

**GCE**

**Applied Science**

Unit **G622**: Monitoring the Activity of the Human Body

Advanced Subsidiary GCE

**Mark Scheme for June 2014**

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.


All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

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Annotations

 The symbol consists of the letters 'BP' in a bold, black, sans-serif font, enclosed within a red square border.	Blank Page – this annotation <b>must</b> be used on all blank pages within an answer booklet (structured or unstructured) and on each page of an additional object where there is no candidate response.
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Expected Answers			Marks	Additional Guidance
1	a	right atrium;	1	<b>ignore:</b> details e.g. wall/top left/in / on top of <b>reject</b> near to/above right atrium <b>accept:</b> any correct annotation on Fig.1.1.
	b	i	1	<b>ignore:</b> ADP
		ii	6	<b>valid points</b> <ul style="list-style-type: none"> <li>• atria/atrium contract(s)/ atrial systole</li> <li>• AV/atrioventricular/tricuspid/bicuspid, valve opens/ allows blood flow (from atria) into the ventricles</li> <li>• role of AVN/ Bundle of His/Purkyne fibres</li> <li>• ventricle(s) contract(s)/ ventricular systole</li> <li>• blood leaves ventricle(s)/heart, into the arteries (pulmonary/aorta)</li> <li>• AV/atrioventricular valves, close/ stop backward flow</li> <li>• semilunar valves, open/ allow blood flow</li> <li>• AV/atrioventricular valves open/ semilunar valves close, again/at diastole/at start of next cycle</li> </ul>
		iii	2	<b>ignore:</b> irregular/inefficient, opening/closing
	c	i	1	<b>accept</b> electrocardiograph/ecg <b>ignore</b> trace
		ii	2	<b>ignore</b> references to heart rate e.g. faster <b>ignore</b> reference to beat/strength of contraction

Expected Answers			Marks	Additional Guidance
	iii	fast(er)/ 100 beats per minute;  healthy male pulse rate is 60 – 80 beats per minute;	2	<b>accept</b> high/greater = fast <b>ignore</b> any value above 100 beats per minute <b>ignore</b> references to tachycardia <b>accept</b> any value(s) between 60 and 80
d	i	<u>135/85;</u> <u>mm Hg;</u>	2	
	ii	(Artificial) pacemaker does not respond to adrenaline/hormones; OR Steve's own pacemaker does not respond to adrenaline/ is overridden by artificial pacemaker	1	
		<b>Total</b>	<b>18</b>	

Expected Answers			Marks	Additional Guidance				
2	a	X drawn in Fig.2.1 in any region around the red blood cell and inside the blood capillary wall;	1	<b>accept</b> any correct use of label line/arrow				
	b	i need <b>more</b> energy/ATP;	1	<b>ignore</b> respire aerobically / more respiration				
		ii <table border="1"> <tr> <td>(mitochondrion)</td> <td><b>aerobic;</b></td> </tr> <tr> <td>(cytoplasm outside the mitochondrion)</td> <td><b>anaerobic;</b></td> </tr> </table>	(mitochondrion)	<b>aerobic;</b>	(cytoplasm outside the mitochondrion)	<b>anaerobic;</b>	2	
(mitochondrion)	<b>aerobic;</b>							
(cytoplasm outside the mitochondrion)	<b>anaerobic;</b>							
		iii <p><i>any two from:</i>            increased <b>rate</b> of reaction;  <b>more</b> ATP (released/produced);            shift from aerobic to anaerobic respiration/ <b>more</b> anaerobic respiration/  <b>less</b> aerobic respiration;            lactic acid produced;</p>	2	<p><b>accept</b> increased frequency of reactions/respiration</p> <p><b>ignore</b> references to CO<sub>2</sub></p> <p><b>accept</b> increased rate of <b>anaerobic</b> respiration = 2marks</p>				
	c	i <p><i>any two from:</i>            capillary wall (very) thin/one cell thick/ 0.5 – 2 µm thick;            thin layer of tissue fluid/ capillary is very close to the muscle cells;            red blood cell touching the capillary wall;</p>	2	<p><b>reject</b> cell walls</p> <p><b>ignore</b> unqualified thin walls</p> <p><b>ignore</b> unqualified thin layers</p> <p><b>ignore</b> references to plasma</p>				

