

**ADVANCED SUBSIDIARY GCE  
APPLIED SCIENCE**

**G622**

Unit 3: Monitoring the activity of the human body

Candidates answer on the question paper

**OCR Supplied Materials:**

None

**Other Materials Required:**

- Electronic calculator
- Ruler (cm/mm)

**Friday 22 May 2009  
Morning**

**Duration: 1 hour 30 minutes**



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, 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	12	
2	12	
3	27	
4	19	
5	20	
<b>TOTAL</b>	<b>90</b>	


Answer **all** the questions.

1 A teacher was preparing a test on respiration and combustion. She produced **Worksheet 1** and a **Homework exercise** to use with her class.

(a) Complete the worksheet.

**Worksheet 1**

(i) Write a word equation that could represent aerobic respiration **and** combustion.

..... + .....  ..... + .....

+ energy [2]

(ii) Name **two** forms in which energy can be released during the burning of coal.

1. ....

2. .... [2]

(iii) Name the molecule in which the energy released by respiration is stored so that it can be used in a living cell.

..... [1]

(iv) Name the chemical process that is common to both aerobic respiration and burning.

..... [1]

(b) Imagine that you are one of the students in the class and complete the following homework exercise.

**Homework.** Describe how the circulatory system is involved in the respiration process. Include the words from the list in your description.

**blood      glucose      heart      lung      red blood cell      transport**

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [6]

[Total: 12]

2 Students were preparing a PowerPoint presentation about the heart. One of the slides they produced is shown in Fig. 2.1.

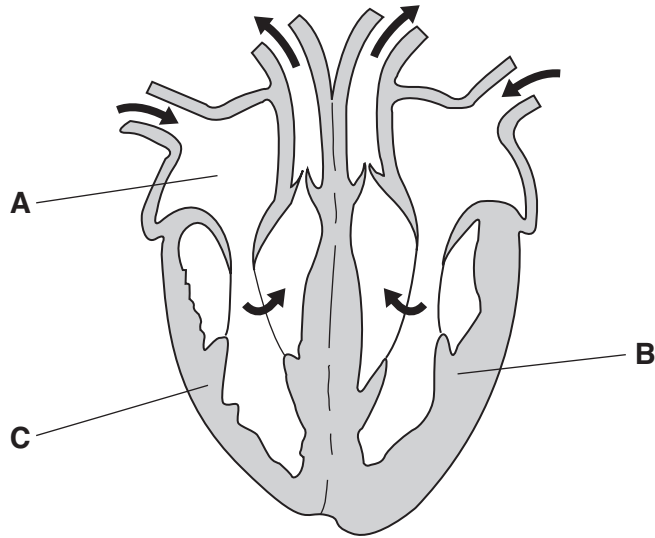


Fig. 2.1

(a) (i) Name A ..... [1]

(ii) Describe the function of A.

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

(iii) Explain the difference in thickness shown by the muscular walls B and C.

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



3 Sports scientists can monitor the physiological status (fitness) of athletes using a variety of monitoring equipment.

(a) Complete Table 3.1 to show the normal values against which data might be compared.

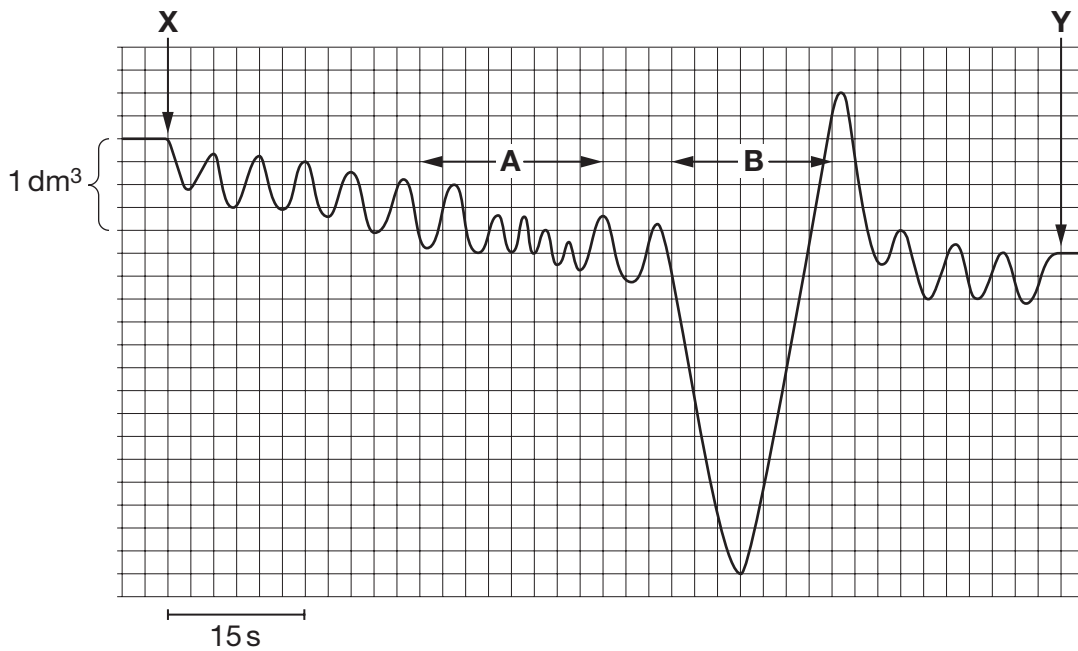
**Table 3.1**

feature	normal value for healthy 17-year-old female
breathing rate	..... breaths min <sup>-1</sup>
tidal volume	..... unit .....
vital capacity	..... unit .....

