

**ADVANCED SUBSIDIARY GCE**

**APPLIED SCIENCE**

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)

**Tuesday 11 January 2011  
Morning**

**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, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- 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).
- Answer **all** the questions.
- Do **not** write in the bar codes.

**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 are advised to show all the steps in any calculations.
-  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.
- This document consists of **16** pages. Any blank pages are indicated.

Answer **all** the questions.

1 Hospital patients often have their body temperature recorded on a chart at regular intervals.

(a) What is the range of the **normal** core body temperature for an adult at rest?

from ..... to ..... °C [2]

(b) The maintenance of a stable body temperature involves a number of natural physiological mechanisms.

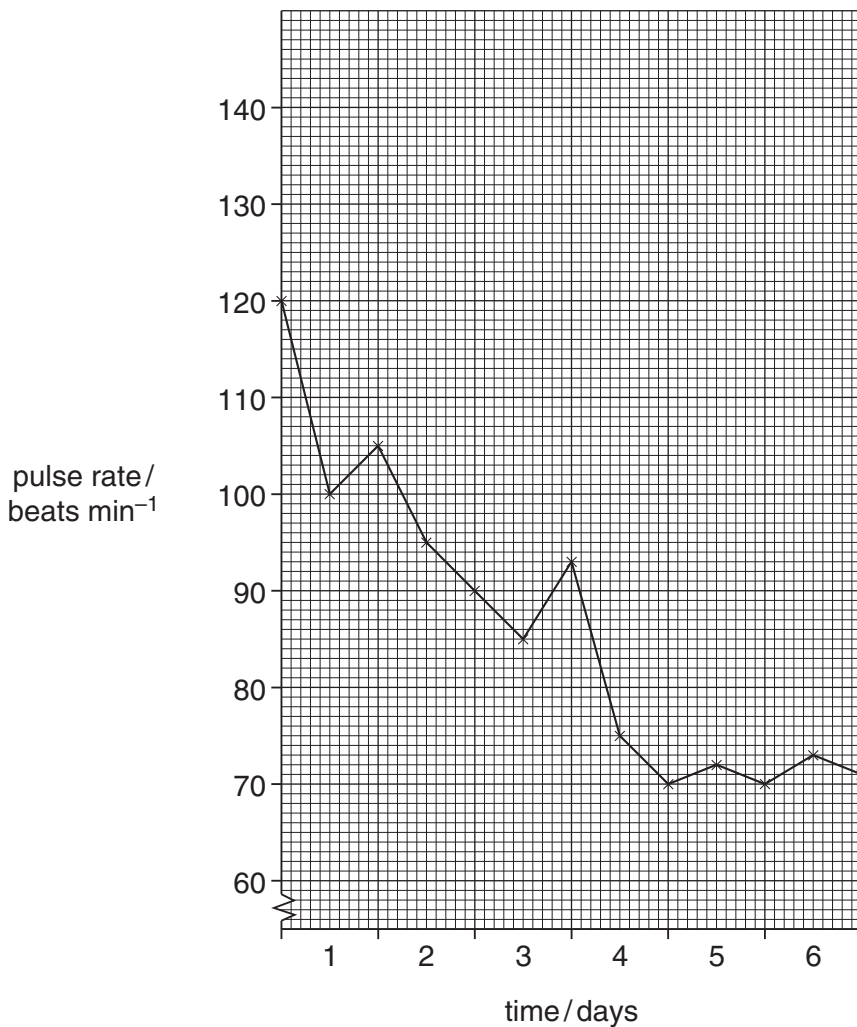
State two physiological mechanisms used when the body responds to **very cold** external temperatures.

1. ....

2. .... [2]

(c) Hyperthermia is when body temperature is much higher than normal.

The graph, Fig. 1.1, shows **pulse rate readings** for a patient recovering from hyperthermia over a 6 day period.



**Fig. 1.1**

(i) Which day does the graph show that the patient has recovered from hyperthermia?

day = ..... [1]

(ii) What is the evidence for your conclusion?

Use the graph to support your answer.

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

(iii) Give one explanation for the changes in pulse rate during **day 6**.

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

(iv) What is the percentage **decrease** in the pulse rate between the highest and lowest readings in the graph, Fig. 1.1?

Show your working.

highest reading ..... lowest reading .....

percentage decrease = ..... % [3]

(v) Explain the link between hyperthermia, vasodilation and pulse rate.

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

- (d) A long-distance runner is suffering from heat exhaustion and needs urgent medical attention from a first aider.

His body temperature is taken using a clinical, glass thermometer.

- (i) Describe how to measure the body temperature accurately using this type of thermometer.

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

- (ii) A temperature-sensitive plastic strip can be used to estimate the body temperature of children. The strip can be simply placed on the forehead of the child and a reading is taken.

State one **advantage** and one **disadvantage** of using this plastic strip.

advantage .....  
.....  
disadvantage .....  
..... [2]

- (iii) Name one other type of thermometer used to measure body temperature.

