SPECIMEN

Advanced Subsidiary GCE

Applied Science

Monitoring the Activity of the Human Body

Specimen Paper

G622

Time: 1 hour 30 minutes

Candidates answer on the question paper.

Additional materials:
None

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 black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure 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 if 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.
- You may use an electronic calculator.
- This document consists of **12** pages. Any blank pages are indicated.

  [100/4438/3] [100/4439/5] **[Turn over**

Answer **all** the questions.

1 Respiration is the process by which living things obtain energy for their activities**.**

(a) State **three** different processes occurring within the human body which need a supply of energy.

1. .....

2. .....

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

(b) Aerobic respiration and anaerobic respiration take place in the human body. They both make energy available to body cells but the way they achieve this differs.

Write a sentence to describe these differences with respect to:

(i) substrates used

.....

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

(ii) products formed

.....

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

(iii) quantity of energy made available to a cell.

.....

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

(c) Sports physiologists sometimes refer to a phenomenon known as ‘oxygen debt’.

Explain what they mean by the term *oxygen debt*.

.....

.....

.....

.....

.....

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

[Total 9]

2 Staff in an asthma clinic were asked to monitor and record lung volumes.

(a)

(i) Complete Table 2.1 to show 'typical' lung volumes.

Table 2.1

	gender	volume / dm^3
tidal volume	male	0.4 – 0.5
	female	
vital capacity	male	
	female	4.25

[2]

(ii) Name a piece of laboratory equipment that is commonly used to measure lung volumes.

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

(b) State the typical breathing rate for an adult male at rest.

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

(c) The volume of air being breathed (lung ventilation) by someone at rest can be found by multiplying the tidal volume (dm^3) by the breathing rate (breaths per min).

(i) Complete Table 2.2.

Table 2.2

patient	tidal volume / dm^3	breathing rate/ breaths $minute^{-1}$	Lung ventilation / dm^3 $minute^{-1}$
Richard	0.5	12	
James	0.2		6.0

[2]

(ii) How does James' tidal volume compare to the typical value-range for males?

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

(d) Gas exchange takes place in the alveoli. Some of the air breathed into the lungs does not get into the alveoli. Approximately 0.15 dm^3 of air fills the tubes leading to the alveoli.

This part of tidal volume is called 'dead space'.

(i) Name the **three** types of tubes leading to the alveoli.

1. .....

2. .....

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

(ii) The amount of air reaching the alveoli each breath, to take part in gas exchange, can be estimated using the following equation:

air to alveoli = tidal volume – dead space

Alveolar ventilation can be calculated using the following equation:

alveolar ventilation = air to the alveoli x breathing rate

Richard and James both had the same 'dead space' volume, 0.15 dm^3.

Richard had an alveolar ventilation of 4.2 dm^3 per minute.

Calculate James' alveolar ventilation.

Show your working.

..... dm^3 $minute^{-1}$ **[3]**

(iii) Use your answer to **(d)(ii)** to compare and explain Richard and James' probable ability to take part in physical exercise.

.....

.....

.....

.....

.....

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

[Total 15]

3 People working in the 'health and fitness' sector monitor indicators of physiological status.

A student was interested in the various meters used and the way data from them is presented.

(a) Values obtained from tests are usually compared with 'average values' for the indicators to see if they are 'normal'.

Table 3.1 lists some physiological indicators and their 'normal' values.

Complete the table.

Table 3.1

physiological indicator	'normal' value	unit
blood pressure, 18 year old male		mm Hg
breathing rate	15 - 18	beats per min
tidal volume at rest		dm^3
peak flow		$dm^3\ min^{-1}$
body temperature, range		

[5]

(b) One of the basic measurements carried out is to establish an individual's blood pressure.

Name the meter used to measure blood pressure.

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

(c) A doctor may prescribe a peak flow meter if a patient has asthma.

(i) Give **three** instructions that would be given to the patient to make sure they use the meter correctly.

.....

.....

.....

.....

.....

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

(ii) Fig. 3.1 shows an example of a two week diary of peak flow readings done by a child who has quite bad asthma.

