OCR
RECOGNISING ACHIEVEMENT

OXFORD CAMBRIDGE AND RSA EXAMINATIONS
Advanced Subsidiary GCE

HUMAN BIOLOGY 2856

Blood, Circulation and Gaseous Exchange

Monday **5 JUNE 2006** Morning 1 hour

Candidates answer on the question paper.
Additional materials:
Electronic calculator
Ruler (cm/mm)

Candidate Name	Centre Number	Candidate Number

TIME 1 hour

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 blue or black 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	10	
2	7	
3	8	
4	12	
5	12	
6	11	
TOTAL	60	

This question paper consists of 12 printed pages.

Registered Charity Number: 1066969
[Turn over

Answer all the questions.

1 (a) Fig. 1.1 shows the structure of an alveolus.

A diagram has been removed due to third party copyright restrictions

Details:

A diagram showing the structure of an alveolus

Fig. 1.1

(i) Name cells A and B.

A .....

B ..... [2]

(ii) Surfactant is found on the inner surface of the alveoli.

Explain the role of surfactant on the inner surface of the alveoli.

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..... [2]

(b) Cyclists in the Tour de France spend some time at altitude in the Alps during the competition.

Fig. 1.2 shows two spirometer traces from the same cyclist, taken before and after the longest climb in the competition, Alpe d'Huez.

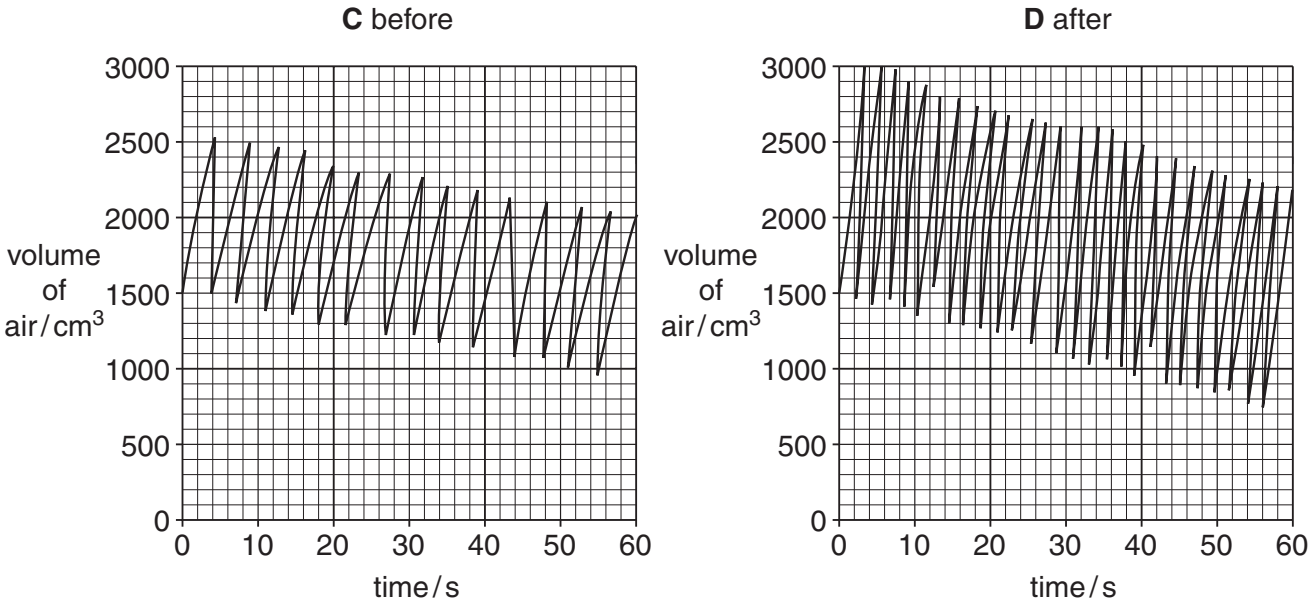

Fig. 1.2

(i) State the differences in breathing shown on the two traces.