Expected Answers		Marks	Additional Guidance
	<p><b>ii</b> <b>[0 marks]</b> Candidate includes fewer than two correct valid points in the response.</p> <p><b>[1 - 2 marks]</b> Candidate shows a basic understanding of how oxygen and/or glucose reach the muscle cells, including <b>at least two valid points</b> but with little or no explanation. With little evidence of a logical order.</p> <p><b>[3 – 4 marks]</b> Candidate shows an understanding how oxygen and glucose reach the muscle cells, including <b>at least four</b> valid points. The explanation follows some logical order.</p> <p><b>[5 - 6 marks]</b> Candidate shows a high level of understanding how oxygen and glucose reach the muscle cells including <b>at least six</b> valid points. The explanation follows a clear logical order.</p>	6	<p><b>valid points</b></p> <p><b>oxygen</b></p> <ul style="list-style-type: none"> <li>uptake/gaseous exchange at alveoli/lungs</li> <li>carried by, (oxy)haemoglobin/red blood cells/plasma</li> </ul> <p><b>glucose</b></p> <ul style="list-style-type: none"> <li>uptake in the digestive tract/correctly named part</li> <li>transported (in solution/dissolved) via blood plasma</li> </ul> <p><b>ignore</b> glucose in red blood cells</p> <p><b>oxygen/glucose</b></p> <ul style="list-style-type: none"> <li>correct reference to diffusion at alveoli/digestive tract/muscle cells</li> <li>more oxygen/glucose in alveoli/digestive tract than in blood/follows concentration gradient</li> <li>more oxygen/glucose in blood than in muscle cells/ follows concentration gradient</li> <li>cellular respiration uses oxygen/ glucose</li> </ul>
	<p><b>d</b> <i>any one from</i> narrowing of <b>bronchioles</b>;</p> <p>less oxygen reaching the alveoli;</p>	1	<p><b>ignore</b> airways/windpipe/ trachea</p> <p><b>ignore</b> less oxygen reaching lungs</p>

Expected Answers			Marks	Additional Guidance
	<b>e</b>	<p><i>any five from:</i></p> <p>(patient should be) relaxed/at rest/not out of breath;            breath in deeply/ take a deep breath/ as much/as far as you can ;            breath out hard /fast;            hold meter horizontal;            zero the meter;            lips/mouth around mouthpiece;            take highest/best of three readings;</p>	5	<p><b>accept</b> more than one correct response in each box</p> <p><b>ignore</b> nose clips/ sterilising mouthpiece</p> <p><b>ignore</b> sitting down/comfortable</p> <p><b>ignore</b> breathe in hard</p> <p><b>ignore</b> average</p>
		<b>Total</b>	<b>20</b>	



