

**ADVANCED SUBSIDIARY GCE  
HUMAN BIOLOGY**

Blood, Circulation and Gaseous Exchange

**TUESDAY 3 JUNE 2008**

**2856**

Morning  
Time: 1 hour

Candidates answer on the question paper  
**Additional materials (enclosed):** None

**Additional materials (required):**  
Electronic calculator  
Ruler (cm/mm)



Candidate  
Forename

Candidate  
Surname

Centre  
Number

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Candidate  
Number

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**INSTRUCTIONS TO CANDIDATES**

- Write your name in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use blue or 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.

**INFORMATION FOR CANDIDATES**

- The number of marks for each question is given in brackets [ ] at the end of each question or part question.
- The total number of marks for this paper is **60**.
- 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**

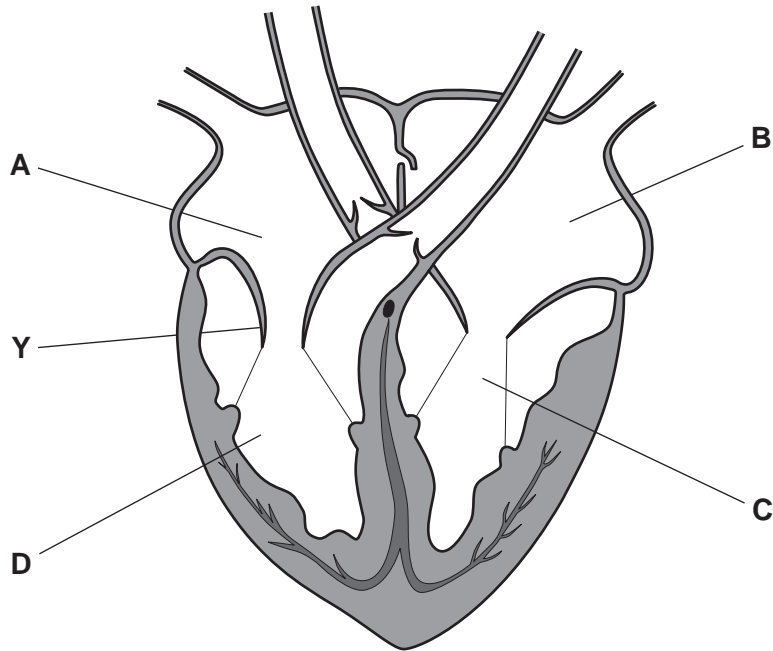
Qu.	Max.	Mark
1	10	
2	11	
3	15	
4	9	
5	9	
6	6	
<b>TOTAL</b>	<b>60</b>	

This document consists of **12** printed pages.

Answer **all** the questions.

1 The human heart circulates blood around the body approximately one thousand times each day.

Fig. 1.1 shows a diagram of a section through a human heart. The chambers of the heart are labelled **A** to **D**.



**Fig. 1.1**

(a) (i) In which chamber of the heart, **A**, **B**, **C** or **D**, is the SA (sino-atrial) node located?

.....[1]

(ii) Name structure **Y**.

.....[1]

(b) Table 1.1 refers to the location of the valves between the atria and ventricles.

Complete the table to show whether the valves are open or closed when the pressure in chamber **C** is at its **highest**.

Use only the words 'open' or 'closed' in the table.

**Table 1.1**

location of valve	valve (open or closed)
between chamber <b>C</b> and chamber <b>B</b>	
between chamber <b>D</b> and chamber <b>A</b>	

[2]

(c) When an erythrocyte leaves the heart, it travels through different **types** of blood vessel before returning to the heart.

List the **types** of blood vessel, **in the correct order**, through which the erythrocyte will travel. The first one has been done for you.

heart

arteries

.....

.....

.....

.....

.....

heart

[4]

(d) Cardiac output is one measure of the performance of the heart in circulating the blood.

Explain what is meant by *cardiac output*.

.....

.....

.....[2]

[Total: 10]

- 2 (a) The fluid mosaic model describes the arrangement of the molecules in the cell surface membrane.

Fig. 2.1 is a diagram showing part of the cell surface membrane of an erythrocyte.

