OCR
RECOGNISING ACHIEVEMENT

ADVANCED SUBSIDIARY GCE **G622**

APPLIED SCIENCE

Unit 3: Monitoring the activity of the human body

FRIDAY 23 MAY 2008 Morning

Time: 1 hour 30 minutes

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

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

CUP/T44164

Candidate Forename		Candidate Surname	
Centre Number		Candidate Number	

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 **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.

FOR EXAMINER'S USE		
Qu.	**Max.**	**Mark**
1	**10**	
2	**31**	
3	**19**	
4	**10**	
5	**20**	
TOTAL	**90**	

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

[Turn over

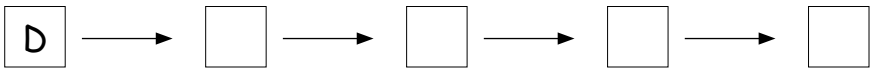
Answer **all** the questions.

1 Students were preparing a presentation on the topic 'The Respiratory System'. They included questions to assess how well their audience had understood their presentation. Complete the assessment sheet sections **(a)** to **(d)** below.

(a) Air passes into and out of the body through a system of tubes.
The following structures are involved.

A alveoli **B** bronchiole **C** bronchus
D mouth **E** trachea

Write the letters **A**–**E** in the order that represents the route taken by air when someone breathes in. One has been done for you.



[3]

(b) State **one** adaptive feature of the **trachea** and **one** shown by the **alveoli** that allow them to carry out their functions.

trachea.....

.....

.....[1]

alveoli.....

.....

.....[1]

(c) Name the process responsible for the exchange of gases at the respiratory surface of the lungs.

.....[1]

(d) Describe how breathing movements are brought about to move air **into** the lungs.

.....

.....

.....

.....

.....

.....

.....[4]

[Total: 10]

2 The results obtained using monitoring equipment and procedures help medical staff to understand the probable physiological status of their patients.

(a) Place ticks (✓) in Table 2.1 under the correct equipment used to monitor each of the factors/ activities listed.

Table 2.1

	equipment			
factor/activity	electrocardiogram	spirometer	sphygmomanometer	thermometer
blood pressure				
heart activity				
lung volumes				
body temperature				

[4]

(b) Match the results (**1**–**5**) in **Column I** to the likely physiological status in **Column II** (**A**–**F**).

	Column I			**Column II**
1	body temperature, 32°C	☐	**A**	bradycardia
2	body temperature, 36.8°C	☐	**B**	death
3	less peaks than a normal ECG trace	☐	**C**	hyperventilation
4	more peaks than a normal ECG trace	☐	**D**	hypothermia
5	straight-line ECG trace	☐	**E**	normal
			F	tachycardia

[5]

(c) In hospitals, various tests are carried out on patients' blood samples.

(i) How are blood cell counts used in the diagnosis of anaemia?

.....

.....

.....[2]

(ii) For health and safety reasons, nurses have to be aware of risk assessment. The following risk assessment form could be used before working with blood samples.

Complete the form below.

Risk Assessment Form
Type of activity Blood test
Material/procedure: *Taking a blood sample from a patient.*
Hazard: [2]
What could go wrong: [2]
Safety precautions: [2]
In case of accident: [2]
Risk (high/medium/low) explained: [1]

(d) Analyses of blood samples may be used to provide evidence about drug use and abuse.

(i) The hormone erythropoetin (EPO) is a protein secreted by the human kidneys.
EPO is involved in the production of erythrocytes (red blood cells).
It is possible to produce this protein biotechnologically and market it as a drug.
Some long distance athletes have been known to take a course of EPO as part of their training programme.

Explain how a course of EPO may lead to improved performance.

.....

.....

.....

.....

.....

.....

.....[4]

(ii) Name a recreational drug.

.....[1]

(iii) Name **two** techniques used to identify drugs present in a blood sample.

1. .....

2. .....[2]

(iv) State the principles of how blood tests are used to confirm the presence of a drug in the blood taken from an athlete.

.....

.....

.....

.....

.....[4]

[Total: 31]

3 Sports studies students were trying to assess the effect of exercise on pulse rate.

They obtained the following data from two of their peer group, Luke and Cameron.
One of them exercised regularly and the other did not.

