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General Certificate of Education (A-level)
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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 <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 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)	By osmosis (no mark) 1. From a high water potential to a low water potential/down a water potential gradient; 2. Through aquaporins/water channels; By facilitated diffusion (no mark) 3. Channel/carrier protein; 4. Down concentration gradient; By active transport (no mark) 5. Carrier protein/protein pumps; 6. Against concentration gradient; 7. Using ATP/energy (from respiration); By phagocytosis/endocytosis (no mark) 8. Engulfing by cell surface membrane to form vesicle/vacuole; By exocytosis/role of Golgi vesicles (no mark) 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 diffusion 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