.....

..... [1]

(ii) What is the number of breaths per minute recorded on trace **D**?

..... [1]

(iii) State **two** safety precautions which must be taken when using a spirometer.

1 .....

2 ..... [2]

(iv) Suggest why both traces slant downwards.

.....

.....

..... [2]

[Total: 10]

2 **(a)** Approximately 60% of body mass is made up of water. Three important properties of water are:

- it is a solvent
- it has a high specific heat capacity
- it has a high latent heat of evaporation.

Explain why,

(i) its properties as a solvent are important;

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..... [2]

(ii) a high latent heat of evaporation helps in temperature regulation.

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..... [2]

(b) What is meant by the term **water potential**?

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..... [2]

(c) Diabetes mellitus is a disease in which insulin is either not produced or not used effectively. Insulin activates enzymes which convert glucose to glycogen.

State what would happen to the water potential of the blood in a person with diabetes.

..... [1]

[Total: 7]

3 In this question, one mark is available for the quality of use and organisation of scientific terms.

In the past, some athletes have used a banned technique called blood doping to improve performance. This involves increasing the number of red blood cells just before competition, which increases the oxygen carrying capacity of the blood. Authorities can test for this by measuring the concentration of haemoglobin in the blood.

Describe a procedure which may be used to measure the concentration of haemoglobin in human blood.

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..... [7]

Quality of Written Communication [1]

[Total: 8]

4 (a) The transport system in humans is described as being a double circulatory system.

Explain what is meant by a double circulatory system.

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..... [2]

Fig. 4.1 is a photomicrograph of two blood vessels, E and F.

An image has been removed due to third party copyright restrictions

Details:

An image of a photomicrograph of two blood vessels

Fig. 4.1

(b) Name the types of blood vessel labelled E and F on Fig. 4.1.

E .....

F ..... [2]

(c) Fig. 4.2 gives information about the blood pressure in various vessels of the human circulatory system.