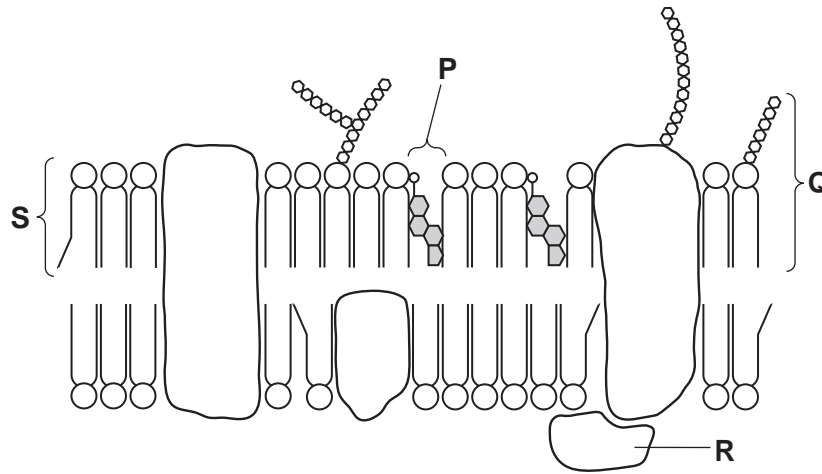


Fig. 2.1

- (i) Name the molecules labelled P to S.

P .....

Q .....

R .....

S .....[4]

- (ii) Explain why this model is described as a *fluid mosaic model*.

.....

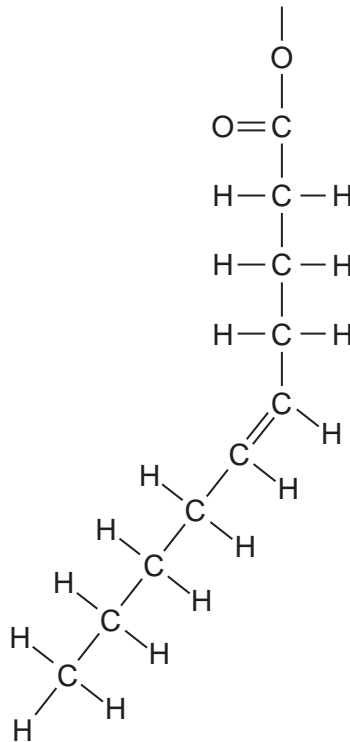
.....

.....

.....

.....[2]

(iii) Fig. 2.2 is an enlarged view of **part** of molecule **S**, showing the structure of one of the fatty acid chains.



**Fig. 2.2**

Give a reason why this fatty acid is **unsaturated**.

.....[1]

(b) Unsaturated and saturated fatty acids are components of triglycerides.

Explain the **useful** roles of unsaturated and saturated triglycerides in the body.

.....

.....

.....

.....

.....

.....

.....[4]

[Total: 11]



(b) The ABO system is one way in which types of donated blood are grouped.

(i) Table 3.1 shows the ABO blood groups of individuals donating and receiving blood.

Complete Table 3.1.

Use a tick (✓) if a blood transfusion could be safely performed.

Use a cross (x) if a transfusion could not be safely performed.

**Table 3.1**

		recipient blood group	
		B	O
donor blood group	A		
	AB		
	O		

[3]

(ii) If incompatible blood groups are mixed, agglutination occurs.

What is meant by *agglutination*?

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

(iii) Name **one other** system for grouping types of blood.

.....[1]

[Total: 15]

- 4 In recent years, the risk of developing coronary heart disease (CHD) has increased for women in the UK.

Fig. 4.1 shows the influence of some risk factors on the incidence of CHD in women aged between 45 and 54 years in the UK.

