

ADVANCED SUBSIDIARY GCE

APPLIED SCIENCE

Unit 3: Monitoring the activity of the human body

G622

Candidates answer on the question paper

OCR Supplied Materials:

None

Other Materials Required:

- Electronic calculator
- Ruler (cm/mm)

Wednesday 14 January 2009

Afternoon

Duration: 1 hour 30 minutes



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, however additional paper may be used if necessary.

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**.
- 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.

FOR EXAMINER'S USE		
Qu.	Max.	Mark
1	11	
2	7	
3	17	
4	22	
5	19	
6	14	
TOTAL	90	

Answer **all** the questions.

1 A sport-physiotherapist was discussing the significance of respiration as a factor affecting a patient's progress.

(a) State and explain why respiration is an important life process. Give **two** uses of respiration in the body in your explanation.

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

(b) State the differences between aerobic and anaerobic respiration in humans, using the headings below.

(i) Substrates

aerobic:
anaerobic: [2]

(ii) Products

aerobic:
anaerobic: [2]

(iii) Number of molecules of ATP produced from one molecule of glucose.

aerobic:
anaerobic: [2]

(c) Name **one** sports activity where the muscles of an athlete are likely to be respiring aerobically for most of the time and one other where they are likely to be respiring anaerobically.

(i) aerobic

(ii) anaerobic [2]

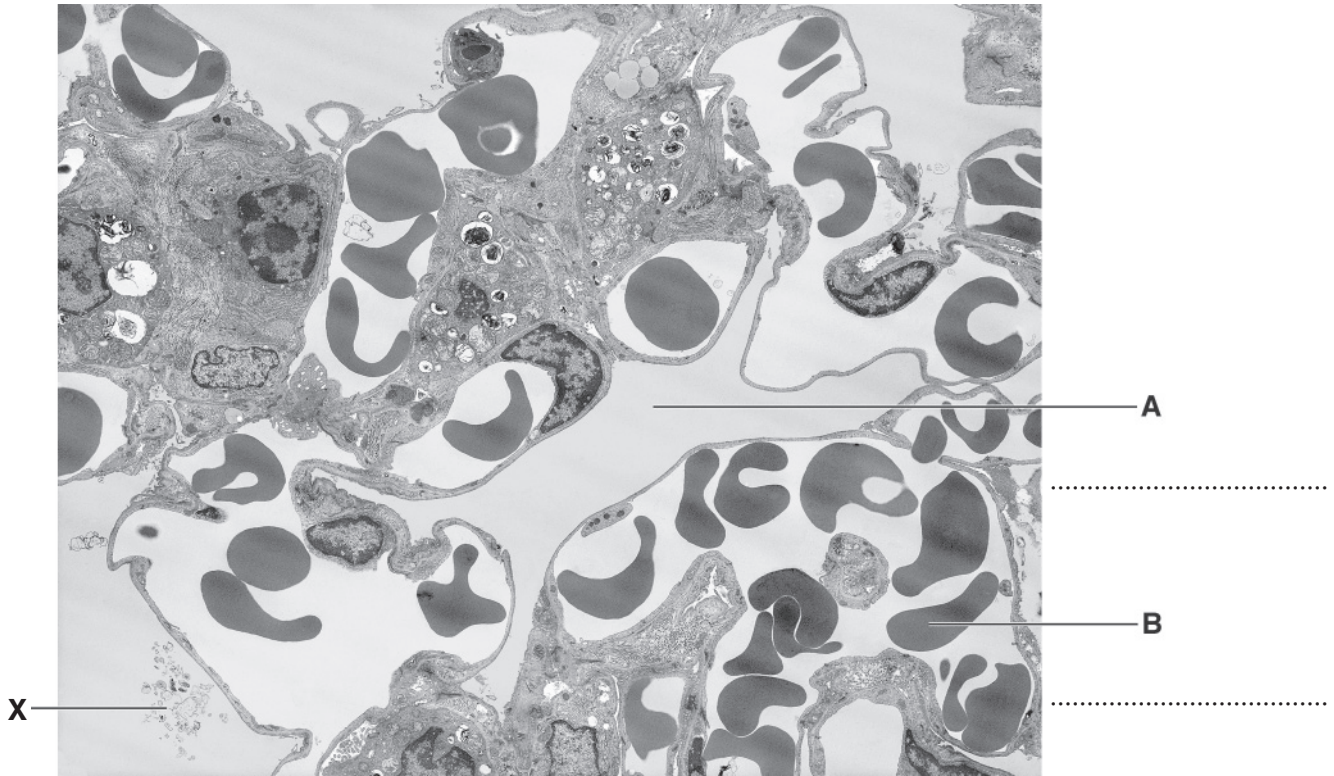
[Total: 11]

3 A group of students were researching the structure and function of the human gas exchange system.

(a) One of the illustrations they found was the electron micrograph of lung tissue shown in Fig. 3.1.

