OCR
RECOGNISING ACHIEVEMENT

ADVANCED SUBSIDIARY GCE

APPLIED SCIENCE

G622

Monitoring the Activity of the Human Body

OCE/17533

Candidates answer on the Question Paper

OCR Supplied Materials:
None

Other Materials Required:
- Electronic calculator
- Ruler (cm/mm)

Thursday 27 May 2010
Afternoon

Duration: 1 hour 30 minutes

G6222

Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

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 **90**.
- Where you see this icon you will be awarded marks for the quality of written communication in your answer.

  This means, for example, you should:
  - ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear;
  - organise information clearly and coherently, using specialist vocabulary when appropriate.
- 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 (a) A trainee teacher produced a set of **Flash Cards** to use with his class during revision. Imagine you are one of his students using these cards.

The flash cards were to be used to revise features shown by arteries, veins and capillaries. Each card had a question on one side and the correct answer on the other side.

Fig. 1.1 shows an example Flash Card.

Question	**Answer**
Name three types of blood vessels.	1 *artery* 2 *vein* 3 *capillary*

Fig. 1.1

State the correct answers to questions **(i)** to **(v)** in the right-hand boxes.

Question (i)	**Answer (i)**
Which blood vessels carry blood towards the human heart from body organs?	**[1]**

Question (ii)	**Answer (ii)**
Which human blood vessels have the thickest walls?	**[1]**

Question (iii)

Which blood vessels have pocket valves?

Answer (iii)

[1]

Question (iv)

State **one** way in which the function of a pulmonary vein is different from the function of other veins.

Answer (iv)

[1]

Question (v)

Which type of blood vessel has a wall between 0.1 μm and 0.5 μm thick?

Answer (v)

[1]

(b) The trainee teacher then produced two worksheets which his students used to revise breathing, gas exchange and transport in human beings.

(i) Complete **Worksheet 1**.

Worksheet 1

1 Fig.1.2 shows some of the organs in the human thorax.

Label structures **A**, **B**, **C** and **D**.

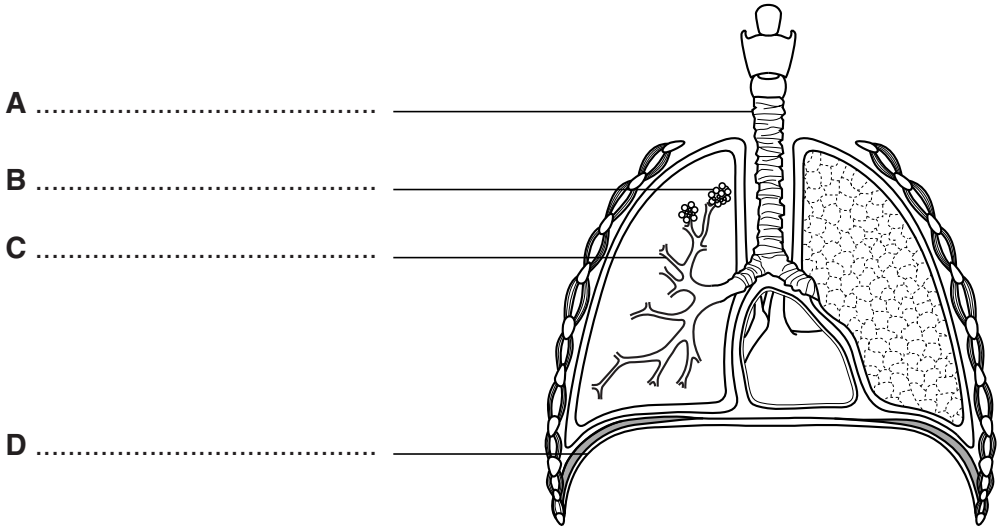


Fig. 1.2

[4]

2 Table 1.1 shows some of the structures and changes that are involved in inhalation.

Complete the table to describe the changes that occur during **inhalation**.

Table 1.1

feature	change
ribs and sternum	raised by contraction of the …… muscles
diaphragm	shape becomes more ……
volume of thorax	……
air pressure inside thorax	……
air movement	from the …… to the …… air space

[5]

(ii) Complete **Worksheet 2**.

Worksheet 2

1 The following paragraph describes gas exchange in the human lung.

Complete the sentences with the correct words from the list.

air **blood** **body** **less** **lungs** **more**

Air entering the lung during inhalation diffuses into the alveolar spaces.

