Mark Scheme (Results)

January 2018

Pearson Edexcel International Advanced Level In Biology (WBI01) Paper 01 Lifestyle, Transport, Genes And Health

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Question Number	Correct Answer	Mark
1(a)(i)	**1(a)(i). The only correct answer is C** ***A*** *is not correct because it is not a stage of the cardiac cycle* ***B*** *is not correct because the pressures are too high* ***D*** *is not correct because the pressures are too high*	**(1)**

Question Number	Correct Answer	Mark
1(a)(ii)	**1(a)(ii). The only correct answer is C** ***A*** *is not correct because the AV valve is open* ***B*** *is not correct because the AV valve is open* ***D*** *is not correct because the semi lunar valve is closed*	**(1)**

Question Number	Answer	Additional Guidance	Mark
1(b)(i)	1. 0.44 ; 2. 60 ÷ 0.44 = 136 (bpm)	Mp1 A-0.42 to 0.45 Ignore-(0.64-0.2) Mp2 do not accept decimal points A-133/136/140/143 **Correct answer gains both marks**	**(2)**

Question Number	Correct Answer	Additional guidance	Mark
1(b)(ii)	aorta ;		**(1)**

Question Number	Answer	Additional guidance	Mark
1(c)	1. to generate pressure / ensure mass { transport / flow } ; 2. idea of overcoming the limitations of diffusion ;	Mp1 A-to pump blood in one direction/ pump blood around the body I-maintain pressure I-pump blood ONLY Mp2 A-diffusion alone is insufficient I-distance is too large ONLY I-refs to SA/V ratio	**(2)**

Question Number	Correct Answer	Additional guidance	Mark
2(a)	1.ventilation/correct description of ; 1. idea of removing carbon dioxide **and** replenishing oxygen ; 2. idea of blood flow (in capillaries) ; 3. removing {oxygenated blood/oxygen} from {gas exchange surface /alveoli} ; OR bringing {deoxygenated blood/carbon dioxide} to the {gas exchange surface / alveoli} ;	Mp1 A-breathing I-refs to GE surface FEATURES	**(3)**

Question Number	Correct Answer	Additional guidance	Mark
2(b)	(QWC – Spelling of technical terms must be correct and answer must be organised in a logical sequence) 1. {faulty / absent/non-functional/eq } CFTR {protein/channel} ; 2. CFTR protein is a {chloride ion channel} ; 3. chloride ions stay inside cells /do not enter mucus ; 4. water does not move from cells into the mucus / eq ; 5. by osmosis ; 6. thick mucus (in the airways) / eq ; 7. idea of reduced ventilation at gas exchange surface ; 8. idea of reduced {concentration gradient/diffusion} of gases (in the alveoli) ;	Emphasis on logical sequence Penalise use of chlorine only ONCE Do not accept gene Mp4 A-water moves into cells(from mucus) Mp6 A ref to viscous/sticky Mp7 A - reduced airflow to alveoli ignore – blockage of airways or alveoli. Mp8 ignore -less efficient/reduced gas exchange ONLY	**(5)**

Question Number	Correct Answer	Additional guidance	Mark
2(c)	Similarities 1. unaffected/normal/eq alleles of the CFTR gene (are obtained) ; 2. inserted into target cells using a {vector / carrier mechanism } ; Differences 3. in germ line gene therapy the target cell is an {embryonic stem cell / eq} **AND** in somatic gene therapy the target is cells in the {affected/eq tissue} ; 4. germ line therapy only needs to be carried out once **AND** somatic gene therapy needs to be repeated ;	Mp1 do not accept gene alone, but allow 'form of gene' Mp2 Accept named vector or mechanism e.g. virus/ liposome/plasmid/gene gun Mp3 and 4-both parts of mp needed as Q is comparative. Ignore gametes. Mp4 A - permanent v temporary Do not accept -"cure" ignore - refs to ethics/cost	**(3)**

Question Number	Correct Answer	Mark
3(a)(i)	**3(a)(i). The only correct answer is D** ***A*** *is not correct because the figures in table are not inversely proportional* ***B*** *is not correct because the figures in table are not inversely proportional* ***C*** *is not correct because the figures in table are not inversely proportional*	**(1)**

Question Number	Correct Answer	Mark
3(a)(ii)	**3(a)(ii). The only correct answer is D** ***A*** *is not correct because this calculation is incorrect* ***B*** *is not correct because this calculation is incorrect* ***C*** *is not correct because this calculation is incorrect*	**(1)**

Question Number	Answer	Additional guidance	Mark
3(b)(i)	1. as the concentration of cholesterol increases the incidence of CVD increases ; 2. as the blood pressure increases the incidence of CVD increases ; 3. for systolic blood pressure {above 21.2 kPa} there is a large / eq increase in the incidence of CVD ; 4. correct manipulation of data linked to mp1,2 or 3 ;	Mp1 and 2: A-positive correlation/directly proportional. A - converses Mp3 I - highest/A-greatest increase	**(3)**