(i) Label **A** and **B** on Fig. 3.1.
Select your labels from the following list.

- alveolus
- blood platelet
- bronchus
- red blood cell



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Fig. 3.1

[2]

(ii) Name the tube that delivers air to position **X** in Fig. 3.1.

..... [1]

4 A series of measurements are usually taken by a member of the medical staff on a patient's arrival in hospital.

(a) (i) Complete Table 4.1 to show the **standard values** for four important physiological indicators for a 20-year-old female.

You **must** include the appropriate units.

Table 4.1

physiological indicator	standard values
blood pressure unit
body temperature unit
heart rate unit
vital capacity unit

[4]

(ii) Standard values for physiological indicators are important pieces of data. Suggest why.

.....

 [2]

- (iii) Table 4.2 includes three pieces of physiological data. Complete Table 4.2 to suggest what they may indicate.

Table 4.2

value	indication
low red blood cell count	
glucose concentration greater than 9.0 mmol dm^{-3}	
body temperature 32°C	

[3]

- (b) (i) Table 4.3 includes equipment commonly used during physiological examinations. Name the indicators which are measured and/or recorded by the equipment listed. Numerical values are **not** required.

Table 4.3

equipment	indicator measured and/or recorded
clinistix	
sphygmomanometer	
peak flow meter	
thermometer	

[4]

(ii) Fig. 4.1 show three traces, **A**, **B** and **C** recorded using one piece of monitoring equipment.