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

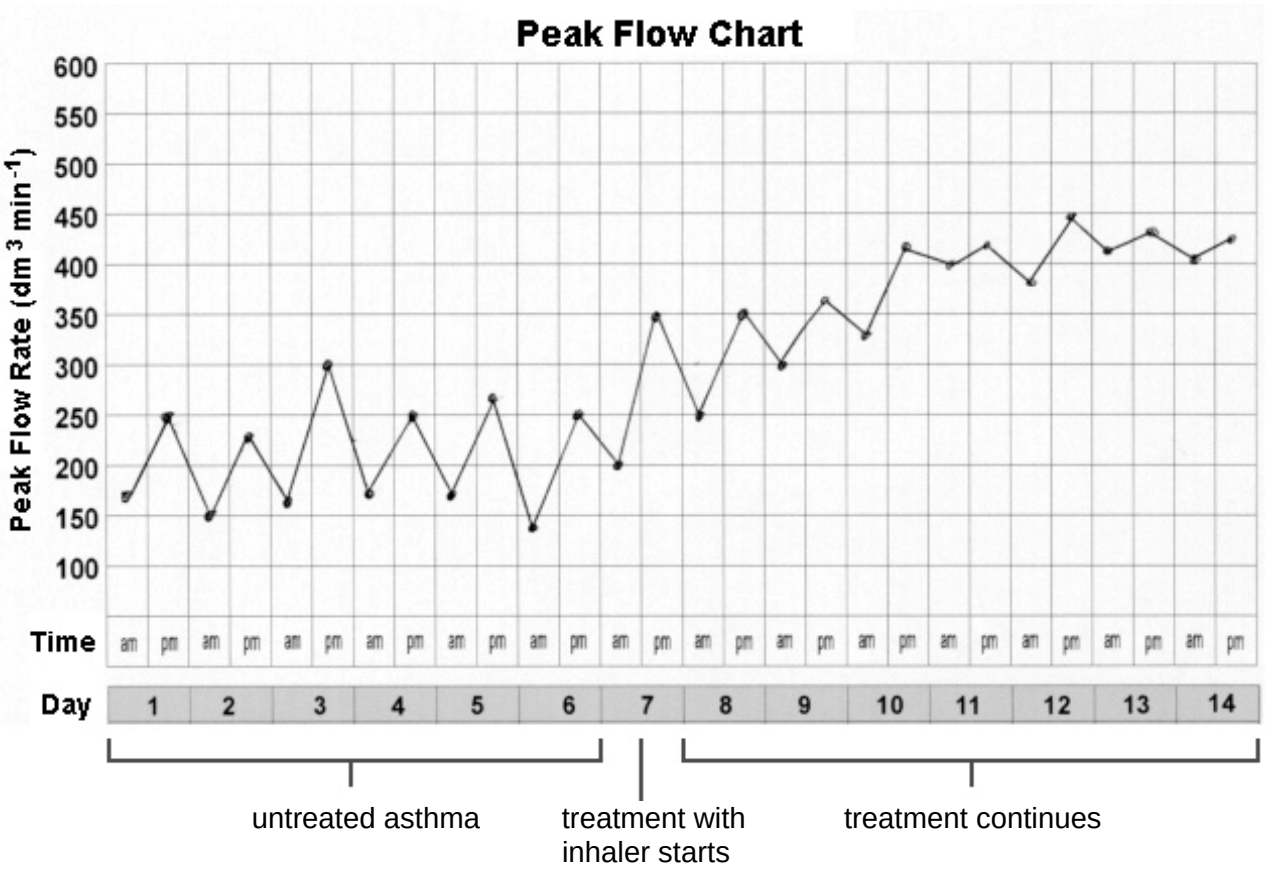

Fig. 3.1

Use the data from Fig. 3.1 to describe **two** effects of the inhaler on the child's peak flow rate.

1. .....

.....

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

2. .....

.....

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

(d) The chart in Fig. 3.2 shows a spirometer trace produced by a 16-year-old male who breathed normally, took a deep breath and then exhaled as strongly as he could.