..... [1]

[Total: 20]

2 Andrew has had an accident on his bicycle and has a serious bone fracture in his arm.

Andrew's arm was X-rayed before and after treatment, Fig. 2.1.

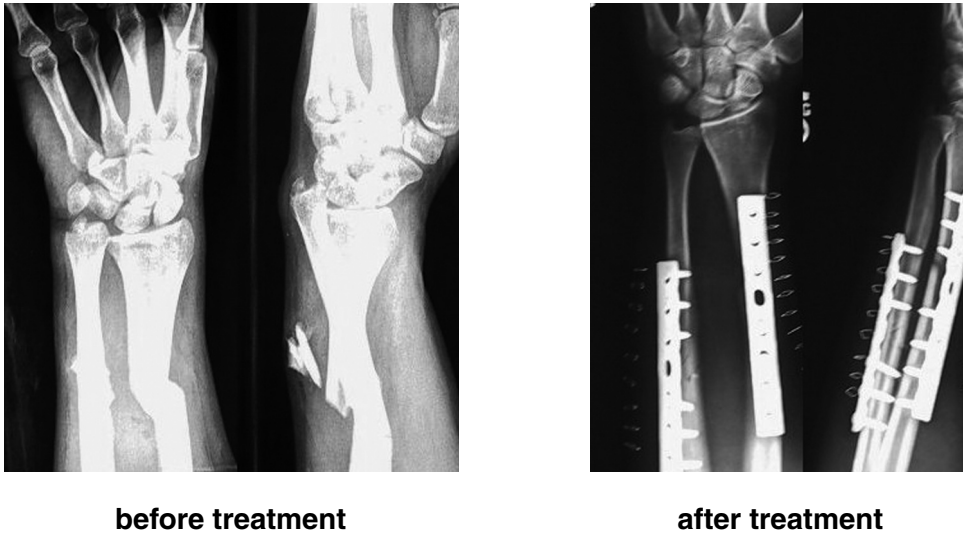


Fig. 2.1

(a) Give two reasons why X-ray radiography is described as 'non-invasive'.

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



(iii) Andrew's notes indicate that he has a heart defect.

Name two other methods that might have been used to monitor Andrew's heart.

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

(d) The use of an X-ray scanner has potential hazards.

Complete Table 2.1 to indicate one risk and a related safety precaution for the **radiographer**.

**Table 2.1**

hazard	risk	safety precaution
X-radiation		

[2]

[Total: 16]

3 Blood pressure is affected by age, health and wellbeing.

(a) Give the blood pressure values for a typical 18-year-old.

..... / ..... mmHg [2]

(b) A 40-year-old man has a blood pressure of 135/85 mmHg.  
State what these two values of the blood pressure reading represent.

135 mmHg .....

85 mmHg ..... [2]

(c) An 89-year-old lady, Mrs Jones, is referred to her doctor by her care home staff. She does not seem to have much energy and her blood pressure changes dramatically throughout each day.

(i) Explain why the symptoms shown by Mrs Jones may indicate a circulatory problem.

1 lack of energy .....  
.....  
.....  
..... [2]

2 changing blood pressure .....  
.....  
.....  
..... [2]





(iii) An example of the changing blood pressure for Mrs Jones over a 24 hour period is shown in Fig. 3.2.