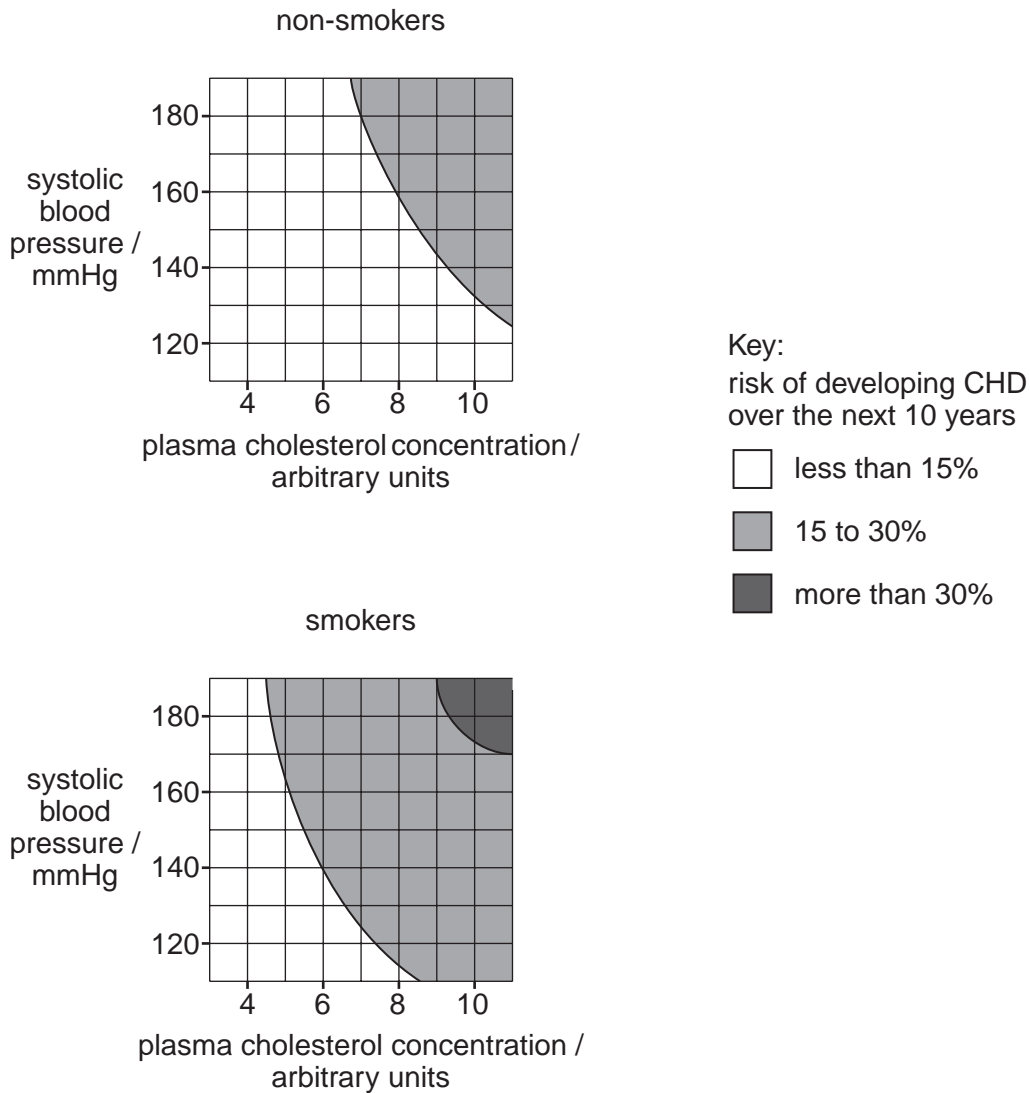


Fig. 4.1

- (a) Using the data from Fig. 4.1, state the **three** factors leading to the highest risk of developing CHD.

1 .....

.....

2 .....

.....

3 .....

.....[3]



(b) Explain why the data in Fig. 4.1 **cannot** be used to determine the risk of developing CHD for an **individual** woman.

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

(c) Explain how high blood pressure **increases** the risk of developing an atheromatous plaque.

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

[Total: 9]

5 (a) Use the most appropriate word(s) from the list to complete the paragraph below.

- endothelial      muscle      less      lymph
- more      plasma      serum      tissue fluid

The cellular components of blood are erythrocytes, leucocytes and platelets. The rest of the blood is referred to as ..... . As blood flows through capillary beds in a muscle, water and dissolved substances are forced through the ..... cells which make up capillary walls. The fluid passes into the space surrounding the muscle cells forming ..... . As fluid leaves the blood, the relative concentration of proteins in the blood increases. This loss of fluid causes the water potential of the blood to become ..... negative.

[4]

(b) If the flow of blood in the veins becomes too slow, deep vein thrombosis (DVT) may occur. This is a condition resulting from the formation of a blood clot, usually inside a deep vein in the leg.

(i) Explain how regular contraction and relaxation of the muscles in the legs can help prevent DVT.

.....

.....

.....

.....

.....

.....

.....[3]

- (ii) Table 5.1 shows the results of a study investigating the effect of wearing elastic compression stockings during long haul flights.

**Table 5.1**

	number of people	number of cases of DVT
people wearing elastic compression stockings during flight	1314	3
people <b>not</b> wearing elastic compression stockings during flight	1323	47

Calculate the total number of cases of DVT as a **percentage** of all people in the study.

Show your working.

Give your answer to **the nearest whole number**.

Answer = ..... % [2]

[Total: 9]

6 People are encouraged to take first aid qualifications so that they could save lives in emergency situations.

One such emergency may involve helping someone who has stopped breathing (as in respiratory arrest).

(a) Describe how to perform expired air resuscitation on an **adult** in respiratory arrest.

.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....[4]

(b) State **two** ways in which expired air resuscitation is different when performed on **babies**.

1 .....  
.....  
2 .....  
.....[2]

[Total: 6]

**END OF QUESTION PAPER**

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*Copyright Acknowledgements:*

Fig. 4.1 data      Source: D. Wood, *Prevention of coronary heart disease in clinical practice: Recommendations of the Second Joint Task Force of European and other Societies on Coronary Prevention*, 1998, *European Heart Journal* 19:1434–1503.

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