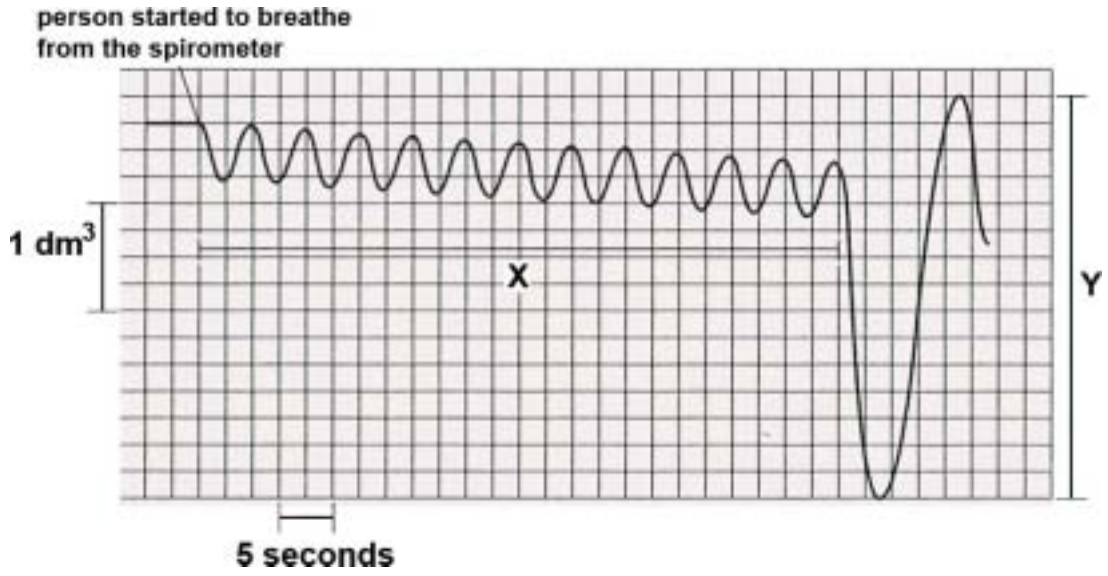

Fig. 3.2

(i) What was the breathing rate during period **X**?

..... breaths per minute **[2]**

(ii) Name lung volume **Y**.

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

(e) Fig. 3.3 shows a chart produced by another monitoring device.

Fig. 3.3

(i) Which monitoring device is likely to have been used to produce this trace?

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

(ii) This trace is not 'normal'. State **one** irregularity shown in the trace.

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

(iii) Name the condition which is shown in Fig. 3.3.

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

[Total: 19]

4 An ultrasound scanner was set up to enable a cardiologist to assess blood flow across a valve in her patient's heart. Special positioning of the scanner was necessary to 'view' the heart through a gap between the ribs.

A special gel was used to fill the space between the probe of the ultrasound scanner and the patient's skin.

(a) Explain why the gel was used to fill the space between the probe and the patient's skin.

.....

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

(b) Explain why the probe needs special positioning to view the heart.

.....

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

(c) Explain the basic principles of how the ultrasound scanner can be used to assess blood flow.

.....

.....

.....

.....

.....

.....

.....

.....

.....

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

(d) State **two** further medical uses of ultrasound, other than assessing blood flow in the heart.

1. .....

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

(e) State **two** advantages of using ultrasound to make a diagnosis.

1. .....

.....

2. .....

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

(f) Whenever possible, a patient is made aware of the risks and benefits involved before imaging methods are used in diagnosis.

State and explain **one** risk which might arise from using **X-rays** to make a diagnosis.

.....

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

[Total: 14]

5 Andrew and Joe were each given a drink containing 75g of glucose in 300 cm^3 of water. Their blood glucose was measured at intervals for the next two and a half hours.

Table 5.1 shows the results of the investigation.

Table 5.1

time after drinking glucose solution / minutes	blood glucose concentration / mg per 100 cm^3 blood	
	Andrew	Joe
0	89	82
15	110	125
30	138	172
45	115	190
60	76	210
90	75	200
120	72	146
150	86	125

(a) Describe **four** changes shown in Andrew's blood glucose concentration during the 150 minutes of the investigation.

Use data in your description.

.....

.....

.....

.....

.....

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

(b) Explain how blood glucose concentration is controlled.

.....

.....

.....

.....

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

(c) The results obtained for Joe differ from those for Andrew.

Use data from Table 5.1 to describe **two** differences.

1. .....

.....

2. .....

.....

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

(d) State and explain the differences given in **(c)**.

.....

.....

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

(e) Fig. 5.1 shows a graph of the results of a similar investigation. The four curves represent the blood glucose and insulin concentrations of two individuals.

