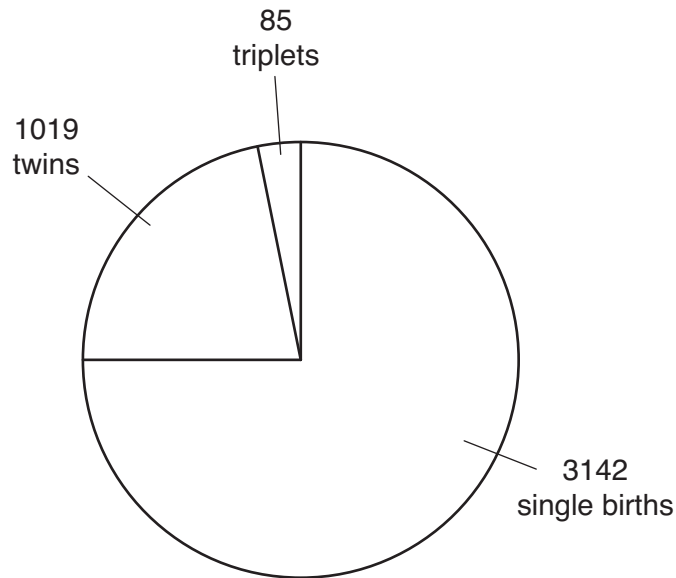


Fig. 5.1

(a) Explain the difference between *multiple pregnancy* and *multiple birth*.

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

(b) With reference to Fig. 5.1, calculate the percentage of births that resulted in twins.

Show your working and give your answer **to the nearest whole number**.

Answer = % [2]

- 6 Nitrogen is a vital element in the synthesis of amino acids and ultimately proteins, such as insulin and myosin.

Fig. 6.1 outlines some of the ways in which nitrogen is cycled in nature.

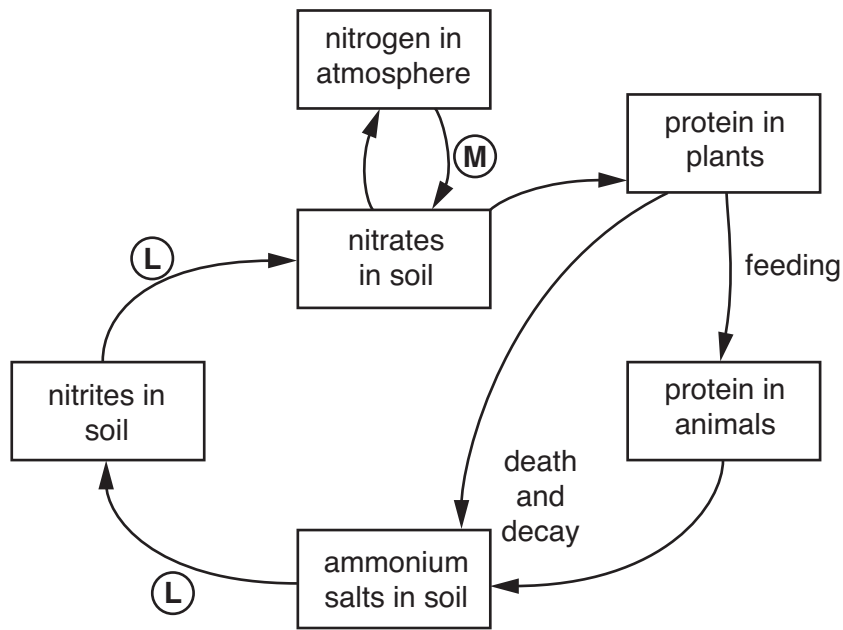


Fig. 6.1

- (a) State the **types** of bacteria that cause the processes **L** and **M**.

L

M [2]

(c) Fig. 6.2 shows the relationship between annual deforestation rate and annual human population growth for six countries.

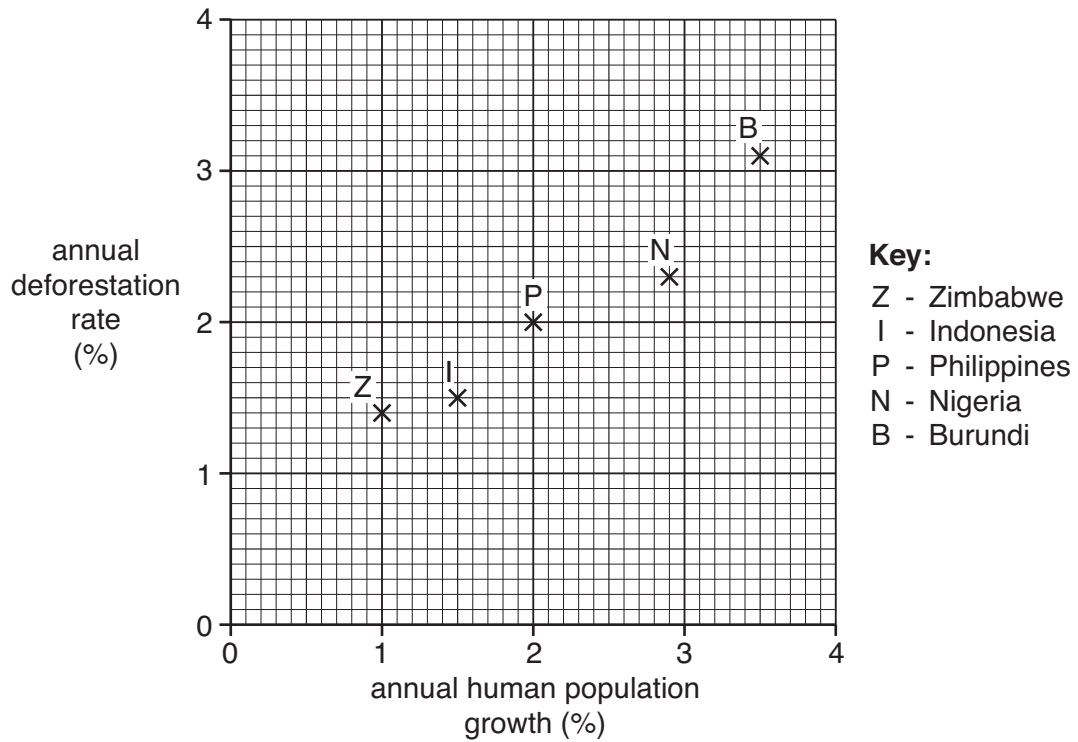


Fig. 6.2

(i) Describe the relationship shown in Fig. 6.2.

.....

.....

.....

.....

..... [2]

- (ii) Deforestation is one factor linked to increasing atmospheric carbon dioxide concentration.

Suggest ways by which **individuals** can reduce their impact on increasing atmospheric carbon dioxide concentration.

.....

.....

.....

.....

.....

.....

.....

.....

..... [3]

[Total: 10]

END OF QUESTION PAPER

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