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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)	(**P**) Trachea/windpipe and (**Q**) bronchus;	1	For **P** or **Q**, accept (ring of) cartilage (i.e. not for both) Accept bronchi Reject bronchioles Ignore reference to left or right lung
1(b)	1. Increases volume (in lungs/thorax); 2. Lowers pressure (in lungs/thorax); 3. Air (pushed) in by higher outside pressure / down pressure gradient;	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 and 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 anaerobic 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 and fructose;	1	Ignore reference to alpha and beta Either way around
3(a)(ii)	Glucose and galactose;	1	Ignore reference to alpha and beta Either way around
3(b)	1. (Amylase) pancreas, produces maltose; 2. (Maltase) in/on epithelium (of small intestine), produces glucose;	2	Place and 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)	1. Water lost into gut/water moves into gut/ water leaves cells; 2. Low(er) water potential of intestine/gut (lumen); 3. Osmosis/movement down a WP gradient; 4. Less/not enough water (re)absorbed;	3 max	QWC ignore large/small WP QWC ignore reference to high/low concentrations of water or high/low concentrations of solution Ignore reference to stomach QWC ignore 'along' concentration gradients
4(b)(i)	Starch is not (very) soluble/does not dissolve well;	1	Accept converse for glucose in **A** Ignore 'starch is osmotically inactive' Ignore reference to solute potentials
4(b)(ii)	55;; Working : 5% for **A** and 60% for **B**;	2	2 marks for correct answer Max 1 if answer as a %

Question	Marking Guidance	Mark	Comments
5(a)	1. (Phosphate) changes shape of TK/changes shape of enzyme/changes the active site; 2. Active site forms/becomes the right shape/can bind to substrate/complementary to substrate/E-S complex can form;	2	It = phosphate Accept 'alters' for changes 1. Reject that phosphate is an inhibitor Accept adding energy/affecting charged/affects polar groups (on amino acids) 2. Reject similar/same shape as substrate
5(b)	1. Faulty TK has functional active site <u>without phosphate</u>; 2. (So, faulty) TK functional all the time/TK not controlled (by phosphate);	2	Accept 'works without phosphate'
5(c)	1. Non-competitive inhibitor/binds to site other than active site; 2. Causes TK to be in non-functional form/active site not formed/wrong shape/E-S complex not formed; 3. So, (uncontrolled) cell division stopped/slowed/controlled;	2 max	Accept allosteric site Do not accept 'changes shape' unqualified

Question	Marking Guidance	Mark	Comments
6(a)	Aorta;	1	
6(b)	1. Left ventricle pumps to whole body (except lungs)/pumps blood further; 2. Left ventricle does most work/produces a greater pressure/produces a greater force;	2	Accept converse for right ventricle Reject 'push'
6(c)	1. (Valve **A**) atrioventricular valve; 2. Semi-lunar valve;	2	1. Accept bicuspid/mitral 2. Accept aortic valve Ignore references to left and right
6(d)	**X** because (no mark) 1. 52.1% survived without replacement compared to 12.1% / difference of 40%; 2. 10.9% required repair or replacement of artificial heart compared to 41.4% / difference of 30.5%; 3. 37% died compared to 46.6% / difference of 9.6%; ***OR*** (X/Y = 119 divided by 58 = 2.05) 14.4; 49.2; 55.4;	3	Accept other valid calculations – probabilities If correct figures written in table, award marks Max 2 if incorrect rounding of values Note that this ratio could be reversed i.e. 58 divided by 119 multiplied by numbers in top row Accept rounded to 14; 49; and 55;

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)	1. Men with condition always have higher heart rates; 2. But no direct measurements of blood pressure; 3. Only one investigation/test/need more studies; 4. Using different recording methods/conditions (in each case so cannot compare results); 5. Men without condition also have increased/higher heart rate in doctor's surgery;	2 max	Accept blood pressure references for heart rate Accept - no stats analysis to show significance Ignore references to 'yes' and 'no' throughout

Question	Marking Guidance	Mark	Comments
8(a)	1. Infected by/susceptible to (other) pathogen(s)/named disease caused by a pathogen (from environment); 2. Pathogen(s) reproduce/cause diease (in host); 3. Damage cells/tissues/organs; 4. Release toxins;	3 max	Context is where immune system cannot prevent or stop these events Allow attack/kill MPs not given in context of HIV
8(b)(i)	1. (HIV enters cells) before antibodies can bind to/destroy it; 2. Antibodies cannot enter cells (to destroy HIV)/stay in blood; ***OR*** 3. (Enters cells) before (secondary) immune response caused/before memory cells have time to respond; 4. So no antibodies present (to attack HIV); ***OR*** 5. Vaccine taken up too quickly to cause immune response; 6. So no antibodies/memory cells formed;	2 max	Ignore SAFETY comments 1. and 2. Relate to antibodies 3. and 4. Relate to virus 5. and 6. Relate to vaccine
8(b)(ii)	1. Antigen (on HIV) changes; 2. (Specific) antibody/receptor no longer binds to (new) antigen; ***OR*** 3. Many different strains of HIV/many antigens present on HIV; 4. Not possible to make a vaccine for all antigens/vaccine may not stimulate an antibody for a particular antigen;	2 max	Accept mutates Ignore SAFETY comments

8(c)	3 suitable suggestions;;; E.g. 1. Inactive virus may become active/viral transformation; 2. Attenuated virus might become harmful; 3. Non-pathogenic virus may mutate and harm cells; 4. Genetic information/protein (from HIV) may harm cells; 5. People (may) become/test HIV positive after vaccine used; 6. This may affect their work/life;	3 max	QWC ignore reference to HIV cells 5. Vaccinated people may develop disease from a different strain to that in the vaccine 6. May continue high risk activities and develop or pass on HIV

Question	Marking Guidance	Mark	Comments
9(a)	<u>By osmosis (no mark)</u> 1. From a high water potential to a low water potential/down a water potential gradient; 2. Through aquaporins/water channels; <u>By facilitated diffusion (no mark)</u> 3. Channel/carrier protein; 4. Down concentration gradient; <u>By active transport (no mark)</u> 5. Carrier protein/protein pumps; 6. Against concentration gradient; 7. Using ATP/energy (from respiration); <u>By phagocytosis/endocytosis (no mark)</u> 8. Engulfing by cell surface membrane to form vesicle/vacuole; <u>By exocytosis/role of Golgi vesicles (no mark)</u> 9. Fusion of vesicle with cell surface membrane;	5 max	No mark awarded for naming terms e.g. osmosis, facilitated diffusion, active transport, co-transport etc. QWC ignore large/small WP QWC ignore reference to high/low concentrations of water or high/low concentration of solution QWC ignore 'along' concentration gradients Co-transport subsumed into mark scheme for active transport and facilitated diffusion Can award MP2, 3, 5 for 3 marks with no context given Ignore lipid <u>diffusion</u> as in stem of question

9(b)	1. Atheroma is fatty material/cholesterol/foam cells/plaque/calcium deposits/LDL; 2. In wall of artery; 3. (Higher risk of) aneurysm/described; 4. (Higher risk of) thrombus formation/blood clot; 5. Blocks coronary artery; 6. Less oxygen/glucose to heart muscle/cells/tissue; 7. Reduces/prevents respiration; 8. Causing myocardial infarction/heart attack; 9. Blocks artery to brain; 10. Causes stroke/stroke described;	5 max	2. Reject 'on', 'in artery', 'vein' Thicker walls insufficient 4. Accept pulmonary embolism/described