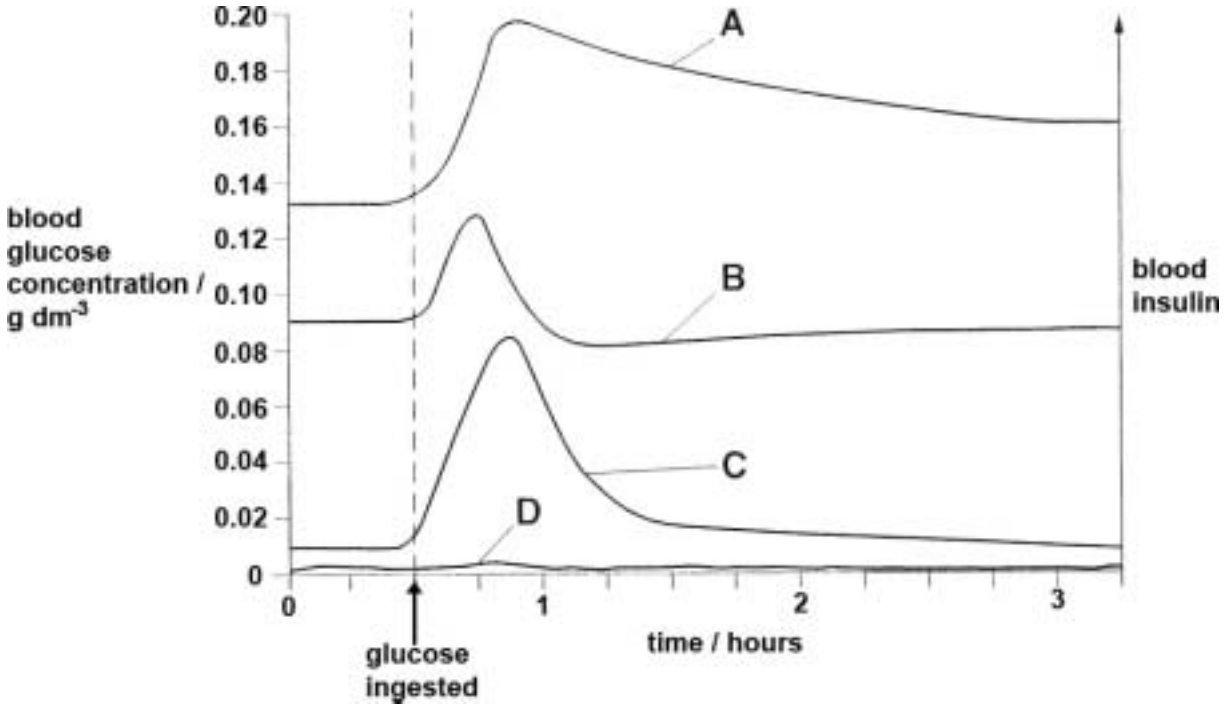

Fig.5.1

Match graphs **A**, **B**, **C** and **D** to one each of labels **1, 2, 3** and **4**.

label	graph
1 blood glucose in diabetic person	
2 blood glucose in normal person	
3 blood insulin in diabetic person	
4 blood insulin in normal person	

[3]

[Total 16]

6 A student was researching the effect of exercise on blood pressure.

(a)

(i) Explain how blood pressure is increased inside the heart.

.....

.....

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

(ii) Explain why blood must be put under pressure in the body.

.....

.....

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

(b) Fig. 6.1 shows information about blood pressures in parts of the human circulatory system during one cardiac cycle.