Question Number	Answer	Additional guidance	Mark
3(b)(ii)	1. { endothelium / lining } of arteries is damaged ; 2. an inflammatory response takes place ; 3. {cholesterol/calcium salts/fibrous tissue} builds up/eq ; 4. {atheroma/ plaques} form ; 5. narrowing of arteries / formation of blood clot more likely ; 6. reduced supply of {oxygen/glucose/ nutrients } to tissues ; 7. idea of death or fatigue of tissue/a correctly named CVD ;	Mp1 A-endothelial cells Do not accept - endothelium wall Mp5 A-blocks artery Mp7 accept heart attack/myocardial infarction/stroke/angina	**(4)**

Question Number	Answer	Additional guidance	Mark
3(b)(iii)	1. antihypertensives / eq ; 2. dizziness, nausea, abnormal heart rhythm ; 3. statins ; 4. muscle pain / diabetes ; 5. anticoagulants / eq ; 6. increased risk of bleeding / eq ; 7. platelet inhibitory drugs/eq ; 8. increased risk of bleeding/eq ;	Accept: ACE inhibitors, calcium channel blockers/diuretics/beta blockers/vasodilators/ARBs A-propranolol/other named drug Mp2-Accept: other correctly identified side effect eg hypotension,swollen ankles.dizziness Mp 4 Accept: muscle inflammation, muscle pain, liver damage,diabetes/kidney failure Mp5-accept named examples e.g. aspirin, warfarin, heparin Mp7 clopidogrel/trifusal NB-an incorrect answer I a list negates the mp	**(4)**

Question Number	Answer	Additional guidance	Mark
4(a)	1. condensation reaction / removal of water ; 2. between amino group and carboxylic acid group ; 3. forming a peptide bond ;	**Accept all MPs on a correct diagram, accept correct chemical formulae** Mp2 A-carboxyl group, amine group Mp3 A-amide bond	**(3)**

Question Number	Answer	Additional guidance	Mark
4(b)(i)	1. 3 ÷ 70 ; 2. 4.29 (%) ;	Accept 4% or 4.3% Do not accept - 4.2 or 4.28 Accept correct answer to any number of DPs Correct answer gains 2 marks	**(2)**

Question Number	Answer	Additional guidance	Mark
4(b)(ii)	1. converted to fibrin (by thrombin) ; 2. this forms (insoluble) mesh / eq ; 3. trapping the {red blood cells/platelets} ;	Mp3 I-blood cells only	**(2)**

Question Number	Answer	Additional guidance	Mark
4(c)	1. primary structure is the {order/sequence} of amino acids ; 2. determines the {folding of the protein/secondary structure} ; 3. determines the {position / type } of bonds (between R groups); 4. determines the {3 D shape/tertiary structure} of the albumin / albumin is a globular protein ; 5. so that hydrophilic { R groups / amino acids} are on the outside of the protein/hydrophobic R groups are inside ;	Mp1 do not accept ref to bases Mp3 accept correctly named bond, do not accept peptide bond Mp5 accept polar for hydrophilic, non-polar for hydrophobic	**(4)**

Question Number	Correct Answer	Mark
5(a)(i)	**5(a)(i). The only correct answer is B** ***A*** *is not correct because Y is not a fatty acid chain* ***C*** *is not correct because Y is not a fatty acid chain* ***D*** *is not correct because the phosphate groups which point outwards are not hydrophobic*	**(1)**

Question Number	Correct Answer	Mark
5(a)(ii)	**5(a)(ii). The only correct answer is D** ***A*** *is not correct because this is an incorrect calculation* ***B*** *is not correct because this is an incorrect calculation* ***C*** *is not correct because this is an incorrect calculation*	**(1)**

Question Number	Answer	Additional guidance	Mark
5(b)(i)	1. by (simple) diffusion ; 2. from a region of high concentration to a region of low concentration / eq ; 3. oxygen is small **and** non-polar so it can pass directly between phospholipids/through bilayer ;	Mp1 do not accept facilitated diffusion Mp2 A - down a concentration gradient Mp3 ignore-through the membrane only	**(2)**

Question Number	Answer	Additional guidance	Mark
5(b)(ii)	1. ref to active transport/pump ; 2. ATP is used to {activate/change shape} of carrier protein / eq ; 3. concentration of potassium ions is higher inside the cell than outside ;	Mp1 A-to pump K^+/for Na^+/K^+ pump Mp3 A-moved against the concentration gradient Mp3 A-converse	**(2)**

Question Number	Answer	Additional guidance	Mark
5(b)(iii)	1. facilitated diffusion ; 2. through a {channel / carrier / co-transport} protein ; 3. from a region of high concentration to a region of low concentration ;	Mp1 do not accept diffusion only Mp3 A-down a concentration gradient	**(2)**