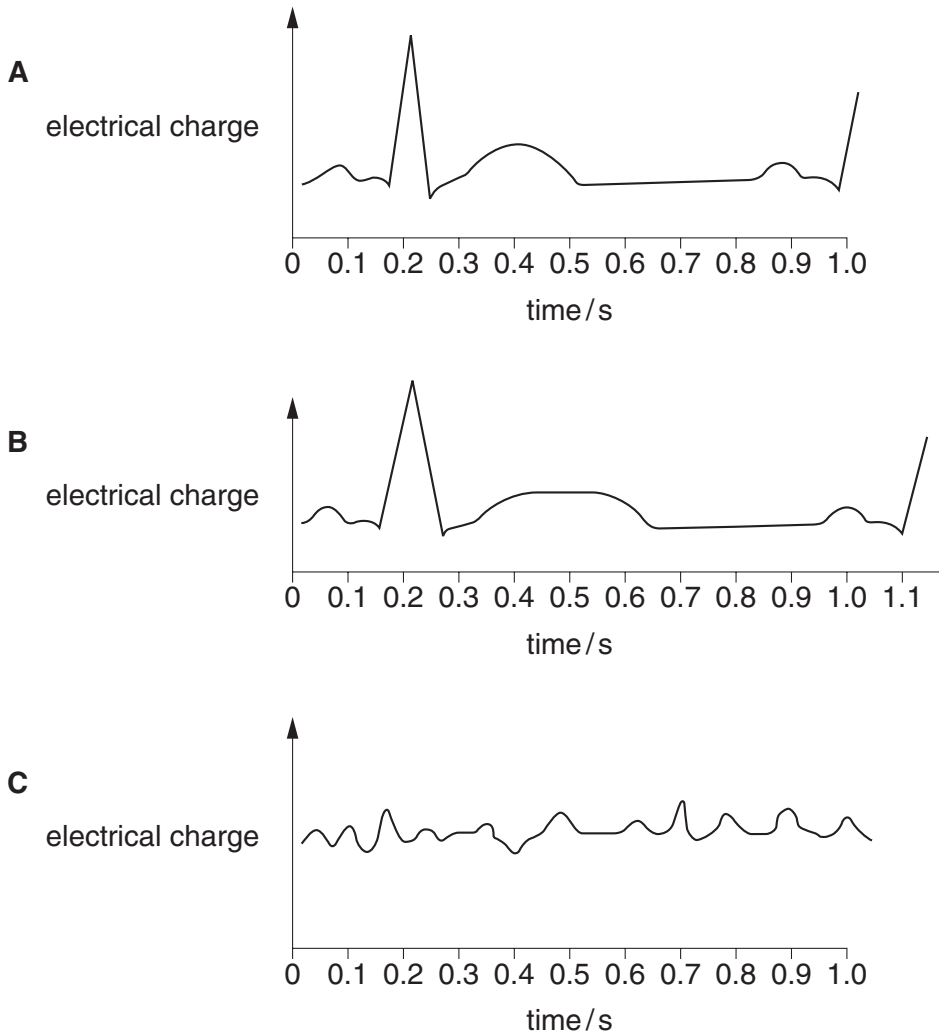


Fig. 4.1

1. Name the piece of equipment which would have been used to produce traces **A**, **B** and **C**.

..... [1]

2. Trace **A** was produced by a normal, healthy individual.
Name the condition indicated by traces **B** and **C**.

B

C [2]

- 5 One area of research that sports physiologists pursue is the way that the body's cardiovascular system changes with change in activity.

The heart rate and stroke volume were recorded for a student while he was walking, jogging and running with increasing speed on a treadmill.

- (a) (i) Explain how to measure someone's heart rate (pulse).

.....

.....

.....

.....

..... [3]

- (ii) Fig. 5.1 shows a graph of heart rate for the student while he was walking, jogging and running with increasing speed on a treadmill.

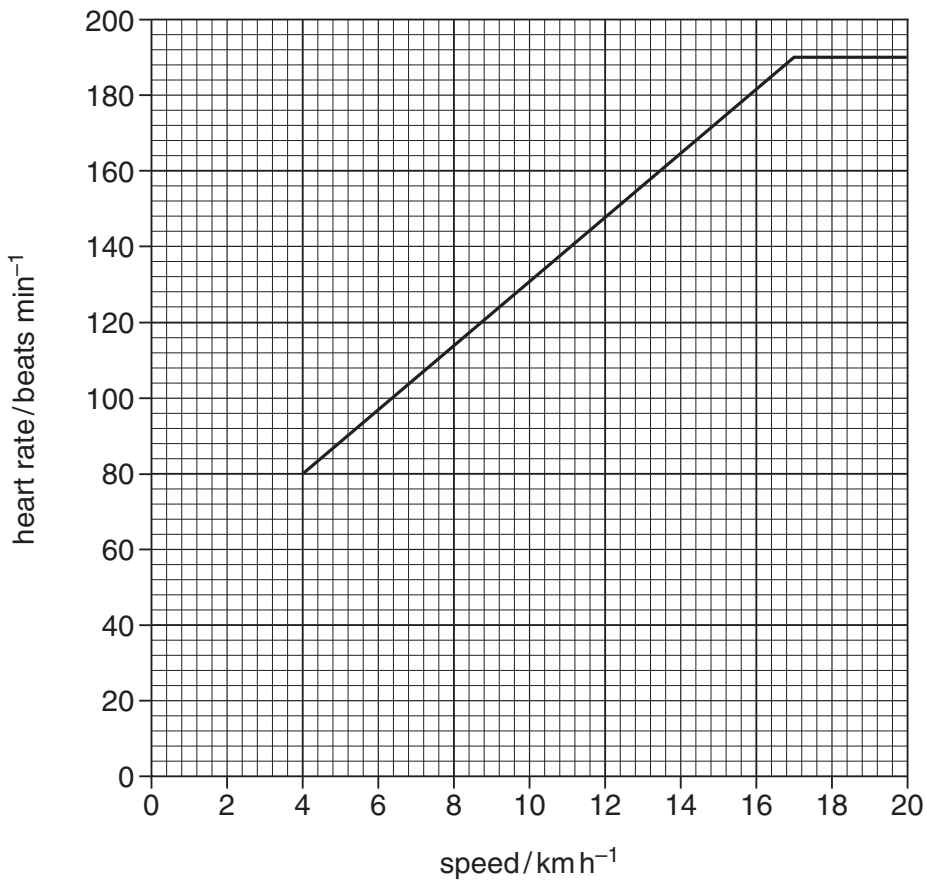


Fig. 5.1

Use Fig. 5.1 to describe the changes in heart rate that took place with increasing treadmill speed.

Use data values in your answer.

.....

.....

.....

.....

.....

.....

.....