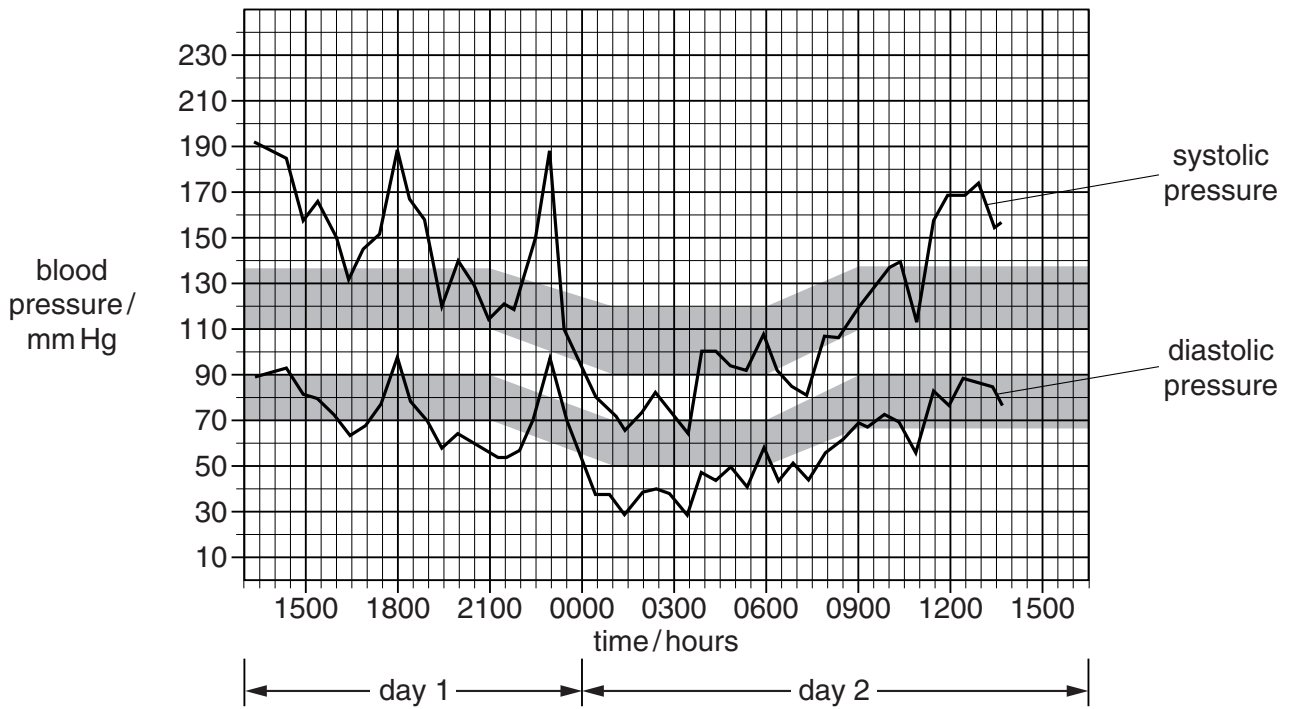


Fig. 3.2

1 State the blood pressure reading at midnight (0000 hrs).  
 ..... / ..... mmHg [2]

2 Explain why the two lines show the same pattern on the graph, Fig. 3.2.  
 .....  
 ..... [1]

- (d) The doctor decides to take frequent blood samples from Mrs Jones over a two day period. A nurse, working alongside the doctor, carries out a risk assessment for this series of blood tests.

Complete the risk assessment form below. You should consider **one** risk for the **nurse**.

<b>Risk assessment form</b>	
<b>1. potential hazard</b>	
Handling patient's blood	
<b>2. potential risk</b>	
	[1]
<b>3. two safety precautions</b>	
	[2]
<b>4. dealing with an accident</b>	
	[1]
<b>5. level of risk (with explanation)</b>	
	[1]

- (e) The doctor is concerned about the results of Mrs Jones' blood test and considers the option of surgery to correct the circulatory problem.

(i) Identify two potential benefits of surgery for the patient, Mrs Jones.

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

(ii) Suggest two reasons why it may be **inappropriate** to treat Mrs Jones.

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

[Total: 26]

Turn over

4 Chronic obstructive pulmonary disease (COPD) is often caused by smoking.

COPD causes airways in the lungs to become narrower and lots of mucus is produced. This makes it harder for air to get in and out of the lungs.

(a) Table 4.1 gives four structures of the airways and the lungs.

Complete the table by putting a **tick (✓)** in each box to indicate that the feature is present in the structure or a **cross (X)** to indicate that the feature is absent.

**Table 4.1**

structure	feature			
	cartilage	goblet cells	smooth muscle	cilia
trachea				
bronchus				
large bronchiole				
alveolus				

[4]

(b) What is the **link** between the function of the goblet cells and the cilia?

.....

.....

.....

..... [2]

(c) Suggest how COPD affects the activity of the goblet cells.

.....

..... [1]

(d) State what is likely to happen to the tidal volume of COPD patients and suggest why this happens.

.....

.....

.....

..... [2]



- 5 Suzanne is a volunteer working with a team of exercise physiologists as part of a research programme.



She has the concentration of three substances measured in her **muscles** when at rest and after sprinting, using exercise equipment.

The results are shown in Table 5.1.

**Table 5.1**

substance	concentration/ $\mu\text{mol g}^{-1}$ muscle tissue	
	at rest	after sprinting
ATP	4.5	3.3
glycogen	84.0	56.2
lactic acid	1.2	30.8

- (a) State and explain the changes taking place in the concentration of the substances listed, after sprinting.

(i) **ATP**

change .....

explanation .....

.....

.....

..... [3]

**(ii) glycogen**

change .....

explanation .....

.....

.....

..... [3]

**(iii) lactic acid**

change .....

explanation .....

..... [1]

**(b)** State why lactic acid must be removed or broken down within the body after exercise.

.....

..... [1]

**(c)** Muscle cell contraction is directly affected by the rate of respiration and ATP levels.

State **two** other biological processes in the body directly affected by ATP levels.

1. ....

2. .... [2]

**(d)** A sample of Suzanne’s blood can be analysed to provide information about her level of fitness.

State **two** features of Suzanne’s blood sample, likely to be examined for this purpose.

1. ....

2. .... [2]

**[Total: 12]**

**END OF QUESTION PAPER**

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