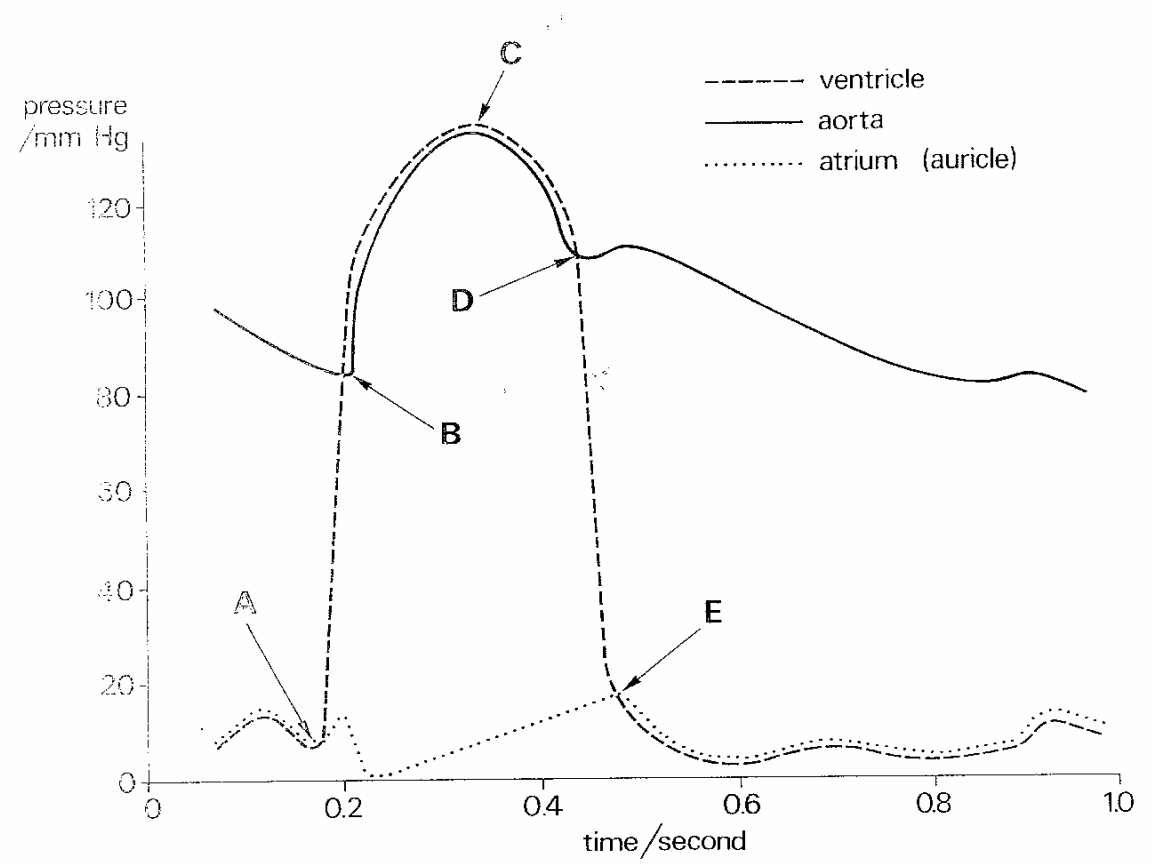

Fig. 6.1

(i) Using Fig. 6.1, explain why this information relates to the left side of the heart.

.....

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

(ii) At point **A** in Fig. 6.1, the bicuspid or mitral valve closes. Describe the changes taking place in the heart at points **B** – **E**, during the cardiac cycle.

Include blood pressure and time values in your description.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... **[7]**

(c) The changes shown in Fig. 6.1 occur every time the heart contracts.

The student's research showed that during exercise, blood pressure rises automatically to meet the body's increased needs.

(i) State **two** locations for the pressure sensors involved in controlling blood pressure.

1 .....

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

(ii) Name the part of the brain that receives impulses from these sensors.

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

[Total 15]

Paper Total [90]

OXFORD CAMBRIDGE AND RSA EXAMINATIONS

Advanced Subsidiary GCE (or Advanced GCE)

APPLIED SCIENCE G622

Monitoring the Activity of the Human Body

Specimen Mark Scheme

The maximum mark for this paper is 90.

Question Number	Answer	Max Mark
1(a)	**State three different processes going on within the human body which need a supply of energy.** three from: muscle contraction / AVP ; nerve impulse transmission ; re-absorption ; active transport ;	**[3]**
1(b)	**Aerobic respiration and anaerobic respiration take place in the human body. They both make energy available to body cells but the way they achieve this differs.** **Write a sentence to describe these differences with respect to:**	
1(b)(i)	**substrates used;** the substrates for aerobic respiration are glucose and oxygen whereas the substrate for anaerobic respiration is glucose only / occurs in the absence of oxygen ;	**[1]**
1(b)(ii)	**products formed;** aerobic respiration produces carbon dioxide and water whereas anaerobic respiration produces lactic acid ;	**[1]**
1(b)(iii)	**quantity of energy made available to a cell.** aerobic respiration releases more energy (from one molecules of glucose) than anaerobic / 38 ATP in aerobic v. 2 ATP in anaerobic ;	**[1]**
1(c)	**Sports physiologists sometimes refer to a phenomenon known as 'oxygen debt'.** **Explain what they mean by the term 'oxygen debt'.** during exercise oxygen demand may exceed supply and cells respire anaerobically / OWTTE ; the amount of oxygen needed to oxidise the lactic acid ; produced during anaerobic respiration ;	**[3]**
2(a)(i)	**Staff in an asthma clinic were asked to monitor and record lung volumes.** **Complete Table 2.1 to show 'typical' lung volumes.** *tidal volume female:*0.4 to 0.5/correct value within range ; *vital capacity male:* 4.6 to 6.0 ;	**[2]**

Question Number	Answer	Max Mark
2(a)(ii)	**Name a piece of laboratory equipment that is commonly used to measure lung volumes.** spirometer / phonetic ;	**[1]**
2(b)	**State the typical breathing rate for an adult male at rest?** 15 – 18 / correct value between limits ;	**[1]**
2(c)(i)	**The volume of air being breathed (lung ventilation) by someone at rest can be found by multiplying the tidal volume (dm^3) by the breathing rate (breaths per min)** **Complete Table 2.2.** Richard lung ventilation: 6(.0) ; James breathing rate: 30 ;	**[2]**
2(c)(ii)	**How does James' tidal volume compare to the typical value-range for males?** low qualified / lower / under ;	**[1]**
2(d)(i)	**Gas exchange takes place in the alveoli. Some of the air breathed into the lungs does not get into the alveoli.** **Approximately 0.15 dm^3 of air fills the tubes leading to the alveoli.** **This part of tidal volume is called 'dead space'.** **Name the three types of tubes leading to the alveoli.** trachea ; bronchus / bronchi ; bronchioles ;	**[3]**
2(d)(ii)	**The amount of air reaching the alveoli each breath, to take part in gas exchange, can be estimated using the following equation:** ***air to alveoli = tidal volume – dead space*** **Alveolar ventilation can be calculated using the following equation:** ***alveolar ventilation = air to the alveoli x breathing rate*** **Richard and James both had the same 'dead space' volume, 0.15 dm^3.** **Richard had an alveolar ventilation of 4.2 dm^3 per minute.** **Calculate James' alveolar ventilation. Show your working.** 0.2 – 0.15 ; 0.05 x 30 ; 1.5 ;	**[3]**

