OCR
RECOGNISING ACHIEVEMENT

ADVANCED SUBSIDIARY GCE **2856**

HUMAN BIOLOGY

Blood, Circulation and Gaseous Exchange

WEDNESDAY 10 JANUARY 2007 Morning

Time: 1 hour

Additional materials: Electronic calculator
Ruler (cm/mm)

Candidate Name

Centre Number

Candidate Number

INSTRUCTIONS TO CANDIDATES

- Write your name, Centre Number and Candidate Number in the boxes above.
- Answer **all** the questions.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- Do **not** write in the bar code.
- Do **not** write outside the box bordering each page.
- WRITE YOUR ANSWER TO EACH QUESTION IN THE SPACE PROVIDED. ANSWERS WRITTEN ELSEWHERE WILL NOT BE MARKED.

INFORMATION FOR CANDIDATES

- The number of marks for each question 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	13	
2	10	
3	8	
4	12	
5	11	
6	6	
TOTAL	60	

This document consists of **13** printed pages and **3** blank pages.

[Turn over

Answer **all** the questions.

1 **(a)** Enzymes are essential for normal blood clotting.

Table 1.1 shows some statements about blood clotting enzymes.
Some are true and some are false.

Write **true** or **false** next to each statement in the table.

Table 1.1

statement	true or false
enzymes are globular proteins	
they do not alter the rate of metabolic reactions	
the reaction takes place in the active site	
the secondary structure of the enzyme molecule refers to the order of amino acids in the polypeptide chain	
one enzyme will hydrolyse a range of substrates	
human enzymes will begin to denature above 40 °C	

[6]

(b) Fig. 1.1 shows the increase in the energy level required to start a reaction. This is called the activation energy.

Draw another line on the graph to show what happens to the activation energy of the reaction if an enzyme is used. [2]

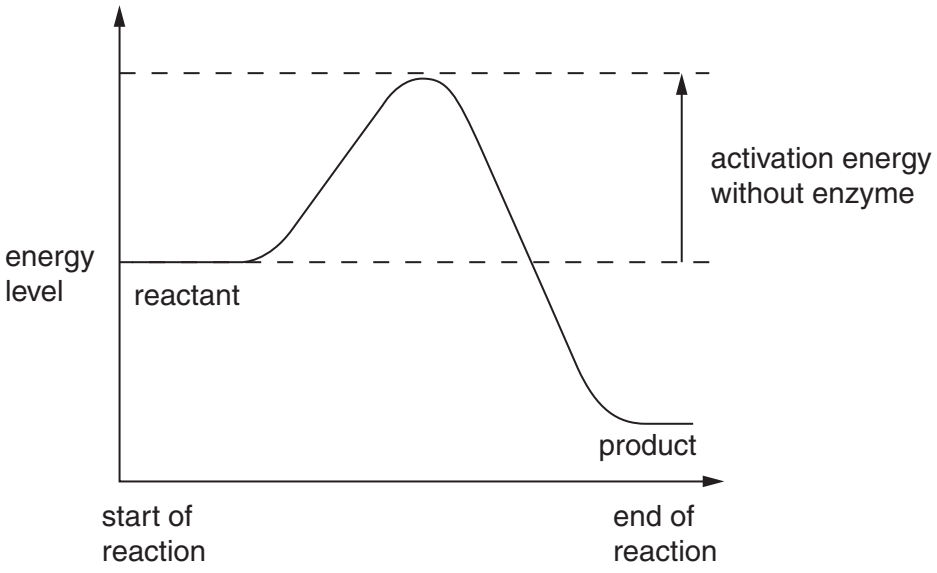

Fig. 1.1

(c) **(i)** When blood clots, soluble fibrinogen is converted to fibrin by the enzyme thrombin.

What would happen to the rate of reaction if the concentration of fibrinogen increased in the blood?

..... [1]

(ii) Explain why this would happen.

.....

.....

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.....

..... [3]

(d) On long haul flights, a person may develop a blood clot in one of the deep-lying veins in a leg. A drug may be administered to break up the clot.

Name a drug that could break up such a clot.

..... [1]

[Total: 13]

2 **(a)** Glucose is an important substrate used in cellular respiration.

Fig. 2.1 shows the structure of an **alpha** (α) glucose molecule with two important groups missing.

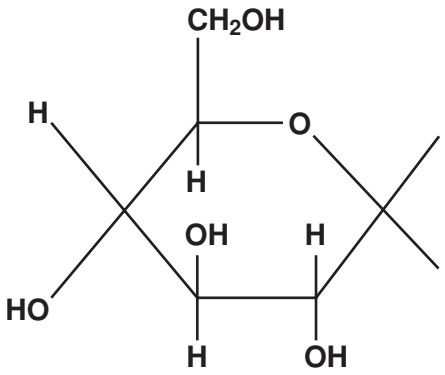

Fig. 2.1

(i) Fill in the **two** missing groups on Fig. 2.1 to show the structure of **alpha** (α) glucose. [1]

(ii) Name the type of reaction which would join two alpha glucose molecules together.