The walls of the alveoli are very thin. Blood arriving at the gas exchange surface has …… oxygen and …… carbon dioxide than the air in the alveolar spaces. In a given time the diffusion gradient for oxygen allows more oxygen to pass from the …… into the …… than leaves it. The carbon dioxide diffusion gradient brings about the net movement of carbon dioxide in the opposite direction. This means that blood leaving the gas exchange surface will carry more oxygen and less carbon dioxide than the blood flowing from the …… . **[5]**

2 Describe and explain how blood transports **oxygen** and **nutrients** to the cells within tissues.

oxygen .....

.....

.....

.....

.....

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

nutrients .....

.....

.....

.....

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

[Total: 24]

2 Barack, a sports studies student, wanted to find out the effect of fast running speed on the heart rate of George, who is a professional athlete.

The investigation involved the use of a treadmill, a type of running machine, in a gym.

(a) Complete the risk assessment below for the investigation stating what the hazards are and explaining how to minimise the risk from these hazards to Barack and George.

<table>
<tr><td colspan="2">Activity
Measuring the heart rate of a person running fast</td></tr>
<tr><td colspan="2">(i) Hazards</td></tr>
<tr><td>Barack

[1]</td><td>George

[2]</td></tr>
<tr><td colspan="2">(ii) Evaluation of risk that someone could be harmed and how seriously</td></tr>
<tr><td>Barack

[1]</td><td>George

[1]</td></tr>
<tr><td colspan="2">(iii) Precautions/means of reducing risk</td></tr>
<tr><td>Barack
1.

2.

[2]</td><td>George
1.

2.

[2]</td></tr>
<tr><td colspan="2">(iv) Reporting</td></tr>
<tr><td colspan="2">

[2]</td></tr>
</table>

(b) For a time after a long period of fast running George's breathing rate continued to be faster than usual.

Complete the following sentences.

(i) Resting muscles use …… respiration to produce ATP. The cell structure in the muscle cells where this process occurs are called …… . **[2]**

(ii) A waste product builds up in George's muscles during a long period of fast running. This waste product is …… . **[1]**

(iii) The term used to describe the state that exists in George's muscles as a result of the long period of fast running is …… . **[1]**

(iv) Sustained fast breathing restores George's muscles to a normal state by allowing the waste product to be …… . **[1]**

[Total: 16]

3 **(a)** Pulse rate, body temperature and sometimes blood pressure are taken when patients see their doctor or visit the hospital. These routine checks are carried out to see how the test values for these 'vital factors' compare to the normal range. The test values are used diagnostically to give an indication of how well or ill a patient might be.

(i) Complete Table 3.1 below.

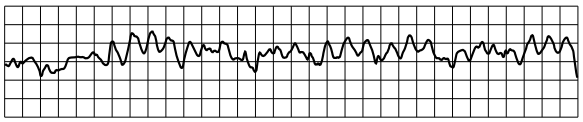
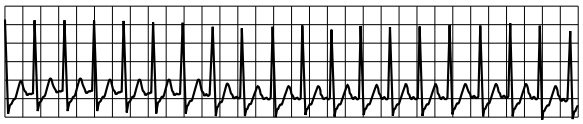
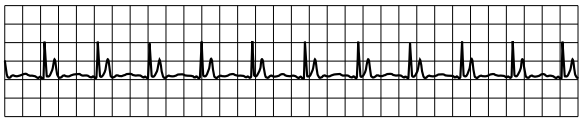
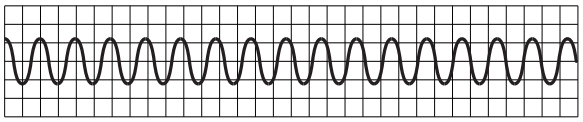
Table 3.1

vital factor	equipment	normal range or value including unit (40-year-old male at rest)
pulse	manual	
body temperature	thermometer	
blood pressure	sphygmomanometer	

[3]

(ii) ECG and spirometer traces and peak flow readings are also used in diagnosis to work out how well or ill someone is.

Column I shows some traces and a peak flow value.
Column II lists possible diagnoses.

Column I – traces and peak flow value		**Column II – diagnoses**
A		**1** asthmatic
B		**2** bradycardia
C		**3** sinus arrhythmia
D		**4** average, healthy person at rest
E peak flow 225 $dm^3 min^{-1}$		**5** tachycardia
		6 ventricular fibrillation

Match each of the traces or numerical value labelled **A** – **E** to a possible diagnosis **1** – **6**.

A …… **B** …… **C** …… **D** …… **E** …… **[5]**

(b) To maintain a healthy state the human body needs to maintain a steady, stable temperature.