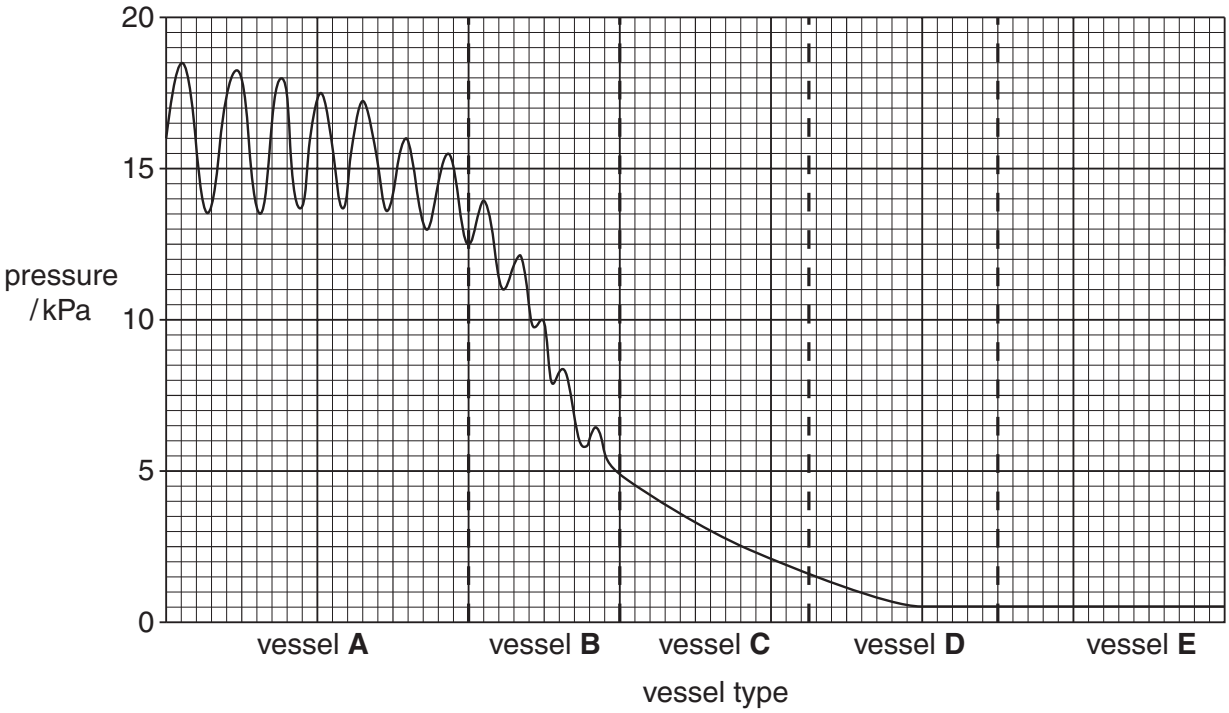

Fig. 4.2

Link each statement on the table to one letter of a vessel type shown in Fig. 4.2.

Some letters may be used more than once.

The first one has been completed.

vessel	statement
B	the pressure is falling in these vessels but the blood still flows in pulses
	the pressure is low in these vessels to ensure that exchange of materials with the cells can take place
	valves ensure that blood does not flow backwards in these vessels
	the tunica media is very thick in these vessels
	the walls of these vessels are one cell thick

[4]

(d) In a car accident the occupants may sometimes suffer from a condition known as hypovolaemic shock. This is due to large-scale loss of blood. The immediate symptoms are a rapid heart rate and paleness.

Suggest what may be happening in the body to cause these symptoms.

rapid heart rate .....

.....

.....

.....

paleness .....

.....

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..... [4]

[Total: 12]

5 Aspirin is a well known pain killer and was introduced in 1899. However, not until recently have other possible uses been suggested for this drug.

- Aspirin and similar drugs work by inhibiting the production of prostaglandins.
- Prostaglandins are local hormones produced from phospholipids.
- Prostaglandins increase blood flow to an infected area, so that there are more blood cells to combat infection.
- Aspirin also inhibits the clotting of blood by inhibiting the enzyme cyclo-oxygenase (COX).

(a) Name a white blood cell that combats infection.

..... [1]

(b) Describe the ways in which aspirin may inhibit the enzyme cyclo-oxygenase.

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..... [5]

(c) Outline the normal process of blood clotting.

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..... [4]

(d) Suggest why low doses of aspirin, taken regularly, may be used to treat patients with coronary heart disease (CHD).

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..... [2]

[Total: 12]

6 **(a)** Explain what is meant by cardiac output.

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..... [2]

(b) Table 6.1 shows the percentage of total blood volume delivered to various organs during light, moderate and maximum exercise.

Table 6.1

	% of total blood volume to organs		
exercise level	brain	muscles	skin
light	8	47	15
moderate	4	71	12
maximum	3	88	2

Describe **and** explain the trends shown by the data in the table.

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..... [3]

QUESTION 6 CONTINUES ON PAGE 12

[Turn over

(c) Table 6.2 shows measurements from four 21-year-old students from the same university. Three were training for specific sporting events, whilst one did not train.

Table 6.2

	measurement		
sporting event	heart septum / mm	left ventricle wall / mm	stroke volume / cm^3
800 metre run	11.0	12.0	160.0
swimming	10.9	10.6	181.0
shot putt	11.0	12.0	110.0
did not train	9.5	10.5	82.0

(i) Calculate the percentage increase in size of the left ventricle wall between the 800 metre runner and the student who did not train.

Show your working.

Answer = ... % [2]

(ii) Training increases stroke volume.

Suggest why training increases stroke volume.

.....

.....

..... [2]

(iii) Suggest **two** reasons why it is unfair to make any valid comparison between the four students.

1 .....

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2 .....

..... [2]

[Total: 11]

END OF QUESTION PAPER