..... [1]

(iii) State the general term for a molecule consisting of two glucose units.

..... [1]

(iv) Suggest **one** reason why glucose is a good respiratory substrate.

.....

..... [1]

(b) Diabetes mellitus is a condition in which the body is unable to regulate the concentration of glucose in the blood. A machine called a **biosensor** can be used to monitor blood glucose concentration in people with diabetes mellitus.

The statements below describe how the biosensor is used.

A The skin is washed and sterilised with alcohol and a sterile lancet is used to take a blood sample.

B A test strip containing an immobilised version of the enzyme glucose dehydrogenase is placed in the biosensor.

C The enzyme reaction produces a small electric current which is picked up by an electrode on the test strip.

D A spot of blood is placed on the test strip.

E The current is read by a meter which converts it to a reading for blood glucose concentration.

Place the statements in the correct order using the appropriate letters. The first one has been done for you.

B .... [3]

(c) Table 2.1 shows biosensor readings taken from three individuals, **two** hours after eating a high carbohydrate meal.

Table 2.1

individual	blood glucose concentration /mmol dm^{-3}
X	4.00
Y	5.12
Z	10.83

(i) State which individual may be diabetic.

..... [1]

(ii) Explain why controlling the concentration of glucose in the blood is so important.

.....

.....

.....

..... [2]

[Total: 10]

[Turn over

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

Fig. 3.1 is a diagram of a section through the gaseous exchange surface in the alveoli, as seen under a light microscope.

A diagram has been removed due to third party copyright restrictions

Details:

A diagram of a section through the gaseous exchange surface in the alveoli

Fig. 3.1

7

Describe the **process** of gaseous exchange in the alveoli **and** describe the **features** of the alveoli that allow the efficient exchange of gases.

gaseous exchange .....

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features .....

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..... [7]

Quality of Written Communication [1]

[Total: 8]

4 **(a)** Chronic lung diseases are a common cause of illness in society. Many of these diseases are caused by smoking.

Name **two** chronic lung diseases, **other than emphysema**, brought about by smoking.

1 .....

2 ..... [2]

(b) As chronic lung disease progresses, airflow into or out of the lungs becomes obstructed and gaseous exchange becomes less efficient.

Describe the changes that occur in the lungs that obstruct the airflow and make gaseous exchange less efficient.

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..... [5]

(c) Table 4.1 shows information on the prevalence of smoking in males and females in England from 2002 to 2003.

Table 4.1

A table has been removed due to third party copyright restrictions

Details:

A table showing information of the prevalence of smoking in males and females in England from 2002 to 2003

Source: National Statistics website: www.statistics.gov.uk

(i) Using the data in Table 4.1, it can be calculated that 56% of males have smoked at some time during their lives.

Calculate the percentage of females who have smoked at some time during their lives.

Answer = ... % [1]

(ii) Explain why the percentages of females in Table 4.1 do not add up to 100%.

.....

.....

.....

..... [2]

(iii) Suggest reasons for the difference in the percentage of males and females in England who had smoked at some time during their lives.

.....

.....

.....

..... [2]

[Total: 12]

5 (a) Coronary heart disease (CHD) is caused when a coronary artery becomes partially blocked by a fatty plaque called an atheroma.

Fig. 5.1 shows a section through a coronary artery with an atheroma.

(i) Label the atheroma with the letter P.

An image has been removed due to third party copyright restrictions

Details:

An image of a section through a coronary atery with an atheroma

[1]

Fig. 5.1

(ii) Describe the function of the coronary arteries.

.....

.....

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..... [2]

(iii) State three risk factors which may lead to the formation of an atheroma.

1 .....

2 .....

3 ..... [3]

(b) Angioplasty is one method of treating coronary heart disease (CHD).

Angioplasty involves inserting a….

An extract has been removed due to third party copyright restrictions

Details:

An extract from The New Scientist about treating coronary heart disease

.....inducing a healing response.

(i) The walls of the coronary arteries consist of three layers.

Name the layer which may be damaged by angioplasty .

..... [1]

(ii) The build-up of scar tissue results in a loss of elasticity in artery walls.

Explain why artery walls need to be elastic.

.....

.....

.....

..... [2]

(iii) Suggest the advantages of using cryoplasty rather than angioplasty.

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..... [2]

[Total: 11]

6 Medical professionals, such as paramedics, have to make swift, accurate diagnoses and treat patients quickly in order to preserve life.

(a) A paramedic team has been called to a busy shopping centre where a man is sitting on the floor surrounded by people. He is breathless with very pale skin and bluish lips. He is also sweating and is complaining of severe chest pain.

(i) What would the paramedic immediately suspect?

..... [1]

(ii) Describe how the man's pulse rate would be monitored **manually** by a paramedic.

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..... [3]

(b) When the man is transferred to the ambulance he is connected to a machine which produces an electrocardiogram (ECG). The ECG trace shows that the man has a much longer than normal time interval between the P and R waves.

Suggest **two** causes for the longer interval between the P and R waves.

1 .....

.....

2 .....

..... [2]

[Total: 6]

END OF QUESTION PAPER

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