Mark Scheme (Results)
October 2017

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

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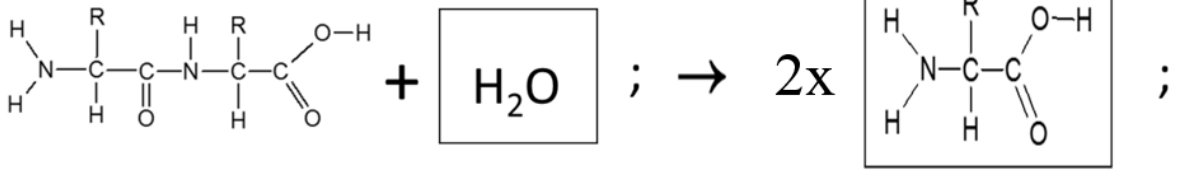
General Marking Guidance

- 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	Answer	Additional guidance	Mark
1(a)		ACCEPT structural formula for water or 'water' ACCEPT- COOH ACCEPT 2 separate amino acids drawn in box	**(2)**

Question Number	Answer	Additional guidance	Mark
1(b)	hydrolysis ;	Accept-hydrolisis	**(1)**

Question Number	Answer	Additional guidance	Mark
1(c)	peptide bond ;		**(1)**

Question Number	Answer	Additional guidance	Mark
1(d)	1. active site that { fits /eq } the { substrate /dipeptide } ; 2. lowers the activation energy (for the reaction) ; 3. detail of how the activation energy is lowered ;	mp1 accept-connects to, attaches mp1 accept an ESC is formed/eq mp3 e.g**.** by weakening or breaking the peptide bond	**(2)**

Question Number	Answer	Mark
2(a)	**2(a). The only correct answer is C** ***A*** *is not correct because although membranes contain carbohydrate this plays no role in the diffusion of oxygen* ***B*** *is not correct because although membranes contain cholesterol this plays no role in the diffusion of oxygen* ***D*** *is not correct because oxygen is non-polar*	**(1)**

Question Number	Answer	Additional guidance	Mark
2(b)(i)	Alveoli / alveolus / alveolar wall / eq ;	Allow description of alveoli e.g. layer of squamous epithelium	**(1)**

Question Number	Answer	Mark
2(b)(ii)	**2(b)(ii). The only correct answer is B** ***A*** *is not correct because surface area is not at its maximum and the thickness is not at its minimum* ***C*** *is not correct because surface area is not at its maximum and the thickness is not at its* ***D*** *is not correct because surface area is not at its maximum and the thickness is not at its*	**(1)**

Question Number	Answer	Additional guidance	Mark
2(c)(i)	1. 18 (mm) / 1.8 cm 2. 0.4 (μm) ;	Accept range from 17-19 mm/1.7-1.9 cm Ecf to mp2 Accept-0.36/0.38/0.4/0.404 Correct answer with no working gains both marks	**(2)**

Question Number	Answer	Additional guidance	Mark
2(c)(ii)	endothelial / (squamous) epithelial cell ;	ACCEPT endothelium, (simple / pavement / flattened) epithelium	**(1)**

Question Number	Answer	Additional guidance	Mark
3(a)	1. phospholipids are able to move ; 2. proteins are scattered in the membrane / eq ;	Mp1 accept ref to them being fluid Mp2 Ignore ref to them forming a mosaic Mp2 Accept-randomly distributed	**(2)**

Question Number	Answer	Mark
3(b(i)	**3(b(i).The only correct answer is D** ***A*** *is not correct because this is too low* ***B*** *is not correct because this is too low* ***C*** *in not correct because this is too low*	**(1)**

Question Number	Answer	Additional guidance	Mark
3(b)(ii)	diffusion ;	Accept simple diffusion	**(1)**

Question Number	Answer	Additional guidance	Mark
3(c)(i)	• increase ; • greater/ higher/eq ; • permeable ; • osmosis ;	DNA-semi/partially permeable	**(4)**

Question Number	Answer	Additional guidance	Mark
3(c)(ii)	1. (membrane) proteins are denatured by heat / eq ; 2. {solutes / cytoplasm / water/eq } leave the {cells/tissues} ;	Mp1-Accept proteins are damaged/disrupted DNA- destroyed/killed Ignore ref to membrane ONLY Mp2-accept cell contents leave only	**(2)**

Question Number	Answer	Additional guidance	Mark
4(a)	1. if energy {intake/input} exceeds energy requirements/eq ; 2. idea that excess energy will be stored as fat ; 3. resulting in an increase in {body mass/BMI} ;	Mp1 accept energy expenditure/output/used I-ref to calories Mp3 accept weight Ignore obesity	**(2)**