Question Number	Answer	Additional guidance	Mark
6(a)(i)	1. sequence of {nucleotides / bases} in DNA ; 2. carrying the information for / coding for a {polypeptide / protein} ;	Mp2 accept "codes for a characteristic through protein synthesis"	**(2)**

Question Number	Correct Answer	Mark
6(a)(ii)	**6(a)(ii). The only correct answer is B** ***A*** *is not correct because 3 is too few for a triplet code* ***C*** *is not correct because 6 is too many for a triplet code* ***D*** *is not correct because 12 is too many for a triplet code*	**(1)**

Question Number	Correct Answer	Mark
6(a)(iii)	**6(a)(iii). The only correct answer is C** ***A*** *is not correct because the base pairing is incorrect* ***B*** *is not correct because the base pairing is incorrect* ***D*** *is not correct because the base pairing is incorrect*	**(1)**

Question Number	Answer	Additional guidance	Mark
6(b)(i)	1. if **both** parents / genotypes are {homozygous dominant / not carriers / eq} ; 2. probability = 0 ; 3. if **one** parent / genotype is {heterozygous/a carrier} ; 4. genotypes of the offspring if one parent is heterozygous ; 5. probability = 50% ;	Mp1-ignore normal Accept suitable genetic diagrams for all mps Accept any letter Do not accept - different letters Mp 3 / 4 - if **two** heterozygotes/carriers are given as parents **do not allow** Mp5 A-0.5/ 1 in 2/2 in 4 Do not accept-ratios eg 1:1(ignore if the correct probability is ALSO given)	**(4)**

Question Number	Answer	Additional guidance	Mark
6(b)(ii)	chorionic villus sampling / CVS ;	Accept spelling variants Accept-chorionic villus testing	**(1)**

Question Number	Answer	Additional guidance	Mark
7(a)	1. presence of -OH/hydroxyl groups ; 2. these are polar groups ; 3. form hydrogen bonds with water (molecules) ;	Mp2 I - vitamin C is polar	**(2)**

Question Number	Answer	Additional guidance	Mark
7(b)	1. as intake of vitamin C increases the relative risk of CVD decreases for **both** men and women ; 2. idea that the risk decreases more for women ; 3. idea that for females there is a continuous decrease with increasing vitamin C intake, **but** not for males ; 4. below 92 , women are at a greater risk **and** above 92, men are at a greater risk OR at 92 the risk for men and women is equal ;	Mp1 - Accept negative correlation / inversely proportional Mp 2 - Accept converse Accept answers within the range 91 – 93 mg day^{-1}	**(3)**

Question Number	Answer	Additional guidance	Mark
***7(c)**	(QWC – Spelling of technical terms must be correct and answer must be organised in a logical sequence) 1. prepare {extract / juice} from each fruit ; 2. use of DCPIP ; 3. titrate using the same {mass / volume} of {the extract / DCPIP} ; 4. description of correct colour change-eg blue to pink/colourless ; 5. method of standardisation ; 6. repeat (whole experiment not with diff fruits) ; 7. idea of controlling the source of the fruit ;	QWC emphasis on clarity of expression Mp1 A description of preparation Mp3 I-amount. Accept stated or known volumes, description of titration, e.g. adding and counting drops Mp4 A-decolourises from blue Mp5 A-calibration curve Mp 7 A- age, storage conditions/temp/time, variety for each species	**(5)**

Question Number	Answer	Additional guidance	Mark
8(a)	1. glycosidic {bonds/links} ; 2. formed by {condensation/removal of water} ; 3. 1,4 **and** 1,6 (glycosidic bonds) ;	Mp1 and 2-A on diagram	**(3)**

Question Number	Answer	Additional guidance	Mark
8(b)	1. branched/terminal ends/side chains ; 2. {rapid/eq} release of glucose or {rapid/eq} {breakdown/hydrolysis} of glycogen ; 3. {rapid/eq} energy release ;	Mp2/3 do not accept "easier"	**(2)**

Question Number	Answer	Additional guidance	Mark
8(c)(i)	1. as the enzyme concentration increases, the initial rate of glycogen synthesis also increases ; 2. idea that the rate {decreases/levels off/plateaus/becomes constant/eq} at higher concentrations ; 3. credit correct manipulation of data ;	Mp1 A-positive correlation/directly proportional Mp2 do not accept-slows down Mp3 Eg from 15-80au there is a 0.5mmol increase	**(2)**

Question Number	Answer	Additional guidance	Mark
8(c)(ii)	1. at low enzyme concentrations enzyme (concentration) is limiting / all active sites are occupied ; 2. increasing the enzyme concentration increases the number of active sites ; 3. (because) more reactions/collisions per unit time/more ESCs formed per unit time ; 4. idea that substrate (concentration) is limiting at higher enzyme concentrations ; 5. (because) not all of the {enzymes/active sites} are occupied/no increase in ESCs formed per unit time ;	Mp1 A-glycogen synthase Mp2 accept-increased frequency Mp4 A-glucose	**(4)**