..... [5]

- (b) When the left ventricle of the heart contracts, a certain volume of blood is pushed out. This volume is known as the stroke volume.

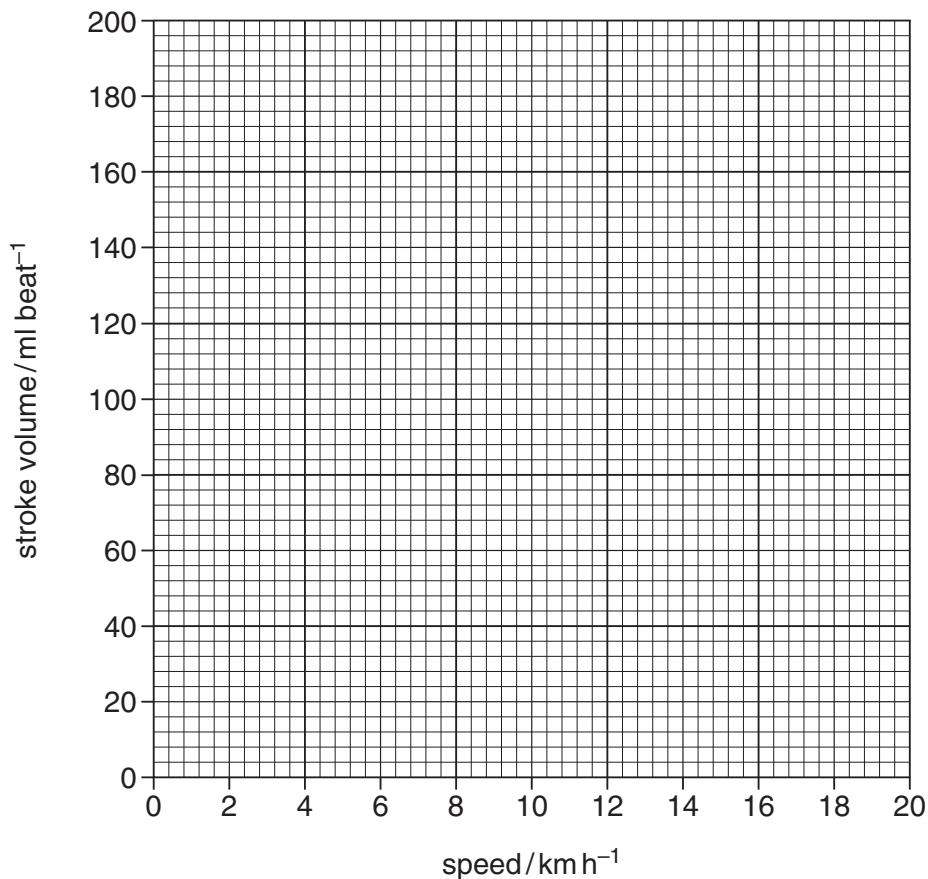
Table 5.1 shows stroke volume values for the same student while he was walking, jogging and running with increasing speed on a treadmill.

Table 5.1

speed/ km h^{-1}	4	5	10	11	14	16	17
stroke volume/ ml beat^{-1}	60	70	140	150	150	140	130

- (i) Use the data in Table 5.1 to draw a graph of stroke volume for the student while he was walking, jogging and running with increasing speed on a treadmill.

Plot the data on the axes provided.



[3]

(ii) Describe how the curve for stroke volume differs from the curve for heart rate (Fig. 5.1).
.....
.....
.....
..... [2]

(iii) The total volume of blood leaving the heart per minute is known as the cardiac output. It is calculated using the following equation.

$$\text{Cardiac output (Q)} = \text{Heart Rate (HR)} \times \text{Stroke Volume (SV)}$$

Use data from Fig. 5.1 and Table 5.1 to calculate the cardiac output for the student at a treadmill speed of **10** km h⁻¹.

cardiac output = ml min⁻¹ [2]

(c) (i) Name a performance-improving drug.
..... [1]

(ii) Describe how a blood test could be used to find the drug named in (i).
.....
.....
.....
.....
..... [3]

[Total: 19]

(b) The patient needs an MRI scan.

State **two** pieces of information, under each of the following three subheadings, that could appear on a risk assessment form for use with the patient in the MRI section of a radiography department.

(i) Hazards in the MRI section.

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

(ii) Risks from these hazards.

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

(iii) Ways to minimise the effects of these risks.

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

[Total: 14]

END OF QUESTION PAPER

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