

Candidate forename						Candidate surname					
Centre number						Candidate number					

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS**  
**AS GCE**  
**G622**  
**APPLIED SCIENCE**

**Monitoring the Activity of the Human Body**

**FRIDAY 18 MAY 2012: Afternoon**  
**DURATION: 1 hour 30 minutes**  
**plus your additional time allowance**

**MODIFIED ENLARGED**

**Candidates answer on the Question Paper.**

**OCR SUPPLIED MATERIALS:**

**None**

**OTHER MATERIALS REQUIRED:**


**Electronic calculator**  
**Ruler (cm/mm)**

**READ INSTRUCTIONS OVERLEAF**

## **INSTRUCTIONS TO CANDIDATES**

- **Write your name, centre number and candidate number in the boxes on the first page. Please write clearly and in capital letters.**
- **Use black ink. HB pencil may be used for graphs and diagrams only.**
- **Answer ALL the questions.**
- **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. If additional space is required, you should use the lined pages at the end of this booklet. The question number(s) must be clearly shown.**

## **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.

**Answer ALL the questions.**

**1 The health and general fitness of patients can be monitored by looking at a number of indicators.**

**(a) The values for indicators obtained from tests are often compared with normal values.**

**Table 1.1 shows some physiological indicators and their normal values.**

**Complete the table.**

**Table 1.1**

<b>PHYSIOLOGICAL INDICATOR</b>	<b>NORMAL VALUE</b>	<b>UNIT OF MEASUREMENT</b>
<b>body temperature (range)</b>	_____	_____
<b>breathing rate</b>	<b>15–18</b>	<b>breaths per minute</b>
<b>tidal volume at rest</b>	_____	<b>dm<sup>3</sup></b>
<b>peak flow</b>	_____	<b>dm<sup>3</sup> min<sup>-1</sup></b>
<b>blood pressure (18-year-old male)</b>	_____	<b>mm Hg</b>
<b>pulse rate (range)</b>	<b>60–80</b>	<b>beats per minute</b>

**[5]**

**(b) Name the piece of equipment used to measure blood pressure.**

\_\_\_\_\_ **[1]**

**(c) Explain how to take pulse rate measurements.**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ **[3]**

- (d) (i) Fig. 1.1 opposite shows a two-week log of peak flow readings completed by a child who has asthma.

The child started using an inhaler on the Monday of the first week and continued to use it throughout the two weeks.

- 1 State when the readings were taken each day.

\_\_\_\_\_ [1]

- 2 Calculate the average peak flow value for the first four evenings (shown as PM) of the first week.

Show your working.

average evening (PM) peak flow = \_\_\_\_\_  $\text{dm}^3 \text{min}^{-1}$  [1]

- 3 Describe ONE way in which the use of the inhaler has affected the child's peak flow rate. Use the data shown in Fig. 1.1 to support your answer.