(i) State the position of the human temperature control (thermoregulatory) centre.

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

(ii) Explain how the following contribute to maintaining a steady temperature.

1 shivering .....

.....

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

2 sweating .....

.....

.....

.....

.....

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

3 vasoconstriction **OR** vasodilation .....

.....

.....

.....

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

[Total: 18]

4 Some students were studying blood pressure as part of their course.

Their assignment brief included two tasks.

The first was to find out how to take someone's blood pressure using a manual, mercury sphygmomanometer.

The second was to interpret graphs involving blood pressure data.

(a) The following list, **A** – **J**, includes instructions which, when taken together, describe how to measure blood pressure using a manual sphygmomanometer.

However, they are **not** in the correct order.

A Bell of stethoscope placed over brachial pulse point, valve on bulb closed.

B Brachial pulse registered and sphygmomanometer bulb squeezed repeatedly until pulse 'lost'.

C Cuff of sphygmomanometer wrapped around upper arm.

D Pressure in cuff increased by further 30 mmHg – no sound heard through stethoscope.

E Record diastolic pressure.

F Record systolic pressure.

G Sounds become inaudible indicating diastolic pressure.

H Tapping sounds become audible indicating systolic pressure.

I The individual should be sitting in a comfortable position with arm at 'heart-height'.

J Valve opened gradually to slowly release pressure in the cuff.

List the letters in the correct order. The first five have been done for you.

I	C	A	B	D					

[4]

(b) Fig. 4.1 shows blood pressure in different blood vessels.

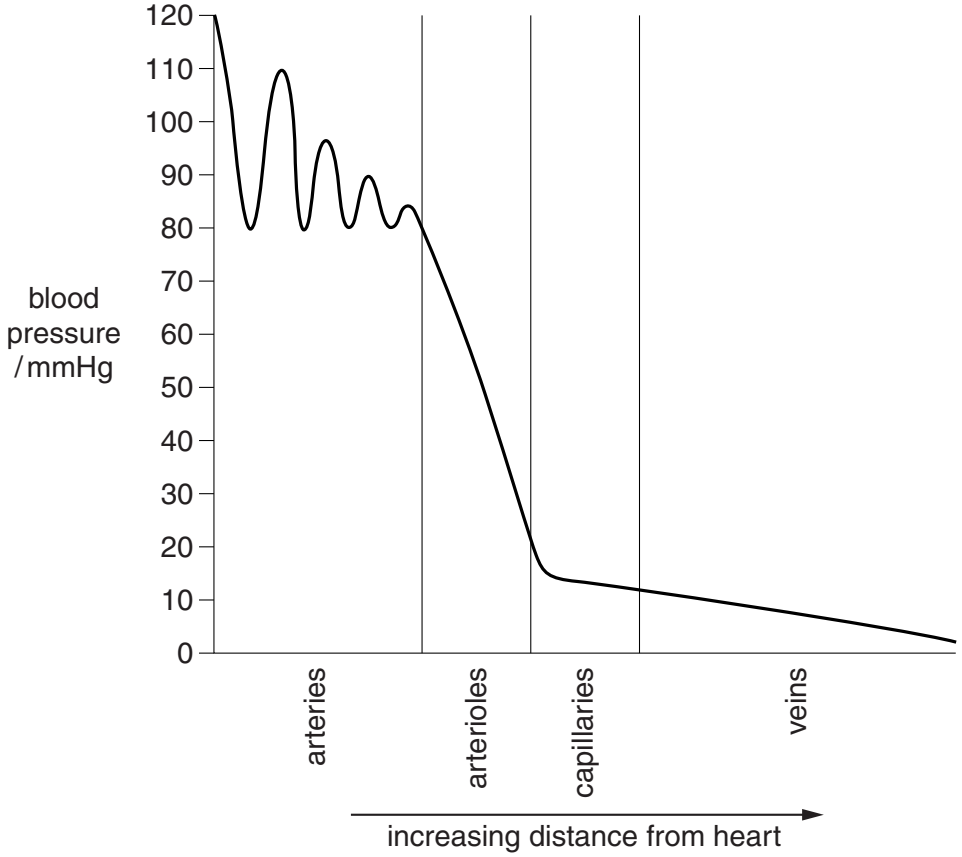


Fig. 4.1

(i) Explain why blood pressure decreases with increasing distance from the heart.

.....

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

(ii) Explain the variation in blood pressure in the arteries.

.....