Question Number	Answer	Additional guidance	Mark
4(b)(i)	EITHER 1. 1.74 – 0.90 = 0.84 ; 2. (0.84 ÷ 1.74) x 100 = 48.3% ; OR 3. 1.74 – 0.90 = 0.84 ; 4. (0.84 ÷ 0.9) x 100 = 93.33% ;	**Correct answer with no working gains full marks** DNA-48 as a whole number DNA-48.2 Accept-48.28 and 48.27	**(2)**

Question Number	Answer	Additional guidance	Mark
4(b)(ii)	reduced levels of selenium (in the diet) are associated with an increase in BMI/obesity (for both men and women) ;	ACCEPT converse ACCEPT inverse / negative correlation ;	**(1)**

Question Number	Answer	Additional guidance	Mark
4(b)(iii)	1. skin fold thickness ; 2. waist circumference/eq ; 3. waist to hip ratio ; 4. body fat mass/body fat % ; 5. body fat distribution ;	Mp2 accept size/width/diameter DNA-hip to waist ratio DNA-mass/weight only DNA-BMR	**(1)**

Question Number	Answer	Mark
4(c)(i)	**4(c)(i). The only correct answer is C** ***A*** *is not correct because a correlation is not shown* ***B*** *is not correct because a correlation is not shown* ***D*** *is not correct because a correlation is not shown*	**(1)**

Question Number	Answer	Additional guidance	Mark
4(c)(ii)	1. idea that smoking causes platelet damage ; 2. increases the risk of formation of blood clots ; 3. increases the risk of {plaque formation/atheroma/ atherosclerosis} ; 4. increases blood pressure ;	Mp1 accept platelets become "sticky"	**(3)**

Question Number	Answer	Additional guidance	Mark
5(a)	1. frog **and** humans have a double circulatory system ; 2. frog **and** human hearts have two atria ; 3. frog **and** human have pulmonary circuit /carry blood to lungs ; 4. frog **and** human have a systemic circuit /carry blood around body ; 5. frog heart has only one ventricle while human heart has two/eq ; 6. in frog oxygenated blood and deoxygenated blood are mixed **but** not mixed in humans/eq ;	**Please not that each MP must be comparative-ie mention both frog and human to gain mark** Ignore-3 v 4 chambers Mp5 accept frog heart has no septum/is not separated while human heart has septum/is separated	**(4)**

Question Number	Answer	Additional guidance	Mark
5(b)	1. oxygenated and deoxygenated circuits are kept separate / not mixed/eq ; 2. idea that this maintains a steep gas concentration gradient in the lungs/eq ; 3. (leading to) a fast rate of diffusion of { oxygen / carbon dioxide / gases } in the lungs	Accept converse for all mps	**(3)**

Question Number	Answer	Additional guidance	Mark
***5(c)**	1. atrioventricular valve opens during atrial systole ; 2. to allow blood to flow into the ventricle ; 3. atrioventricular valve closes during ventricular systole ; 4. to prevent blood flowing back into the atria ; 5. semilunar valve opens during ventricular systole ; 6. to allow blood into the aorta/arteries ; 7. semilunar closes during diastole ; 8. to prevent blood from flowing back into the ventricle ;	**QWC emphasis is clarity of expression** **Paired responses-but mp1/3/5/7 are stand alone marks.** Accept named AV valves eg bicuspid and tricuspid Accept contraction for systole/relaxation for diastole for all mps	**(5)**

Question Number	Answer	Additional guidance	Mark
6(a)(i)	1. place a *Daphnia* (in a drop of solution) on a microscope slide/eq ; 2. use an appropriate method to hold *Daphnia* in place ; 3. time/stated time to acclimatise in the solution (before measurements are taken) ; 4. count number of heart beats in set time period- eg 10 secs-60 secs ; 5. determine heart rate at each time point ; 6. **named** control variable ; eg temperature, concentration / volume of glucose / lactose, time for acclimatisation	Mp2 eg cotton wool/ cover slip/vaseline Mp5 accept find beats per minute/bpm Mp6 eg temperature, concentration / volume of glucose / lactose, time for acclimatisation,same species or source of Daphnia/pH	**(4)**

Question Number	Answer	Additional guidance	Mark
6(a)(ii)	1. idea that glucose has very little effect on the heart rate ; 2. idea that overall lactose causes a decrease in heart rate(compared with control) ; 3. lactose has very little effect on heart rate {in the first 16 minutes/up to 16 minutes} ; 4. idea that lactose decreases the heart rate {after 16 minutes/from 16 minutes until the end} ; 5. credit correct manipulation of figures compared to the control ;	**ACCEPT glucose increases heart rate slightly** Eg at end of experiment/90 mins there is a diff of 140 bpm between lactose and control or x 4.5	**(3)**