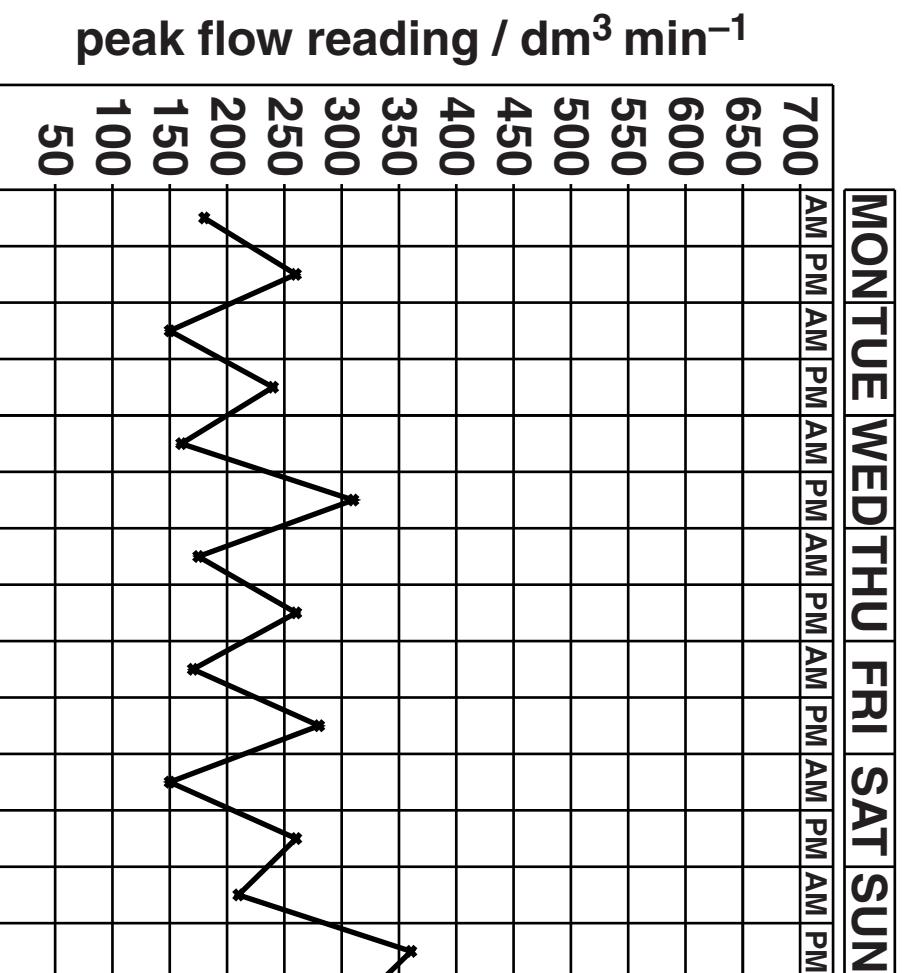
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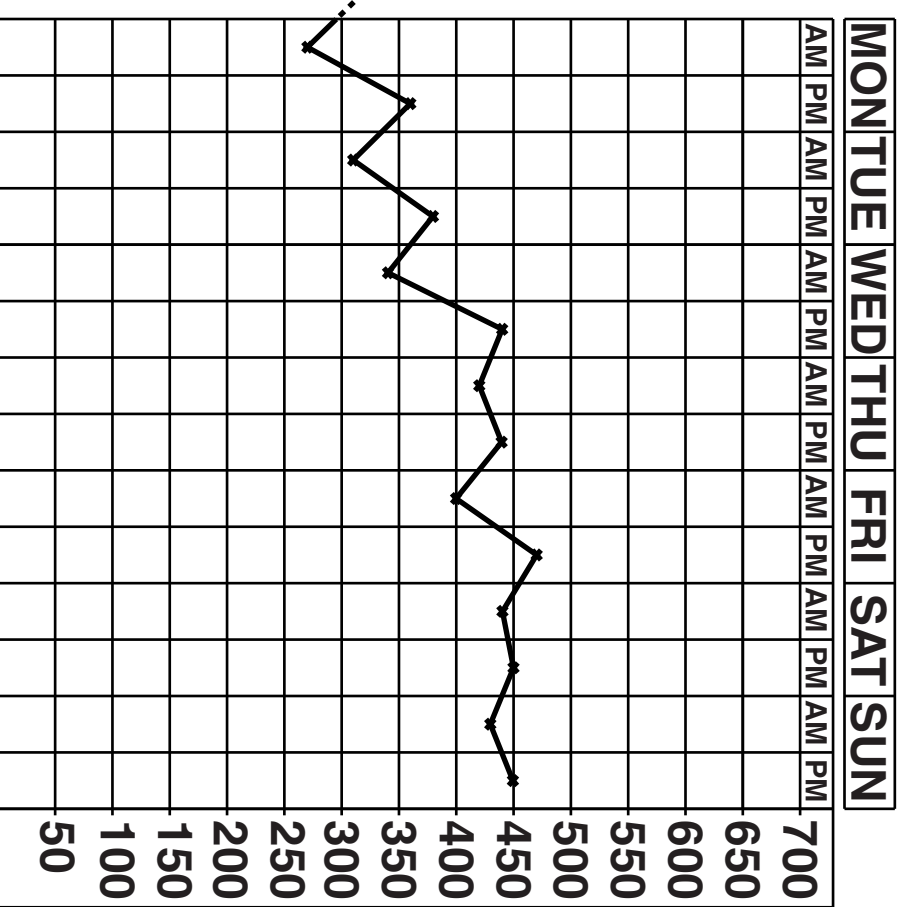
\_\_\_\_\_

\_\_\_\_\_ [2]

# WEEK 1



## WEEK 2



**Fig. 1.1**

(ii) Complete the boxes to show the route followed by air EXHALED from the child's lungs.