.....

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

(iii) Use Fig. 4.1 and your own knowledge to complete Table 4.1.

Table 4.1

blood pressure/mmHg	name
maximum in arteries	..... pressure
minimum in arteries	..... pressure

[4]

(c) Fig. 4.2 shows the changes taking place in parts of the heart and the aorta at points **A** to **D** of a single cardiac cycle.

Use Fig. 4.2 to answer the following questions.

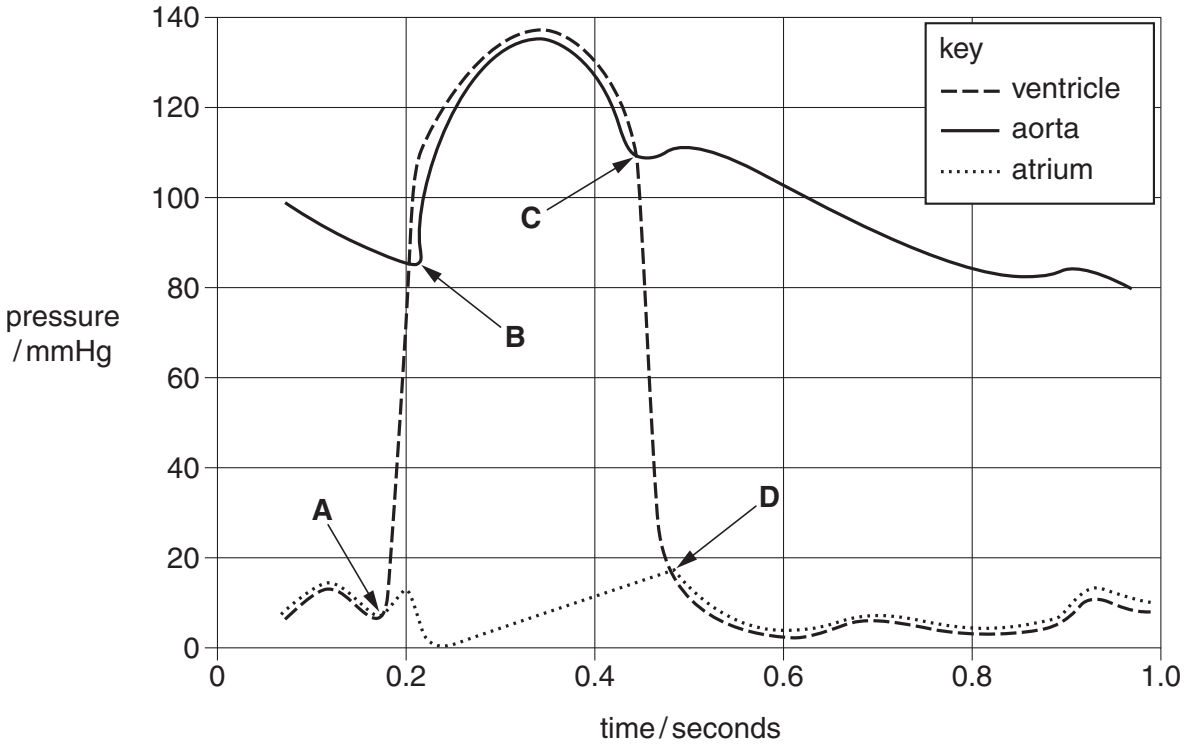


Fig. 4.2

(i) State the time when the blood pressure in the atrium is at its lowest.

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

(ii) State the blood pressure in the aorta at 0.6 seconds.

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

(iii) Use your knowledge of the structure and function of the heart to describe the action of the valves at points **A** to **D** on the graph.

A .....

.....

B .....

.....

C .....

.....

D .....

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

[Total: 17]

5 **(a)** A patient is referred to a specialist department of a hospital where a variety of medical imaging equipment is available for scanning purposes. One of these is likely to be an ultrasound scanner.

(i) State two medical applications of ultrasound scanning.

1. .....

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

(ii) List two advantages of using ultrasound scanning.

1. .....

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

(iii) Describe and explain the basic principles of ultrasound scanning.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... **[6]**

(b) An elderly lady living in a care home was suffering from a combination of circulatory and respiratory disorders. Chest X-rays indicated a serious lung condition. The results suggested that surgery was required.

Identify any benefits and risks, to the elderly lady, that might arise from this diagnosis and suggested treatment.

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... **[5]**

[Total: 15]

END OF QUESTION PAPER

PLEASE DO NOT WRITE ON THIS PAGE