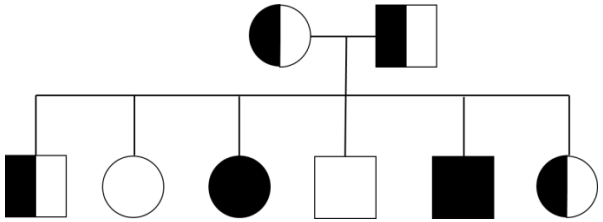
Question Number	Answer	Mark
6(a)(iii)	**6(a)(iii). The only correct answer is B** *lactose is NOT made from glucose and fructose* *only lactose contains a glycosidic bond because it is a disaccharide* *glucose IS a monosaccharide and lactose is NOT a monosaccharide*	**(1)**

Question Number	Answer	Additional guidance	Mark
6(b)(i)	1. lactose is larger than glucose/converse ; 2. lactose fills the opening in the ion channels ;	Accept: lactose has a different shape Mp2 accept glucose passes through the ion channel DO NOT ACCEPT lactose blocks the channel	**(2)**

Question Number	Answer	Additional guidance	Mark
6(b)(ii)	1. named disaccharide ; 2. slows/decreases (heart rate)/same effect as lactose ; or 3. named monosaccharide ; 4. has no/little effect (on heart rate)/same effect as glucose ;	**e.g. sucrose, maltose,** **e.g. fructose, ribose, deoxyribose, galactose,**	**(2)**

Question Number	Answer	Mark
7(a)(i)	**7(a)(i). The only correct answer is C** ***A*** *is not correct because hexose sugars are not present* ***B*** *is not correct because hexose sugars are not present* ***D*** *is not correct because uracil is not present*	**(1)**

Question Number	Answer	Mark
7(a)(ii)	**7(a)(ii). The only correct answer is D** ***A*** *is not correct because alleles occur in pairs* ***B*** *is not correct because there will always be SOME effect* ***C*** *is not correct because being heterozygous is irrelevant*	**(1)**

Question Number	Answer	Additional guidance	Mark
7(b)	1. parents correctly shown ; 2. three genotypes shown in offspring ; 3. six genotypes shown as male and female ;	Allow consequential error (incorrect parents)  Ignore Punnet squares	**(3)**

Question Number	Answer	Additional guidance	Mark
7(c)(i)	1. there are 20 (different) amino acids ; 2. three bases gives 64 possibilities ; 3. two bases gives 16 possibilities ; 4. idea that three bases is more than enough, two bases would not be enough ;		**(2)**

Question Number	Answer	Additional guidance	Mark
7(c)(ii)	**(QWC – Spelling of technical terms must be correct and the answer must be organised in a logical sequence)** 1. double helix/DNA unwinds/unzips/separates/eq ; 2. helicase breaks hydrogen bonds ; 3. (mono) nucleotides line up along the single strands ; 4. complementary base pairing occurs ; 5. hydrogen bonds form (between bases) ; 6. DNA polymerase joins the nucleotides together ; 7. with phosphodiester bonds ; 8. reference to semiconservative replication / two identical {copies of DNA/daughter strands} are made ;	**QWC emphasis is logical sequence [penalise once only]** Mp4 accept description of complementary base pairing eg A-T/G-C	**(5)**

Question Number	Answer	Additional guidance	Mark
8(a)	1. idea that prothrombin is the inactive enzyme ; 2. prothrombin is converted to { thrombin /an active enzyme} ; 3. by thromboplastin ; 4. (thrombin) converts fibrinogen to fibrin ; 5. fibrin traps {platelets/red blood cells} to form clot ;	mp1 ignore protein mp1 ignore inactive only	**(3)**

Question Number	Answer	Additional guidance	Mark
8(b)	1. as prothrombin concentration increases clotting time decreases ; 2. more prothrombin to convert into thrombin ; 3. the greater the concentration of thrombin the faster the production of fibrin ;	Mp1 accept negative correlation/inverse relationship	**(3)**

Question Number	Answer	Additional guidance	Mark
8(c)(i)	1. presence of prothrombin mutation increases the risk (of heart attack)/converse ; 2. homozygous (recessive) for mutation have the { highest risk / higher risk than heterozygotes } (of heart attack) ; 3. { other blood groups / not group O } increase the risk of heart attack (for all prothrombin genotypes) ; 4. credit correct manipulation of figures ;	1. **ACCEPT** homozygous for no mutation have lowest risk (of heart attack) ; 3. ACCEPT converse	**(3)**

Question Number	Answer	Additional guidance	Mark
8(c)(ii)	1. mutation in prothrombin increases the risk of blood clotting ; 2. mutation results in an altered primary structure for prothrombin ; 3. active site of thrombin has altered shape/eq ; 4. thrombin produced has increased enzyme activity ;	Mp2 accept different order/sequence of amino acids	**(3)**