- A alveoli
- B bronchi
- C bronchioles
- D trachea

Put the letters A, B, C and D in the correct order.

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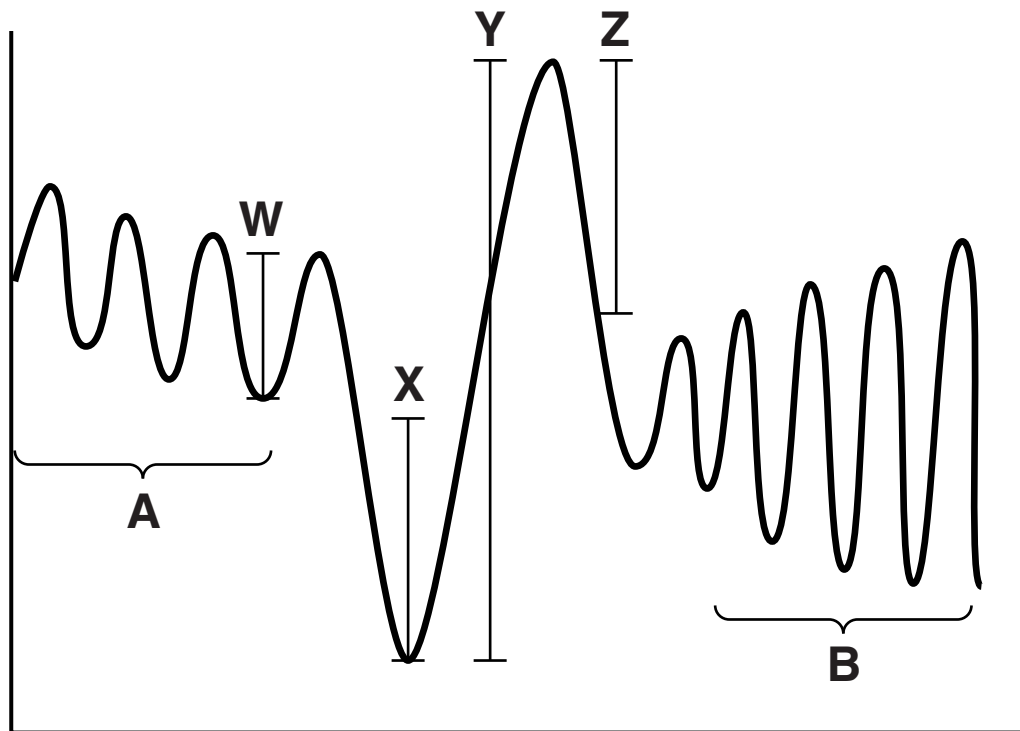
direction of exhaled air



[2]



- (e) Fig. 1.2 is a trace produced by a piece of equipment used to monitor a person's breathing.



**Fig. 1.2**

- (i) Name the piece of equipment used to produce this trace.

\_\_\_\_\_ [1]

- (ii) State which region, W, X, Y or Z, represents the tidal volume at rest.

region \_\_\_\_\_ [1]

- (iii) State the reason for the differences in regions A and B.

\_\_\_\_\_ [1]

**[Total: 18]**

- 2 A student is studying the structure and function of the human heart.

Fig. 2.1 shows a section of a human heart.