[5]

(b) A spirometer can be used to measure volumes of gas breathed in and out.

Fig. 3.1 shows a spirometer trace produced by a 17-year-old female student who was sitting down when the recording was made.



**Fig. 3.1**

- (i) Use the number of breaths taken by the student during the first 15 seconds, after time **X**, to calculate her breathing rate.

Give your answer in breaths  $\text{min}^{-1}$ .

breathing rate = ..... breaths  $\text{min}^{-1}$  [2]

- (ii) Complete Table 3.2 for this student.

**Table 3.2**

feature	value
tidal volume during the first 15 seconds	$\text{dm}^3$
vital capacity	$\text{dm}^3$

[2]

- (iii) Use the information in Tables 3.1 and 3.2 to comment on the relative fitness of the student.

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

- (iv) State and explain what the trace indicates at time periods **A** and **B**. You may use data values in your answer.

period **A**

.....  
.....  
.....

period **B**

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

- (v) The data in Fig. 3.1 show that during the time period from X to Y the trace fell from left to right.

This indicates that oxygen was being removed from the spirometer chamber.

How much oxygen did the student inhale from the chamber during that time?

oxygen inhaled = ..... unit ..... [1]

- (c) Sports governing bodies also need to use techniques to monitor possible illegal practices that could affect the performance of athletes.

- (i) Other than alcohol, name a recreational drug and a performance-enhancing drug.

recreational drug ..... [1]

performance-enhancing drug ..... [1]

- (ii) Describe how a blood sample could be used to detect the presence of a drug in an athlete.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [3]

- (iii) Describe the procedures for the treatment of material that may be contaminated with microbiological hazards.

*In this part of the question, two marks will be given for the appropriate use of English, spelling, punctuation and grammar.*

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

Quality of Written Communication [2]

[Total: 27]



4 (a) Individuals suffering from asthma need to monitor and manage their condition.

(i) A nurse explains how to use a peak flow meter.

The list **A–H** includes the instructions that she might give to an asthma sufferer on how to take peak flow readings.

The instructions are **not** in the correct order.

- A** Blow as hard as you can.
- B** Hold the peak flow meter level horizontally.
- C** Make sure that the pointer is at zero.
- D** Repeat to give three values recording the highest reading.
- E** Reset the pointer to zero.
- F** Stand or sit in a comfortable, upright position.
- G** Take a deep breath and close your lips firmly around the mouthpiece.
- H** Take the reading.

1 Arrange the letters in the correct sequence.

Three have been done for you.

<b>F</b>	<b>C</b>						<b>D</b>
----------	----------	--	--	--	--	--	----------

[3]

2 Explain why it is important that the flow meter is held horizontally.

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

3 Explain why it is advisable to take three readings.

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

(ii) Fig. 4.1 shows weeks 8 and 9 of the peak flow diary of a child who has bad asthma.

The diary shows the effect of an inhaler that was prescribed and used continuously for part of the two week period.

Readings were taken twice a day; in the morning and again in the evening.

