

**General Certificate of Education (A-level)  
January 2013**

**Biology**

**BIOL1**

**(Specification 2410)**

**Unit 1: Biology and Disease**

**Final**

***Mark Scheme***

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Question	Marking Guidance	Mark	Comments
1(a)	<b>(P)</b> Trachea/windpipe <u>and</u> <b>(Q)</b> bronchus;	1	For <b>P</b> or <b>Q</b> , accept (ring of) cartilage (i.e. not for both) Accept bronchi Reject bronchioles Ignore reference to left or right lung
1(b)	<ol style="list-style-type: none"> <li>1. Increases volume (in lungs/thorax);</li> <li>2. Lowers pressure (in lungs/thorax);</li> <li>3. Air (pushed) in by higher outside pressure / down pressure gradient;</li> </ol>	2 max	Context must be lungs/thorax Ignore space increases Accept lungs/chest expand Ignore reference to 'change in pressure' Ignore reference to 'sucked in'
1(c)	Tidal volume <u>and</u> ventilation rate;	1	Accept volume each breath and breathing rate Accept either way around Tidal volume must have context of 'in one breath' not 'volume' alone Ignore units Accept TV × VR/BR

Question	Marking Guidance	Mark	Comments
2(a)(i)	(Aerobic) respiration;	1	Accept ATP production/energy release Reject <u>anaerobic</u> respiration Reject energy production
2(a)(ii)	Golgi (apparatus/body);	1	Ignore smooth ER
2(b)	('It' = Optical microscope) 1. Has low resolution/not high enough resolution; 2. (Because) wavelength of light not short enough/too long;	2	Ignore reference to magnification Accept converse relating to EM Accept larger wavelength Accept statements that microscopes have a wavelength

Question	Marking Guidance	Mark	Comments
3(a)(i)	Glucose <u>and</u> fructose;	1	Ignore reference to alpha and beta Either way around
3(a)(ii)	Glucose <u>and</u> galactose;	1	Ignore reference to alpha and beta Either way around
3(b)	<ol style="list-style-type: none"><li>1. (Amylase) pancreas, produces maltose;</li><li>2. (Maltase) in/on epithelium (of small intestine), produces glucose;</li></ol>	2	Place <u>and</u> product = 1 mark (mark horizontally) Ignore references to salivary glands or saliva Accept wall/lining of small intestine Ignore reference to cells alone Ignore reference to ribosomes/rER

Question	Marking Guidance	Mark	Comments
4(a)	<ol style="list-style-type: none"> <li>1. Water lost into gut/water moves into gut/ water leaves cells;</li> <li>2. Low(er) water potential of intestine/gut (lumen);</li> <li>3. Osmosis/movement down a WP gradient;</li> <li>4. Less/not enough water (re)absorbed;</li> </ol>	3 max	<p>QWC ignore large/small WP</p> <p>QWC ignore reference to high/low concentrations of water or high/low concentrations of solution</p> <p>Ignore reference to stomach</p> <p>QWC ignore 'along' concentration gradients</p>
4(b)(i)	Starch is not (very) soluble/does not dissolve well;	1	<p>Accept converse for glucose in <b>A</b></p> <p>Ignore 'starch is osmotically inactive'</p> <p>Ignore reference to solute potentials</p>
4(b)(ii)	55;; Working : 5% for <b>A</b> and 60% for <b>B</b> ;	2	<p>2 marks for correct answer</p> <p>Max 1 if answer as a %</p>

Question	Marking Guidance	Mark	Comments
5(a)	<ol style="list-style-type: none"> <li>1. (Phosphate) changes shape of TK/changes shape of enzyme/changes the active site;</li> <li>2. Active site forms/becomes the right shape/can bind to substrate/complementary to substrate/E-S complex can form;</li> </ol>	2	<p>It = phosphate</p> <p>Accept 'alters' for changes</p> <ol style="list-style-type: none"> <li>1. Reject that phosphate is an inhibitor</li> </ol> <p>Accept adding energy/affecting charged/affects polar groups (on amino acids)</p> <ol style="list-style-type: none"> <li>2. Reject similar/same shape as substrate</li> </ol>
5(b)	<ol style="list-style-type: none"> <li>1. Faulty TK has functional active site <u>without phosphate</u>;</li> <li>2. (So, faulty) TK functional all the time/TK not controlled (by phosphate);</li> </ol>	2	Accept 'works without phosphate'
5(c)	<ol style="list-style-type: none"> <li>1. Non-competitive inhibitor/binds to site other than active site;</li> <li>2. Causes TK to be in non-functional form/active site not formed/wrong shape/E-S complex not formed;</li> <li>3. So, (uncontrolled) cell division stopped/slowed/controlled;</li> </ol>	2 max	<p>Accept allosteric site</p> <p>Do not accept 'changes shape' unqualified</p>

Question	Marking Guidance	Mark	Comments
6(a)	Aorta;	1	
6(b)	<ol style="list-style-type: none"> <li>Left ventricle pumps to whole body (except lungs)/pumps blood further;</li> <li>Left ventricle does most work/produces a greater pressure/produces a greater force;</li> </ol>	2	<p>Accept converse for right ventricle</p> <p>Reject 'push'</p>
6(c)	<ol style="list-style-type: none"> <li>(Valve <b>A</b>) atrioventricular valve;</li> <li>Semi-lunar valve;</li> </ol>	2	<ol style="list-style-type: none"> <li>Accept bicuspid/mitral</li> <li>Accept aortic valve</li> </ol> <p>Ignore references to left and right</p>
6(d)	<p><b>X</b> because (no mark)</p> <ol style="list-style-type: none"> <li>52.1% survived without replacement compared to 12.1% / difference of 40%;</li> <li>10.9% required repair or replacement of artificial heart compared to 41.4% / difference of 30.5%;</li> <li>37% died compared to 46.6% / difference of 9.6%;</li> </ol> <p><b>OR</b></p> <p>(<math>X/Y = 119</math> divided by <math>58 = 2.05</math>)</p> <p>14.4; 49.2; 55.4;</p>	3	<p>Accept other valid calculations – probabilities</p> <p>If correct figures written in table, award marks</p> <p><u>Max 2</u> if incorrect rounding of values</p> <p>Note that this ratio could be reversed i.e. 58 divided by 119 multiplied by numbers in top row</p> <p>Accept rounded to 14; 49; and 55;</p>