<table>
<tr><th>Question Number</th><th>Answer</th><th>Max Mark</th></tr>
<tr><td>2(d)(iii)</td><td>Use your answer to (d)(ii) to compare and explain Richard and James' probable ability to take part in physical exercise.
four from:
1. physical exercise demands extra supply of oxygen;
2. Richard's alveolar ventilation OK (more than double James');
3. Richard's muscles would receive extra oxygen;
4. James' muscles would be starved of oxygen;
5. switching to anaerobic respiration;
6. likely that James not able to take part / fatigues faster ;
7. AVP eg accurate ref to lactic acid / longer aerobic ;</td><td>[4]</td></tr>
<tr><td>3(a)</td><td>People working in the 'health and fitness' sector monitor indicators of physiological status.
A student was interested in the various meters used and the way data from them is presented.
Values obtained from tests are usually compared with 'average values' for the indicators to see if they are 'normal'.
Table 3.1 lists some physiological indicators and their 'normal' values. Complete the table.
<table>
<tr><th>physiological indicator</th><th>'normal' value</th><th>unit</th></tr>
<tr><td>blood pressure, 18 year old male</td><td>120 / 80</td><td>mm Hg</td></tr>
<tr><td>breathing rate</td><td>15 - 18</td><td>breaths per min</td></tr>
<tr><td>tidal volume at rest</td><td>0.4 to 0.5</td><td>dm</td></tr>
<tr><td>peak flow</td><td>400 - 600</td><td>$dm^3\ min^{-1}$</td></tr>
<tr><td>body temperature, range</td><td>36.5 to 37.2</td><td>^oC</td></tr>
</table></td><td>[5]</td></tr>
<tr><td>3(b)</td><td>One of the basic measurements carried out is to establish an individual's blood pressure.
Name the meter used to measure blood pressure.
sphygmomanometer</td><td>[1]</td></tr>
</table>

Question Number	Answer	Max Mark
3(c)(i)	**A doctor may prescribe a peak flow meter if a patient has asthma.** **Give three instructions that would be given to the patient to make sure they use the meter correctly.** three from: ensure sitting down /relaxed (breathing at start) ; ensure marker on the scale is set to zero ; sterile mouthpiece / sterilise mouth piece ; after full breath in, breath out with a rapid forced maximal expiratory puff through the mouth and on into the meter / owtte ; ensure lips sealed around mouth piece ; repeat to give three readings ; taking best as result ;	**[3]**
3(c)(ii)	**Fig. 3.1 shows an example of a two week diary of peak flow readings done by a child who has quite bad asthma.** **Readings were taken twice a day, in the morning and again in the evening.** **Use the data from Fig 3.1 to describe two effects of the inhaler on the child's peak flow rate.** four from: increased peak flow rate ; data ; accept levels to normal after day 10; data ; difference between morning and evening readings less ; data ;	**[4]**
3(d)(i)	**The chart in Fig.3.2 shows a spirometer trace produced by a 16-year old male who breathed normally, took a deep breath and then exhaled as strongly as he could.** **What was the breathing rate during period X?** time period X = 60 seconds ; 12;	**[2]**
3(d)(ii)	**Name lung volume Y.** vital capacity ;	**[1]**
3(e)(i)	**Fig. 3.3 shows a chart produced by another monitoring device.** **Which monitoring device is likely to have been used to produce this trace?** electrocardiogram / ECG	**[1]**

Question Number	Answer	Max Mark
3(e)(ii)	**This trace is not 'normal'. State one irregularity shown in the trace.** frequency / distance between similar peaks / SAW ;	**[1]**
3(e)(iii)	**Name the condition which is shown in Fig.3.3.** arrhythmia;	**[1]**
4(a)	**An ultrasound scanner was set up to enable a cardiologist to assess blood flow across a valve in her patient's heart.** **Special positioning of the scanner was necessary to 'view' the heart through a gap between the ribs.** **A special gel was used to fill the space between the probe of the ultrasound scanner and the patient's skin.** **Explain why the gel was used to fill the space between the probe and the patient's skin.** to prevent (100%) reflection of ultrasound / improve contact / lubricate probe / exclude air ;	**[1]**
4(b)	**Explain why the probe needs special positioning to view the heart.** ultrasound does not pass through bone;	**[1]**
4(c)	**Explain the basic principles of how the ultrasound scanner can be used to assess blood flow.** **Banded mark range:** **[5-6 marks]** Candidate shows a high level of understanding and gives a full explanation of how the ultrasound scanner can be used to assess blood flow, including **at least five** valid points expressed clearly and logically. **For example**: Ultrasound uses sound waves in the frequency of 1 - 15 MHz and short pulses of about 1μs sent into body. Sound waves are partly reflected or transmitted at the boundary between different materials. The 'echoes' are converted into images. There are few, if any, errors in spelling, punctuation and grammar.	