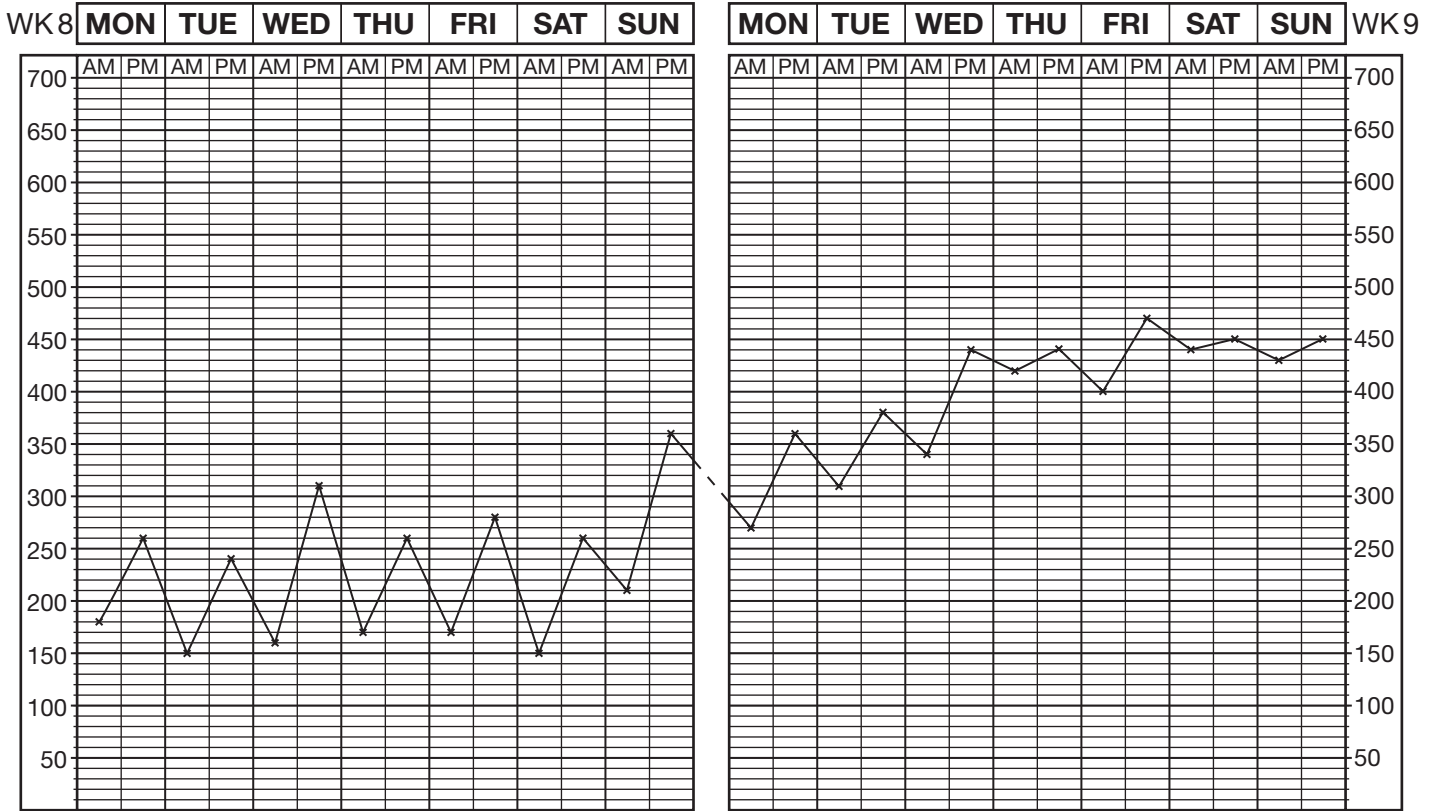


Fig. 4.1

1 Calculate the average peak flow value for the first four evenings (PM) of week 8.

average evening (PM) peak flow = ..... [3]

2 Draw a circle around the day at the top of the chart to indicate the most likely point when the child started to use the inhaler. [1]

3 State the reasoning behind your choice in 2.  
.....  
.....  
..... [1]

4 Describe and interpret the data shown in the peak flow chart. Use data values in your answer.  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
..... [6]

(b) (i) Name the piece of equipment used to monitor blood pressure.  
..... [1]

(ii) A person's blood pressure is recorded as two figures written as a fraction. For example, the blood pressure of a healthy 18-year-old is written as the fraction 120/80 mmHg.  
State the meaning of the **two** parts of the fraction.  
.....  
.....  
.....  
.....  
..... [2]

[Total: 19]

5 (a) A 90-year-old man suffering with a severe chest infection was referred to the radiography department of a hospital for an X-ray.

(i) Explain the basic principles of medical X-ray radiography.

*In this part of the question, two marks are available for organising relevant information and using specialist vocabulary.*

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

Quality of Written Communication [2]

(ii) The X-ray showed possible early signs of cancer and further, more invasive, diagnostic techniques were recommended.

A complicating factor for the radiography department involved the patient’s inability to understand what was said to him and to make any understandable reply. This inability was a result of another, on-going condition caused by one or more strokes.

This could be a situation where some people think it inappropriate to further diagnose and treat the 90-year-old man.

Discuss the risks, benefits and ethical issues involved in this situation.

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

- (b) Some of the equipment used, and activities likely to go on in a radiography department, are potentially hazardous.

Complete Tables 5.1 and 5.2 to illustrate risk analyses for two different people.

**Table 5.1 Radiographer** using a CAT scanner daily as part of his work.

hazard	risk	safety precaution

**Table 5.2 Patient** having an MRI scan.

hazard	risk	safety precaution

[6]

[Total: 20]

**END OF QUESTION PAPER**

**PLEASE DO NOT WRITE ON THIS PAGE**

**15**  
**BLANK PAGE**

**PLEASE DO NOT WRITE ON THIS PAGE**

**PLEASE DO NOT WRITE ON THIS PAGE**



**Copyright Information**

OCR is committed to seeking permission to reproduce all third-party content that it uses in its assessment materials. OCR has attempted to identify and contact all copyright holders whose work is used in this paper. To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced in the OCR Copyright Acknowledgements Booklet. This is produced for each series of examinations, is given to all schools that receive assessment material and is freely available to download from our public website ([www.ocr.org.uk](http://www.ocr.org.uk)) after the live examination series.

If OCR has unwittingly failed to correctly acknowledge or clear any third-party content in this assessment material, OCR will be happy to correct its mistake at the earliest possible opportunity.

For queries or further information please contact the Copyright Team, First Floor, 9 Hills Road, Cambridge CB2 1PB.

OCR is part of the Cambridge Assessment Group; Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.