Question	Marking Guidance	Mark	Comments
7(a)	One suitable factor; E.g. Age/no heart condition/not on medication;	1 max	Not health or lifestyle Accept BMI/ smokers/ diet/ fitness/ race etc. – has to affect heart rate or blood pressure
7(b)	Patients were at rest/not moving/not using muscles/in standardised position/controlled conditions;	1	Accept same position as sleeping Ignore relaxed
7(c)	1. Caused by pressure/surge of blood; 2. From (one) contraction/beat of (left) ventricle/heart;	2	Ignore pulse rate equals heart rate Reject right ventricle Ignore pumps/pumping
7(d)	1. Monitor records heart rate over long period of time/all the time/more data collected; 2. Anomalies in recording have less effect; 3. Recording pulse rate for <u>one minute only</u> may give an anomalous/atypical result; 4. Errors when trying to count pulse for one minute/ human error; 5. Monitor records HR over a range of activities during the day/pulse rate only records for a single set of conditions;	2 max	Ignore reference to continuously as in stem Ignore anomalies can be discarded Ignore more accurate/reliable mean

7(e)	<ol style="list-style-type: none"><li>1. Men with condition always have higher heart rates;</li><li>2. But no direct measurements of blood pressure;</li><li>3. Only one investigation/test/need more studies;</li><li>4. Using different recording methods/conditions (in each case so cannot compare results);</li><li>5. Men without condition also have increased/higher heart rate in doctor's surgery;</li></ol>	2 max	<p>Accept blood pressure references for heart rate</p> <p>Accept - no stats analysis to show significance</p> <p>Ignore references to 'yes' and 'no' throughout</p>
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<p>8(c)</p>	<p>3 suitable suggestions;;; E.g.</p> <ol style="list-style-type: none"> <li>1. Inactive virus may become active/viral transformation;</li> <li>2. Attenuated virus might become harmful;</li> <li>3. Non-pathogenic virus may mutate and harm cells;</li> <li>4. Genetic information/protein (from HIV) may harm cells;</li> <li>5. People (may) become/test HIV positive after vaccine used;</li> <li>6. This may affect their work/life;</li> </ol>	<p>3 max</p>	<p>QWC ignore reference to HIV cells</p> <ol style="list-style-type: none"> <li>5. Vaccinated people may develop disease from a different strain to that in the vaccine</li> <li>6. May continue high risk activities and develop or pass on HIV</li> </ol>
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Question	Marking Guidance	Mark	Comments
9(a)	<p><u>By osmosis (no mark)</u></p> <ol style="list-style-type: none"> <li>1. From a high water potential to a low water potential/down a water potential gradient;</li> <li>2. Through aquaporins/water channels;</li> </ol> <p><u>By facilitated diffusion (no mark)</u></p> <ol style="list-style-type: none"> <li>3. Channel/carrier protein;</li> <li>4. Down concentration gradient;</li> </ol> <p><u>By active transport (no mark)</u></p> <ol style="list-style-type: none"> <li>5. Carrier protein/protein pumps;</li> <li>6. Against concentration gradient;</li> <li>7. Using ATP/energy (from respiration);</li> </ol> <p><u>By phagocytosis/endocytosis (no mark)</u></p> <ol style="list-style-type: none"> <li>8. Engulfing by cell surface membrane to form vesicle/vacuole;</li> </ol> <p><u>By exocytosis/role of Golgi vesicles (no mark)</u></p> <ol style="list-style-type: none"> <li>9. Fusion of vesicle with cell surface membrane;</li> </ol>	5 max	<p>No mark awarded for naming terms e.g. osmosis, facilitated diffusion, active transport, co-transport etc.</p> <p>QWC ignore large/small WP</p> <p>QWC ignore reference to high/low concentrations of water or high/low concentration of solution</p> <p>QWC ignore 'along' concentration gradients</p> <p>Co-transport subsumed into mark scheme for active transport and facilitated diffusion</p> <p>Can award MP2, 3, 5 for 3 marks with no context given</p> <p>Ignore lipid <u>diffusion</u> as in stem of question</p>

<p>9(b)</p>	<ol style="list-style-type: none"> <li>1. Atheroma is fatty material/cholesterol/foam cells/plaque/calcium deposits/LDL;</li> <li>2. <u>In</u> wall of <u>artery</u>;</li> <li>3. (Higher risk of) aneurysm/described;</li> <li>4. (Higher risk of) thrombus formation/blood clot;</li> <li>5. Blocks coronary artery;</li> <li>6. Less oxygen/glucose to heart <u>muscle/cells/tissue</u>;</li> <li>7. Reduces/prevents respiration;</li> <li>8. Causing myocardial infarction/heart attack;</li> <li>9. Blocks artery to brain;</li> <li>10. Causes stroke/stroke described;</li> </ol>	<p>5 max</p>	<ol style="list-style-type: none"> <li>2. Reject 'on', 'in artery', 'vein' Thicker walls insufficient</li> <li>4. Accept pulmonary embolism/described</li> </ol>
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