Question Number	Answer	Max Mark
4(c) cont…	**[3-4 marks]** Candidate demonstrates an understanding, explaining the basic principles, including **at least three** relevant points expressed clearly and logically**. For example:** Ultrasound uses sound waves. Sound waves are partly reflected or transmitted and 'echoes' are converted into images. There may be occasional errors in spelling, punctuation and grammar. **[1-2 marks]** Candidate shows a basic understanding of how the ultrasound scanner can be used to assess blood flow, incorporating **at least one** valid point but with little or no explanation. **For example:** Ultrasound uses sound waves and 'echoes' are converted into images. Errors of grammar punctuation and spelling may be intrusive **[0 marks]:** no response/response not worthy of credit. **Expected knowledge and understanding could include the following valid points:** uses sound waves ; frequencies used 1 to 15 MHz; short pulses / about 1µs sent into body ; at boundary between two different materials ; e.g. bone and soft tissue ; sound waves partly reflected ; partly transmitted ; time for reflected wave to come back indicates depth of interface ; transmitted waves will be reflected at deeper interfaces ; provides series of echoes ; 'real time' ; 'echoes' are converted into images ; images on screen / photos ;	**[6]**
4(d)	**State two further medical uses of ultrasound, other than assessing blood flow in the heart.** two from: to monitor foetal development / to locate the placenta ; physiologist use ; to look for: cysts / stones / tumours / abnormalities (in liver / kidney / pancreas) ; to guide surgeons when carrying out key-hole surgery;	**[2]**
4(e)	**State two advantages of using ultrasound to make a diagnosis.** *two from:* quick / cheaper / readily available ; non-invasive ; safe / no known undesirable side-effects ; effective in producing images of soft tissue / some kinds of cancer ;	**[2]**

Question Number	Answer	Max Mark
4(f)	**Whenever possible, a patient is made aware of the risks and benefits involved before imaging methods are used in diagnosis.** **State and explain one risk which might arise from using X-rays to make a diagnosis.** (ionising) radiation ; and cancer risk / change cell (mutation); OR high voltage supplies ; and electrical hazards ;	**[2]**
5(a)	**Andrew and Joe were each given a drink containing 75g of glucose in 300 cm^3 of water. Their blood glucose was measured at intervals for the next two and a half hours.** **Table 5.1 shows the results of the investigation.** **Describe four changes shown in Andrew's blood glucose concentration during the 150 minutes of the investigation.** **Use data in your description.** statement about change in blood glucose concentration qualified by time; data value(s) in support ; statement about change in blood glucose concentration qualified by time; data value(s) in support ;	**[4]**
5(b)	**Explain how blood glucose concentration is controlled.** *three from:* glucose absorbed into blood stream ; increase in blood glucose causes release of insulin ; from pancreas ; glucose converted to glycogen ; in liver ; falls below threshold ; glucagon released ; glucose released from glycogen in liver ; AVP ;	**[3]**
5(c)	**The results obtained for Joe differ from those for Andrew?** **Use data from Table 5.1 to describe two differences.** two pairs: difference qualified by time or glucose concentration reference ; comparative data ; e.g.: blood glucose increases for longer; 0 – 60 compared to 0 – 30 (for Andrew); maximum glucose (concentration)greater; 210 as compared to 138 (for Andrew); still above starting glucose (concentration) during 150 minutes; whereas Andrew below starting concentration 60 to 150;	**[4]**

Question Number	Answer	Max Mark
5(d)	**State and explain the differences given in (c).** Joe is diabetic/ has diabetes Joe's insulin not lowering blood glucose concentration / insufficient insulin / liver does not respond to insulin produced;	**[2]**
5(e)	**Fig. 5.1 shows a graph of the results of a similar investigation. The four curves represent the blood glucose and insulin concentrations of two individuals.** **Match graphs A, B, C and D to one each of labels 1, 2, 3 and 4.** 1 A 2 B 3 D 4 C	**[3]**
6(a)(i)	**A student was researching the effect of exercise on blood pressure.** **Explain how blood pressure is increased inside the heart.** ventricles / muscles of heart contract ; volume occupied by blood decreases ;	**[2]**
6(a)(ii)	**Explain why blood must be put under pressure in the body.** two from: to enable blood to reach all cells all parts of the body; to take deoxygenated blood to the lungs to enable G.Exchange / SAW ; to deliver named material e.g. oxygen/glucose and remove named waste materials e.g. urea / carbon dioxide / incl. heat;	**[2]**
(6)(b)(i)	**Fig. 6.1 shows information about blood pressures in parts of the human circulatory system during one cardiac cycle.** **Using Fig. 6.1 explain why this information relates to the left side of the heart.** aorta / extremely high pressure reached in ventricles indicates LHS ;	**[1]**