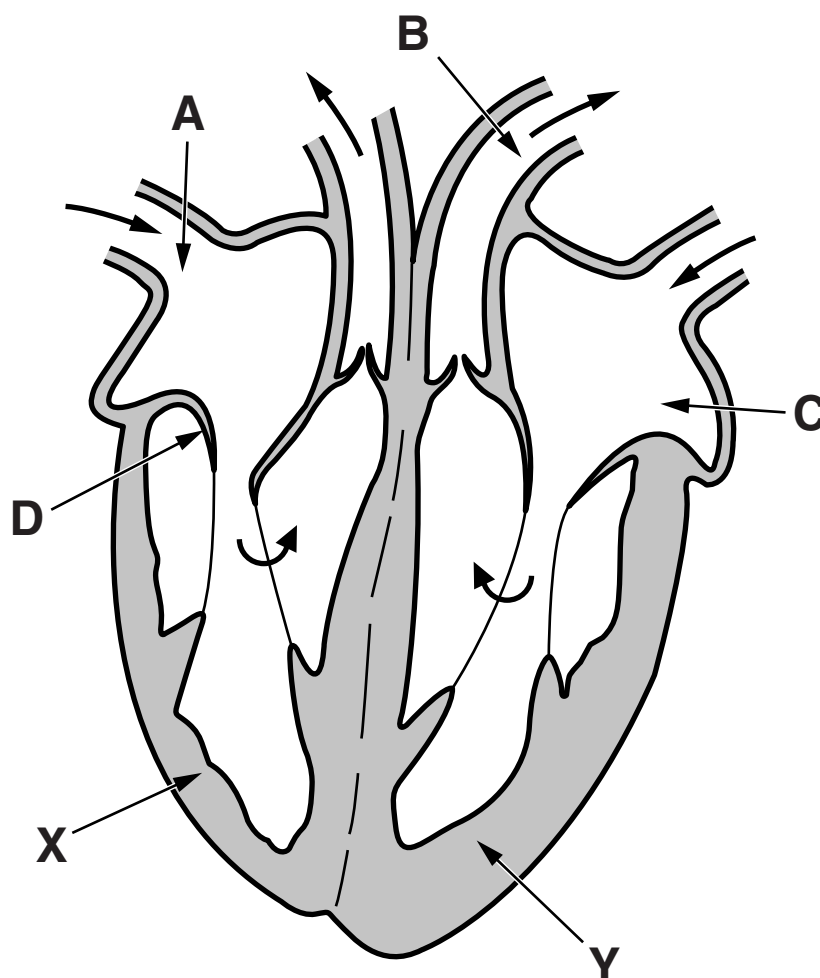


Fig. 2.1

- (a) (i) Name structures A, B, C and D.

A \_\_\_\_\_

B \_\_\_\_\_

C \_\_\_\_\_

D \_\_\_\_\_

[4]

**(ii) Describe the function of structures A and D.**

**function of A** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ **[2]**

**function of D** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ **[2]**

**(b) The thickness of the heart wall at Y is much greater than at X.**

**Explain the effect of this difference on the circulation of blood leaving the heart.**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ **[2]**

**(c) Suggest TWO problems that might occur if structure D in Fig. 2.1 does not function properly.**

1. \_\_\_\_\_  
\_\_\_\_\_

2. \_\_\_\_\_  
\_\_\_\_\_ [2]

**(d) (i) Name a hormone that regulates the activity of the heart.**

\_\_\_\_\_ [1]

**(ii) Explain how this hormone regulates the activity of the heart.**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [2]

- (e) The student finds that an ultrasound scanner can be used to monitor blood flow through the heart.**

**Put a tick (✓) in the boxes below next to the correct statements.**

**An ultrasound scanner is useful for this purpose because it .....**

<b>..... uses a non-invasive technique.</b>	
<b>..... is a disposable piece of equipment.</b>	
<b>..... does not need a trained technician.</b>	
<b>..... shows parts of the heart moving.</b>	
<b>..... gives a three-dimensional image.</b>	
<b>..... gives a clear X-ray image of the heart.</b>	

**[3]**

- (f) The student carries out further research on diagnostic methods.**

**She examines the results obtained when using the following:**

**ultrasound images**

**ECG traces**

**blood pressure readings**

**pulse rate readings.**



**Outline the information which could be obtained from these techniques to identify heart defects.**

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[6]

[Total: 24]

- 3 An 85-year-old lady has an infection in her lungs. Her GP refers her to the radiography department in her local hospital for an X-ray.**

**Fig. 3.1(a) (insert) shows an X-ray of the human chest. Fig. 3.1(b) is an outline drawing of the same image.**

- (a) Explain why the rib is seen as a white object and the lung as a dark object in the X-ray images, as shown in Fig. 3.1(a) and Fig. 3.1(b).**

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**[3]**

- (b) Name the organ labelled A.**

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**[1]**



- (c) The X-ray of the lady's chest indicated that she may have early signs of cancer.**

**Some people believe that it would not be appropriate to carry out further diagnosis and treatment of this 85-year-old lady.**

**State two ethical arguments in favour of, and two against, further diagnosis and treatment of this lady.**

**ethical arguments in favour**

- 1.** \_\_\_\_\_  
\_\_\_\_\_  
**2.** \_\_\_\_\_  
\_\_\_\_\_ **[2]**

**ethical arguments against**

- 1.** \_\_\_\_\_  
\_\_\_\_\_  
**2.** \_\_\_\_\_  
\_\_\_\_\_ **[2]**

- (d) Some of the activities carried out and the equipment used in a radiography department may be hazardous.