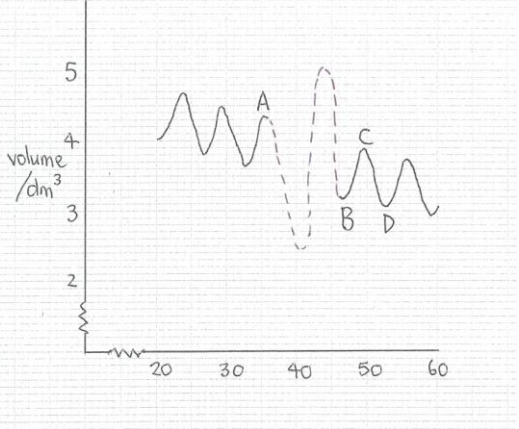
Expected Answers			Marks	Additional Guidance
3	a	<p><i>any two from:</i>            prevent (air) gap/space;            reduce, reflection/loss of (ultrasound) waves / improve transmission/            pass through more easily;            enhance quality of image;            lubrication/reduce friction;</p>	2	<p>OWTTE</p> <p><b>accept</b> prevent = reduce</p> <p><b>ignore</b> creates proper image</p>
	b	<p><b>i</b></p> <p><b>similarities</b></p> <p>shows bone/ soft tissue/ internal body structures;            black and white;</p> <p><b>differences</b></p> <p><i>any two from:</i>            ultrasound show, real time/moving/live, images;            ultrasound has a good resolution of soft tissue/named tissue images;            ultrasound produces 3D images;</p>	4	<p>OWTTE</p> <p><b>ignore</b> storage/digitisation of image</p> <p><b>ORA</b>  <b>note</b> if image not specified assume responses refer to ultrasound</p>
		<p><b>ii</b></p> <p><i>any four from:</i></p> <p>pass through skin/into body;            bounce/reflect off, structures/tissues/boundaries/baby;            the intensity/strength of reflection, influences image/ affected by            density of structure/tissue ;            waves are reflected to/detected at probe;            crystal (in the probe) converts wave to <b>voltage</b>;  <b>voltage</b> converted to image by computer;</p>	4	<p><b>ignore</b> speed of reflection</p> <p><b>accept</b> microphone/sensor/detector = probe</p>

Expected Answers			Marks	Additional Guidance									
c	i	<p><b>baby:</b> treated, in womb/soon after birth/ condition monitored/ treatment can be planned;</p> <p><b>Suzy/mother:</b> aware of condition/ may become adjusted to coping with the defect/ could consider a termination;</p>	2										
	ii	<p><i>any two from:</i></p> <p>unborn baby cannot decide on its own future/ mother needs to agree to treatment;</p> <p>mother needs to decide whether or not to terminate pregnancy/ may reject new born baby;</p> <p>accepting that the baby will have long-term kidney failure/ illness;</p> <p>treatment could harm Suzy/baby;</p> <p>deciding whether or not to inform family members/ confidentiality issues;</p> <p>consider issues affecting future pregnancies;</p>	2	<b>accept</b> poor quality of baby's life									
d	i	<table border="1"> <thead> <tr> <th>hazard when taking blood samples</th> <th>risk generated by the hazard</th> <th>procedure to reduce the risk to the nurse</th> </tr> </thead> <tbody> <tr> <td>reference to sharps/needles</td> <td>cutting skin/ blood loss/ contamination/ infection/ contract correct named disease</td> <td>new/sterile needles/ correct sharps disposal/ training</td> </tr> <tr> <td>reference to blood/open wounds</td> <td>contamination/ infection/ contract correct named disease</td> <td>wear gloves/ training/ blood samples in sealed containers</td> </tr> </tbody> </table>	hazard when taking blood samples	risk generated by the hazard	procedure to reduce the risk to the nurse	reference to sharps/needles	cutting skin/ blood loss/ contamination/ infection/ contract correct named disease	new/sterile needles/ correct sharps disposal/ training	reference to blood/open wounds	contamination/ infection/ contract correct named disease	wear gloves/ training/ blood samples in sealed containers	6	<p>Only 1 marking point per box</p> <p>Risk <b>must</b> be linked to correct hazard in the same row.</p> <p>Procedure <b>must</b> be linked to correct hazard and/or risk in the same row.</p> <p><b>ignore</b> scratch as a hazard</p>
hazard when taking blood samples	risk generated by the hazard	procedure to reduce the risk to the nurse											
reference to sharps/needles	cutting skin/ blood loss/ contamination/ infection/ contract correct named disease	new/sterile needles/ correct sharps disposal/ training											
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Expected Answers			Marks	Additional Guidance
	ii	<p><i>any two from:</i></p> <p>used for different tests;  repeat/duplicate tests/ more reliable/valid results/ to discount anomalies/outliers/ in case one gets broken/lost;  comparison/ later analysis;</p>	2	<b>ignore</b> accurate results/fair test
e	i	any week between 24 and 28;	1	<b>accept</b> when the haemoglobin levels start to increase/ change from 100 to 115;
	ii	<p><i>any three from:</i></p> <p>aerobic respiration needs oxygen;  haemoglobin carries oxygen/ oxyhaemoglobin formed/ less haemoglobin = less oxygen( carried);  <b>cells</b> not receiving sufficient oxygen;  rate of respiration drops/ aerobic respiration shifts to anaerobic;  <b>less</b> ATP released;</p>	3	<p><b>allow</b> muscles = cells</p> <p><b>reject</b> any reference to energy <b>production</b></p>
		<b>Total</b>	<b>26</b>	