Luke and Cameron had their pulse rates counted and recorded before starting to exercise for 2.5 hours on a treadmill. Their pulse rates were recorded every 30 minutes for 3 hours.

Table 3.1 shows the data that were recorded.

Table 3.1

time / mins	pulse rate / beats per min	
	Luke	Cameron
0	68	60
30	160	130
60	164	132
90	160	90
120	94	70
150	98	60
180	90	68

(a) Describe and compare the changes in pulse rates shown by the two students.
Use data values in your answer.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....[6]

(b) Explain the changes in Luke's pulse rate over the three hours.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....[6]

(c) Explain which of the two students, Luke or Cameron, exercised regularly.

.....

.....

.....

.....

.....[2]

(d) The sports studies students also investigated one aspect of lung efficiency of Luke and Cameron as a follow up to the work on pulse rate.
Luke and Cameron were each given a peak-flow meter similar to the one shown in Fig. 3.1.

Fig. 3.1

(i) What does this meter measure?

.....[1]

(ii) Describe how this meter is used.

.....

.....

.....

.....[2]

(iii) Suggest a reading for a normal adult.
Give a unit with your answer.

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

[Total: 19]

4 Analysing a person's blood and monitoring their circulatory system provides information about their fitness.

(a) State the word or phrase that best fits the following.

(i) A high blood oxygen concentration is essential for this type of respiration.

.....[1]

(ii) The blood solute that is the commonest source of energy released by respiration.

.....[1]

(iii) This compound is sometimes described as the 'energy currency' of the cell.

.....[1]

(iv) The blood concentration of this compound increases dramatically in the absence of oxygen.

.....[1]

(b) A sport-physiotherapist was monitoring a new member at a gym. He took her pulse while she was working on an exercise bike.

During the assessment, he suggested to her that 'the heart muscle was the most important muscle in the body'.

Use your knowledge of respiration and circulation to explain what he meant.

In this question two marks will be given for use of specialist terms and spelling, punctuation and grammar.

.....

.....

.....

.....

.....

.....

.....

.....[4]

Quality of Written Communication [2]

[Total: 10]

5 Amina was preparing a leaflet to describe some of the advantages and disadvantages of different types of scanner.

(a) She produced a table similar to Table 5.1 to help herself to organise the information.

(i) Complete bullet points **1**–**6** in Table 5.1 to show the type of information she is likely to have found.

Table 5.1

type of scanner	advantages	disadvantages
X-ray	• relatively cheap and easy • can be interpreted by non-radiologist • good bone resolution	• poor soft tissue resolution • contrast media can be unpleasant and hazardous • **1** .... • **2** ....
CAT or CT	• more readily available than MRI in UK • **3**	• significantly higher radiation doses • very expensive • requires cooperative or sedated patient
MRI	• does not involve ionizing radiation • no known harmful side effects • non-invasive • **4** .... • **5**	• very high cost • cannot scan patients with metallic implants • unsuitable for claustrophobic or obese patients

Ultrasound	• non-invasive • no known harmful side effects • good soft tissue resolution • **6**	• all ultrasound reflected at the air/tissue interface • nothing can be seen beyond bone

[6]

(ii) **1** Explain, using an example, the basic principles of using contrast media in X-ray radiography.

.....

.....

.....

.....[3]

2 State and explain why a patient needs to be cooperative or sedated during a CT scan.

.....

.....

.....

.....[2]

3 A disadvantage for ultrasound is that it is reflected at the air/tissue interface.

State how this problem is minimised at the point where the scanner probe contacts the skin of a patient.

.....

.....[1]

4 Suggest why a thorough assessment and accurate, detailed medical records are important if a person is being considered for an MRI scan.

.....

.....

.....

.....[2]

(b) Amina is aware that a decision to carry out a program of diagnosis and treatment involves consideration of a number of issues that might affect a patient.

In the leaflet, she wants to include a paragraph on the ethical issues which may arise from the results of scanning e.g. an X-ray confirming the presence of a lung tumour.

Write a paragraph on the ethical issues involved.

In this question two marks will be given for the organisation of your answer and for the appropriate use of English.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....[4]

Quality of Written Communication [2]

[Total: 20]

END OF QUESTION PAPER