Question Number	Answer	Max Mark
(6)(b)(ii) 	**At point A in Fig. 6.1 the bicuspid or mitral valve closes. Describe the changes taking place in the heart at points B – E, during the cardiac cycle.** **Include blood pressure and time values in your description.** Candidates are expected to know the following steps: B semilunar / aortic valve opens ; C maximum rate of ejection of blood/ blood flows from ventricle into aorta ; D semilunar / aortic valve closes ; E bicuspid / mitral valve opens ; **Band mark range:** **[6-7 marks]** Candidate shows a high level of understanding with a detailed account of the changes taking place, describing **all** four changes at points B-E using correct scientific terms and also including at least two correct, related blood pressure and / or time values. Candidate presents the changes in the correct sequence. **For example:** The semilunar valve opens at B at a time of 0.2 seconds/pressure of 85 mm Hg. The blood flows from the ventricle into aorta at C with a pressure of more than 120 mm Hg. The semilunar valve closes at D and the bicuspid valve opens at E. There are few, if any, errors in spelling, punctuation and grammar. **[3-5 marks]** Candidate demonstrates sound knowledge and understanding of the changes taking place, describing **at least three** changes from the list above using scientific terms and including one correct, related correct blood pressure / time value. The sequencing is mainly correct. **For example:** At B the semilunar valve opens at a time of 0.2 seconds/pressure of 85 mm Hg. The semilunar valve closes at D and the bicuspid/mitral valve opens at E. There may be occasional errors in spelling, punctuation and grammar.	

Question Number	Answer	Max Mark
(6)(b)(ii) cont…	**[1-2 marks]** Candidate addresses **at least one** of the changes but shows limited understanding of cycle. There is little or no evidence of sequencing. **For example:** Semilunar valve opens at B and the closes at D. Errors of grammar punctuation and spelling may be intrusive **[0 mark]:** no response/response not worthy of credit.	**[7]**
(6)(c)(i)	**The changes shown in Fig.6.1 occur every time the heart contracts. The student's research showed that during exercise, blood pressure rises automatically to meet the body's increased needs. State two locations for the pressure sensors involved in controlling blood pressure.** aorta / aortic ; carotid arteries / sinuses ;	**[2]**
(6)(c)(ii)	**Name the part of the brain that receives impulses from these sensors.** medulla / cardiac centre ;	**[1]**
	Paper Total	**[90]**

Assessment Objectives Grid (includes QWC)

Question	AO1	AO2	AO3	Total
1(a)	3	-	-	**3**
1(b)(i)	1	-	-	**1**
1(b)(ii)	1	-	-	**1**
1(b)(iii)	1	-	-	**1**
1(c)	3	-	-	**3**
2(a)(i)	2	-	-	**2**
2(a)(ii)	1	-	-	**1**
2(b)	1	-	-	**1**
2(c)(i)	-	2	-	**2**
2(c)(ii)	-	1	-	**1**
2(d)(i)	3	-	-	**3**
2(d)(ii)	-	3	-	**3**
2(d)(iii)	-	4	-	**4**
3(a)	5	-	-	**5**
3(b)	1	-	-	**1**
3(c)(i)	3	-	-	**3**
3(c)(ii)	-	4	-	**4**
3(d)(i)	-	2	-	**2**
3(d)(ii)	1	-	-	**1**
3(e)(i)	1	-	-	**1**
3(e)(ii)	-	1	-	**1**
3(e)(iii)	1	-	-	**1**
4(a)	1	-	-	**1**
4(b)	1	-	-	**1**
4(c)	6	-	-	**6**
4(d)	2	-	-	**2**
4(e)	2	-	-	**2**
4(f)	2	-	-	**2**
5(a)	-	4	-	**4**
5(b)	3	-	-	**3**
5(c)	-	4	-	**4**
5(d)	-	2	-	**2**
5(e)	-	3	-	**3**
6(a)(i)	2	-	-	**2**
6(a)(ii)	2	-	-	**2**
6(b)(i)	-	1	-	**1**
6(b)(ii)	-	7	-	**7**
6(c)(i)	2	-	-	**2**
6(c)(ii)	1	-	-	**1**
Totals	**52**	**38**	**0**	**90**