Complete Table 3.1 to show risk analyses for a RADIOGRAPHER using a CAT scanner and a PATIENT having an MRI scan.

Table 3.1

	<b>RADIOGRAPHER using a CAT scanner on a daily basis</b>	<b>PATIENT having an MRI scan</b>
<b>HAZARD</b>		
<b>RISK</b>		
<b>SAFETY PRECAUTION</b>		

[6]

[Total: 14]

- 4 A person with diabetes is using a biosensor to monitor their blood sugar levels.**

**The biosensor shows that the blood sugar levels are too high.**

- (a) State TWO ways in which the person with diabetes can use this result to return their blood sugar levels to within the normal range.**

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**[2]**

- (b) Conditions other than diabetes can be diagnosed by blood sampling.**

**Describe how blood cell counts can be useful in the diagnosis of a NAMED condition.**

**condition \_\_\_\_\_ [1]**

**description \_\_\_\_\_**

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**[2]**

**(c) Blood sampling techniques are also used by the police.**

**(i) Name TWO substances that the police may need to identify in the blood of a car driver.**

**1** \_\_\_\_\_

**2** \_\_\_\_\_ **[2]**

**(ii) Describe how a car driver could be tested for the presence of an illegal substance in their blood.**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ **[3]**

**(d) Hepatitis is a type of liver disease.**

**The ELISA test is used to find antibody indicators for hepatitis.**



**Describe the stages carried out to find antibody indicators for hepatitis during an ELISA test.**

[illegible]

**[5]**

**[Total: 15]**


- 5 Sanjit is studying the process of respiration in muscle cells.

Sanjit's teacher asks him to complete a worksheet.

(a) Complete the worksheet below.

## RESPIRATION WORKSHEET

- (i) Complete the word equation for aerobic respiration.

\_\_\_\_\_ + \_\_\_\_\_  \_\_\_\_\_ + \_\_\_\_\_ + energy  
[2]

- (ii) Put a ring around the molecule produced during respiration that acts as an immediate energy source in muscle cells.

ATP      DNA      GLUCOSE      GLYCOGEN      SUCROSE  
[1]

- (iii) Name the waste product formed during anaerobic respiration in muscle cells.

\_\_\_\_\_ [1]

- (iv) State the two forms in which energy can be released during the BURNING OF FUEL.

1. \_\_\_\_\_

2. \_\_\_\_\_ [2]

- (v) Write down the sites of aerobic and anaerobic respiration in muscle cells.

aerobic site \_\_\_\_\_

anaerobic site \_\_\_\_\_ [2]

- (b) Sanjit knows that his muscle cells can contract only if they respire.**

**List three OTHER processes needing energy released from respiration.**

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_ [3]

- (c) The respiratory and circulatory systems play an important role in the process of respiration.**

- (i) Identify one PROBLEM of the respiratory system and one PROBLEM of the circulatory system which could limit the strength of muscle contraction.**

**respiratory system** \_\_\_\_\_

\_\_\_\_\_

**circulatory system** \_\_\_\_\_

\_\_\_\_\_ [2]

- (ii) Explain why the strength of muscle contraction would be affected by these problems.**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ [2]

- (d) Sanjit's teacher tells him that a range of equipment is available to diagnose respiratory and circulatory system problems, including CAT scans and MRI scans.**

**Describe TWO advantages and TWO disadvantages of using the two types of scanner compared to alternatives.**

TYPE OF SCANNER	ADVANTAGES	DISADVANTAGES
CAT	1.  2.	1.  2.
MRI	1.  2.	1.  2.

**[4]**

**[Total: 19]**

**END OF QUESTION PAPER**



## ADDITIONAL PAGE

**IF ADDITIONAL SPACE IS REQUIRED, YOU SHOULD USE THE LINED PAGES BELOW. THE QUESTION NUMBER(S) MUST BE CLEARLY SHOWN.**

[illegible]

[illegible]

[illegible]

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