Expected Answers				Marks	Additional Guidance	
4	a			5	<p><b>ignore</b> bpm  <b>accept</b> breaths per min / breaths min<sup>-1</sup></p> <p><b>accept</b> 6/6.0</p>	
		<b>feature measured</b>	<b>values/ range</b>			<b>units</b>
		breathing rate	<b>15 to 18</b>			<b>breaths per minute</b>
		<b>tidal volume</b>	0.4 – 0.5			dm <sup>3</sup>
		vital capacity (male)	<b>6.00</b>			dm <sup>3</sup>
vital capacity (female)	<b>4.25</b>	dm <sup>3</sup>				

Expected Answers		Marks	Additional Guidance																						
b	<table border="1"> <thead> <tr> <th>for health and safety</th> <th>for more meaningful results</th> </tr> </thead> <tbody> <tr><td>✓</td><td>✓</td></tr> <tr><td>✓</td><td>✓</td></tr> <tr><td>✓</td><td></td></tr> <tr><td></td><td>✓</td></tr> <tr><td>✓</td><td>✓</td></tr> <tr><td></td><td>✓</td></tr> <tr><td></td><td>(✓)</td></tr> <tr><td></td><td>✓</td></tr> <tr><td></td><td>✓</td></tr> <tr><td></td><td>✓</td></tr> </tbody> </table>	for health and safety	for more meaningful results	✓	✓	✓	✓	✓			✓	✓	✓		✓		(✓)		✓		✓		✓	4	9 correct rows = 4 marks 7 or 8 correct rows = 3 marks 5 or 6 correct rows = 2 marks 4 correct row = 1 mark 3 or fewer correct rows = 0 marks
	for health and safety	for more meaningful results																							
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c	<i>any three from:</i> use a nose clip/ breathe normally; breathe in, deeply/as much/far as possible; breathe out, deeply/as much/far as possible;	3	<b>ignore</b> sequence of events <b>ignore</b> relaxed <b>accept</b> big breaths in and out = 2 <b>ignore</b> breathe out/in as hard/ fast as possible																						

Expected Answers			Marks	Additional Guidance
d	i	 <p>trough before peak ; trough and peak both greater than tidal volume trace;</p>	2	<b>ignore</b> labels C and D shown in the hand drawn graph
	ii	<p><b>X</b> drawn at or level with a peak and an <b>adjacent</b> trough on Fig.4.2;</p> <p>any value between 0.6 and 0.9 ;</p>	2	<b>accept</b> alternative, clear indication of calculating reading on graph <b>reject</b> any measurements between points A and B
	iii	<p>volume of oxygen used is same as volume of carbon dioxide produced; but carbon dioxide released is absorbed by soda lime; volume of air/oxygen remaining in the chamber drops;</p>	3	<b>ignore</b> general/unqualified reference to oxygen levels dropping
<b>Total</b>			<b>19</b>	

Expected Answers			Marks	Additional Guidance
5	a	i	2	OWTTE ORA
		ii	1	<b>ignore</b> unqualified reference to colour <b>ignore</b> references to contamination of the sample
		iii	1	<b>ignore</b> surplus/excess reagents
	b		2	OWTTE  <b>ignore</b> the patient thinks they have AIDS
	c		1	<b>accept</b> AIDS virus = disease
		<b>Total</b>	<b>7</b>	

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